

CLINICAL REASONING IN MUSCULOSKELETAL PHYSIOTHERAPY IN PORTUGAL

by

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Abstract

Clinical reasoning refers to the process in which practitioners, interacting with their patients, structure meaning, goals, and health management strategies based on clinical data, patient/client choices, and professional judgment and knowledge” (Higgs & Jones, 2000, p. 11). Recent literature in physiotherapy and other allied health professions describes clinical reasoning as moving between cognitive and decision-making processes required to optimally diagnose and manage impairment and physical disabilities (hypothetic-deductive), and those required to understand and engage with patients’ experience of disabilities and impairments (narrative reasoning).

Clinical reasoning has been described as a universal process, common to all clinicians, in particular in the musculoskeletal area. However, clinical reasoning models emerged from research developed in specific and well-developed health care and professional cultures, such as Australia and United States, but there has been little discussion of their relevance and applicability to other cultural groups. Since research literature concerning physiotherapy in Portugal is almost non-existent, the aims of this study were twofold. The first aim was to explore clinical reasoning processes in a sample of Portuguese expert physiotherapists and secondly, to identify the current perspective of clinical reasoning held by educators and students, and how it is promoted in the undergraduate curriculum. The focus of the study was musculoskeletal physiotherapy.

The research was influenced by the interpretative/ constructivist paradigm of inquiry. The study consisted of three parts. In part one, the clinical reasoning approach of a sample of Portuguese expert therapists in musculoskeletal physiotherapy was investigated. The study focused on Portuguese clinicians interaction with their patients in order to define and manage clinical problems. Data was collected through non-participant observation, semi- structured interviews, memos and field notes, and analysed thematically to identify and compare the practice and reasoning approach used.

In part two, the generic aspects of undergraduate physiotherapy curricula in Portugal were analysed to provide a first insight of how educational programmes are organized and delivered in Portugal. Then, current musculoskeletal physiotherapy curricula in Portuguese entry-level physiotherapy programs were analysed by a questionnaire survey and

documentary analysis. The specific aim was to capture the educational process and actions underlying current educational practice across undergraduate courses.

In part three (Study 3 and 4), a sample of musculoskeletal lecturers and a sample of near graduate students were selected against criteria relating to the diversity of institutions that offer undergraduate physiotherapy courses (private versus public institutions) and length of time as a Physiotherapy education provider. Each course was examined from lecturer and student perspectives (through individual interviews and focus groups) to see what kind of clinical reasoning' approach were most emphasised in relation to physiotherapy intervention in musculoskeletal conditions. Data were transcribed and subjected to thematic analysis.

Findings showed some similar characteristics in the reasoning process of this group of Portuguese expert physiotherapists in the study when compared with other studies in the musculoskeletal physiotherapy field. However, findings also highlighted that Portuguese physiotherapists were more likely to use and value an instrumental approach to clinical practice. There was little evidence of patients sharing their perspectives about their problems or participating in clinical decisions made. An instrumental approach to reasoning and practice was also dominant in current Portuguese musculoskeletal programs as well in educators' and students' perspectives. The focus was on diagnostic and procedural strategies of reasoning with little emphasis on promoting student competences to involve patients in the decision making process. In this sense, the practice and reasoning of this sample could be seen as more instrumental than communicative.

Perspectives on clinical reasoning differ between cultures and contexts of practice and this has implications for the quality of health care education and service delivery. This research has identified the current model of clinical reasoning in Portuguese Physiotherapy practice. The findings have significant implications for clinical practice in musculoskeletal physiotherapy, curriculum development, and wider education and health service policy.

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Declaration

I declare that the research contained in this thesis, unless otherwise formally indicated within the text, is the original work of the author. The thesis has not been previously submitted to this or any other university for a degree, and does not incorporate any material already submitted for a degree.

Signed



Dated

March the 26 of 2010

CHAPTER 1

Introduction

1.1. The Research Topic

Physiotherapy practice involves the interaction between physiotherapists, patients or clients, families and care givers, in a process of assessing movement potential and in establishing agreed goals and objectives using knowledge and skills unique to physiotherapists (WCPT, 1999, p. 4). In this interactive process, physiotherapists assign a meaning to patients' problems and identify physiotherapists' activities that will ameliorate or minimise these problems (Higgs & Jones, 2000). Assisting patients to regain or improve their health requires the ability to solve or manage clinical problems in order to develop solutions appropriate to patient needs. An important aspect of problem solving is the physiotherapist's ability to make judgements or decisions. This process has been referred to as clinical reasoning, and defined as "the process in which the clinician, interacting with significant others (patient/ client, caregivers, health care team members), structures meaning, goals, and health management strategies based on clinical data, patient/client choices, and professional judgment and knowledge" (Higgs & Jones, 2000, p. 11).

Recent literature in physiotherapy and other allied health professions tends to describe clinical reasoning as a phenomenon that moves between those cognitive and decision-making processes required to optimally diagnose and manage patient presentations of impairments and physical disabilities (hypothetico-deductive) and those required to understand and engage with patients' experience of these disabilities and impairments (narrative reasoning) (Mattingly & Fleming, 1994; Edwards *et al.*, 2004a). Accordingly, and instead of a purely cognitive oriented view of clinical reasoning, this literature emphasises the collaborative nature of the reasoning process (Jensen *et al.*, 2000; Jones *et al.*, 2002; Edwards *et al.*, 2004a; Smith *et al.*, 2008) and recent models in physiotherapy and other health professions underline the need for clinicians to endeavour to understand the assumptions underlying patients' beliefs and decision-making, and to communicate their own assumptions to the patient (Edwards *et al.*, 2004a).

These models tend to describe clinical reasoning as a universal process, common to all clinicians, in particular those working in the musculoskeletal speciality area. However, the majority of these models have emerged from research developed in specific health care and professional contexts such as Australia and United States but there is still little discussion of their relevance and applicability to different cultural groups (Hagedorn, 2001). According to some authors despite the similarities in professional identity across the world, differences in health care ideologies and in the professional culture of a given country, produce differences in “what lies within the field of vision of the profession”, meaning for example, which factors are considered important in relation to health and illness (Richardson, 1999; Jorgensen, 2000).

From the health professional perspective, the identity and value system of the physiotherapy profession in Portugal appears to still be strongly influenced by a traditional biomedical view of health and illness. This view is rooted in fundamental assumptions about the conceptual relations between: normality and abnormality; specific aetiology and generic disease. These assumptions are the basis of knowledge organisation in physiotherapy, influencing educational and clinical conceptions (Pratt, 1989; Richardson, 1992; Roberts 1994; Thorquist, 1994). The influence of the traditional biomedical view of health and illness, and its underlying assumptions could have a profound impact on how physiotherapists and new graduates interpret health and illness, their role as clinicians, as well as the patient–physiotherapist relationship (Thornquist, 1994; 2001; Marcum, 2004; Edwards *et al.*, 2006). This dominant view may hinder development of an integrated conceptual framework of hypothetico-deductive and narrative thinking, with consequences for clinician inquiries, interpretations and decision making in clinical practice (Edwards *et al.*, 2006).

Since the research literature about physiotherapy in Portugal is almost non-existent, a first general aim for this study was to gain insight into physiotherapy practice and education in Portugal. Taking into account the importance of the complexity of clinical scenarios and associated problems, this research sought to describe the current practice of Portuguese expert physiotherapists and to analyse the content and process of clinical reasoning in Portugal.

Secondly, the perceptions of physiotherapy lecturers about their “vision” of clinical practice and reasoning, and how students perceived that “vision”, were explored. The curriculum physiotherapy lecturers decide to offer to their students will depend to a large extent on the views of the profession and discipline within which they work (Fraser & Bosanquet, 2006). Through professional education students and clinicians learn to give attention to selected features of the professional world and to reason about it in particular ways. In this sense the curriculum is an important tool for understanding the beliefs, values and professional perspectives concerning clinical reasoning.

This present research was influenced by the interpretative paradigm of inquiry, and used a multi-methods approach comprising; observation, individual and focus groups interviews; documentary analysis and a questionnaire survey; involving a wide range of participants in physiotherapy practice and education. The investigation consisted of three parts. First, the use of clinical reasoning by a sample of Portuguese expert therapists in musculoskeletal physiotherapy practice was investigated. The focus of the study was on how Portuguese clinicians interact with their patients in order to define and manage their clinical problems. Then, the generic aspects of the “curriculum on paper” from undergraduate courses in physiotherapy in Portugal were analysed in order to provide an initial context of how educational programmes are organised and provided in Portugal. Musculoskeletal programmes in each course were then explored in greater depth by a questionnaire survey and curricula documentary analysis to capture the educational processes and actions underlying current educational practice across undergraduate level courses in musculoskeletal physiotherapy. Finally, the current Musculoskeletal Physiotherapy curriculum in Portuguese entry-level physiotherapy programmes was analysed. The focus was on exploring the underlying assumptions of musculoskeletal physiotherapy curricula and how lecturers and students perceive them. The purpose of this analysis was to see whether the physiotherapy courses were promoting hypothetico-deductive and/ or narrative approaches to reasoning and practice in relation to musculoskeletal conditions.

The current study was therefore designed to generate new insights into clinical reasoning in physiotherapy, based upon clinical practice experiences and taking into account the several different ways a clinician “gets to know” his/her patient, as well as the clinician’s understanding of the patient’s problem and all the contextual factors that may influence the

decision making process including those that may help in the definition of the problem and the clinician's interpretation of it.

It was anticipated that the analysis of the content of Musculoskeletal Physiotherapy (MPT) undergraduate curricula would lead to a better understanding of the choice of the therapists' clinical reasoning style, particularly in novice practitioners. It was expected that the results obtained would shed light on the design of the physiotherapy curriculum that would enhance students' integration of knowledge and use of appropriate clinical reasoning during their practice. Although hypothetico-deductive and narrative clinical reasoning processes are essential to effective practice (Edwards *et al.*, 2006), it was anticipated that the clinical reasoning perspective in Portugal is more focused on diagnosis and instrumental (hypothetico-deductive) reasoning than on narrative and communicative reasoning.

1.2. Purpose of the study

The purpose of this study was to gain an insight into the current approaches to clinical reasoning and practice in Portugal by studying a group of expert musculoskeletal physiotherapists and the current perspectives held by lecturers and students in undergraduate musculoskeletal physiotherapy courses. This study particularly focused on describing the decision-making processes (hypothetic-deductive and narrative) clinicians' use in their clinical practice and how these processes are emphasised in undergraduate musculoskeletal physiotherapy programmes in Portugal.

1.3. Context and Boundaries of this Research

1.3.1. Personal Motivation for the research

At the time of this research the researcher had been a physiotherapist in Portugal for over twenty years, and had worked as a clinician, a teacher, and more recently as a researcher. The researcher had grown up professionally in an educational environment with a strong focus on the ‘right physiotherapists had to be autonomous practitioners’. The prevalent notion of autonomy appears to be confined to independence in decision-making and action, no matter how prepared the students are to take responsibility for the actions taken, or the need to demonstrate accountability for those actions in relation to patients or society.

In order to produce autonomous practitioners, students’ learning was focused on the acquisition of clinical technical competence supported by a sound knowledge base, in line with the diagnosis and disease management roles of the physician. Emphasis was placed on the technical, and rational aspects of knowledge, avoiding everything that promoted uncertainty and subjectivity. Year after year the researcher had strongly supported this approach and as a clinician and teacher had concentrated his efforts on the development of theoretical knowledge and technical skills devaluing other aspects of practice such as the lived experiences of patients. On reflection the assumption was that clinical reasoning was basically related to the ability of clinicians to recognize patients’ signs and symptoms in order to find a clinical diagnosis. Knowledge appeared to be basically a domain of clinicians’ minds with no interference from the specificities of context, the patient or the clinician.

A few years later, even without discussing the assumptions underlying his notion of autonomous practice and his role as physiotherapist, the researcher started questioning his educational practice and also his position as a teacher. In fact, and despite the growing amount of scientific knowledge and practical skills included in the curriculum, students, when observed in real clinical practice environments, often showed that they were unable to select appropriate assessment procedures, to organize patients’ findings in a purposeful way, or integrate the specificities of the person behind their clinical condition. The researcher started to be concerned about the effects of this traditional approach on teaching and learning. This model seemed to be a strong limitation on practice and on students’ learning and progress, and also for the profession itself. It favoured a superficial approach to learning

based on rote-learning. Students were taught to identify or recognize patients' signs and symptoms using long checklists of items when attempting a diagnosis. From a more professional perspective excessive emphasis on instruction alone could impede development of the independent-thinking, ethical, autonomous professionals needed in physiotherapy.

It was with these concerns in mind that the researcher decided to embark upon empirical research to look for alternative ways to improve clinical reasoning abilities in students and through this improve the status of the profession in Portugal. More than verifying the clinical reasoning process and the way it is taught in undergraduate courses the researcher was interested in exploring the decision-making processes clinicians' use in their clinical practice and how these processes are emphasised in the undergraduate musculoskeletal physiotherapy programmes in Portugal.

It was the researcher's belief that many of the above characteristics remain embedded in other physiotherapists' approaches to reasoning and practice in Portugal. These characteristics could be a strong constraint in the self-development of individual clinicians, but also for the profession whose ambition is to educate accountable and responsible professionals at both the level of practice and health care policy.

1.3.2. A Brief Overview of the Profession in Portugal

Physiotherapy is a relatively young profession in Portugal having been developed during the late 1950s. The first physiotherapy course took place at the 'Centro de Medicina de Reabilitação do Alcoitão', under the supervision of an American Physiotherapist since there were no Portuguese tutors qualified to teach such courses. In the last 50 years the profession has been striving for a structured body of knowledge and expertise, a regulatory body, a code of practice and recognition of autonomy in practice. Today, the profession in Portugal has specific legislation that regulates the nature and scope of its activities. Registration for practice is compulsory, and is the responsibility of health authorities (Department for the Human Health Resources).

Beyond government regulation, there is no self-regulation in the profession and levels of critical evaluation and specialisation are low. The Portuguese Physiotherapy Association

adopted the World Confederation for Physical Therapy's (WCPT) description of physiotherapy and its code of ethics (WCPT, 1999). Recently the WCPT's standards of practice were also translated and adopted (APF, 2005). The code of ethics and the standards of practice were established to guide practice and also to communicate the expectations of behaviour that the community can reasonably expect from physiotherapists. However, the Portuguese Physiotherapy Association does not have any legal authority to protect the physiotherapy title, advise members on issues such as ethical practice or mandatory continuing education, salaries and treatment fee structures.

The public has no direct access to physiotherapists and appointments are made by referral from a medical doctor. In some settings, such as hospitals or rehabilitation centres, the physiotherapist cannot provide curative services without a broad or detailed medical prescription. In other settings, such as community health centres, private clinics, sports clinics and domiciliary care, physiotherapists are free to choose the interventions they provide for their patients.

1.3.3. Physiotherapy education in Portugal

Formal training of physiotherapists in Portugal started in 1966, in the 'Escola de Reabilitação do Alcoitão'. In 1982, three other schools were created in Portuguese cities (Lisboa; Coimbra; Porto). These four schools remained the only schools in the country until the late 1990's, producing on average 100 new physiotherapists a year. This scenario has changed dramatically in the last decade with a striking increase in the number of Institutions delivering Physiotherapy Courses. At the present time there are 14 schools¹ providing physiotherapy courses, six of them belonging to the public sector and 8 to the private sector, graduating approximately 700 physiotherapists each year.

Currently, the physiotherapy educational scene is quite diverse and is undergoing considerable change, due to the Bologna process². There is no National Curriculum, no

¹ In Portugal there are fourteen schools responsible for the sixteen physiotherapy undergraduate programmes. The "Instituto Jean Piaget" has three physiotherapy courses in three different locations: Macedo de Caveleiros; Vila Nova de Gaia; Silves (Data related to the year of 2008).

² Since 2005 Portugal has adopted legislation aimed to adapt the Portuguese educational system to the Bologna Principles. Key developments include: introducing a three-cycle system based on learning outcomes and credit ranges, joint degrees, and recognition of prior learning, including non- formal and informal learning, and short

qualifying framework or any accreditation standards to fulfil. The general physiotherapy programme, or curriculum, falls under the authority of the State. Each programme has the flexibility to adjust the relative amount of time spent teaching each sub-area and in deciding on the pedagogical approach to delivery of the curriculum. In this scenario, undergraduate education is the responsibility of higher education institutions, authorized by the government. The role of the Portuguese Physiotherapy Association is consultatory and advisory, following the WCPT declaration about undergraduate education in physiotherapy, adopted by the 14th General Meeting of WCPT (WCPT, 1999).

Taking account of this diversity and the absence of a national framework for educational programmes in physiotherapy differences must be expected in graduates' profiles, curriculum philosophy and design, teaching, learning and assessment strategies as well in the perspectives about the role of clinical reasoning and how it should be promoted in courses and in practice.

1.4. Significance of the study

Clinical reasoning is an emergent area of interest among health professionals in Portugal. Across the health professions there is an increasing need to provide tools for clinicians, which will allow them to be able to interpret and make decisions in complex situations. The description of the forms of reasoning and approaches to clinical practice that Portuguese expert' clinicians use when interacting with their patients in health care contexts, in order to solve or manage their problems, could inform educators in designing educational programmes that can promote effectiveness and facilitate learning through practice (Schon, 1983; Kennedy, 1987; Cervero, 1988; Edwards *et al.*, 2006).

From a more professional perspective, clinical reasoning is referred to as an important contribution to professional development, as it can help to identify several aspects that underlie the physiotherapist's clinical practice. One of the key traits of a profession's autonomy, implies that the profession has a defined body of knowledge and has expertise in that domain (Rothstein & Echternach, 1986). In this sense, clinical reasoning provides the

first cycle vocational qualifications. Following this legislation, an extensive national process was initiated to verify the adequacy of degree programmes with respect to the Bologna Process. This process should be concluded by 2010 (Eurydice, 2007).

means for knowledge use in clinical practice, as well as for knowledge generation (Higgs & Titchen, 2000). From the clinical perspective, expertise develops in part through clinical reasoning, and seems to be essential in improving clinical effectiveness and also contributes to professional autonomy.

From the clinical practice point of view, many new challenges have been posed for physiotherapists. Changes in the political and social contexts, as well as in the concepts of Health; changes in customs, behaviour and life style of populations are examples of the factors that have been responsible for the establishment of new demands on clinical practice in physiotherapy. Nowadays, efficacy and efficiency, productivity and professionalism are demanded and this is implicit through the increase in pressure on health care professionals in order to lead them to reduce costs and treatment time whilst maintaining high quality standards. According to the evidence provided in the last four decades, clinical reasoning seems to be an intrinsic factor that may help in the improvement of physiotherapists' clinical practice. In this sense, it was hoped that this investigation would have some important recommendations to make for the practice of physiotherapists in Portugal.

Worldwide, the needs and expectations of patients are increasing. Patients are better informed about their problems and also about the effectiveness of possible interventions. In their clinical practice, physiotherapists try to implement new and more adequate models of practice by cooperating with their patients, taking their goals into consideration, negotiating, explaining their programmes of treatment, giving alternatives and gaining consent (Gwee, 2003).

Accordingly, the standards of education attained by students will dictate the way they will deal with the knowledge, skills and attitudes required in order to turn them into competent physiotherapists who know how to face the new challenges already discussed (Gwee, 2003). Educationally speaking, it is necessary to provide an answer to these new challenges by adopting learning strategies compatible with the ability to reflect upon practice and to improve the students' ability to manage change responsibly. Knowing more about how physiotherapists approach clinical practice could help in understanding how to structure and guide the professional learning of novice clinicians entering the field of musculoskeletal physiotherapy.

1.5. Clarification of Terms

As the focus of this investigation was centred on the expert, clinical reasoning, and musculoskeletal physiotherapy, it is useful to define these terms.

1.5.1. Clinical Reasoning

In the literature, several terms are commonly used to describe the process by which decisions are made in the delivery of patient care (Thompson, 1999). The main terms used include: clinical reasoning; clinical/ medical problem solving; clinical judgement; diagnostic reasoning and clinical decision-making, and the terms are often used interchangeably. The above results in part from the different contributions of several disciplines interested in describing this process (medicine; nursing, occupational therapy; physiotherapy) but complicate the process of comparing the literature in the field because authors and researchers from various disciplines have used the terminology somewhat differently.

The term clinical reasoning was firstly introduced in medicine to describe “the cognitive process that is necessary to evaluate and manage a patient’s medical problem” (Barrows & Tamblyn, 1980, p. 19). The term encompasses all the cognitive skills implied in patient evaluation and management. Other terms such as medical inquiry or clinical judgment focus on specific parts of this process: Medical inquiry focuses on the data gathering or evaluative aspect of this process; Clinical judgment, or medical decision making, focuses on the decision making component of the clinical reasoning process (Barrows & Tamblyn, 1980).

In Occupational Therapy, the term “clinical reasoning” has been used to describe the process that culminates in a clinical image, which represents “a balanced view of occupational status” by reflecting both assets and deficits (Rogers & Holm, 1991, p. 1045). This process involves a progression from problem sensing to problem definition and problem resolution. Occupational therapists also used the term to refer to the process of structuring meaning. To understand the meaning of a situation means to make sense of the experience. Clinical reasoning from this perspective can be defined partly as the process of making a new or revised interpretation of the meaning of illness or disability for each patient seen (Chapparo & Ranka, 2000). In the nursing literature the terms “judgment” and clinical decision

making” are commonly used. Dowie (1993, p. 8) defines judgment as the “assessment of alternatives”, and decisions as “choosing between alternatives”. Although clinical judgment and decisions can be separated, in health care practice, they are interlinked, and therefore often discussed as a single entity. The expression employed in this investigation is clinical reasoning. It was selected as it is the most commonly used expression in physiotherapy globally. The definition of clinical reasoning is broad in order to capture and encompasses the other terms. For the purpose of this investigation, clinical reasoning refers to “the process in which the clinician interacts with significant others (patients/clients, caregivers; health care team members), structured meaning, goals and health management strategies based on clinical data, patient/client choices, and professional judgment and knowledge (Higgs & Jone, 2000, p. 11).

1.5.2. Expert

The definition of an expert is neither straightforward nor consensual. Dellito (1998) has defined an "expert" as a person who is very skilled or highly trained and informed in his/her field. Jones (1994) stated that the experts in the profession (physiotherapy) are such, not simply on the basis of years of experience or superior handling skills, but because they have highly developed knowledge bases acquired through advanced clinical reasoning where critical thinking has allowed them to formulate a larger repertoire of clinical patterns which they can recognise.

In the physiotherapy literature, researchers have been using the terms, “expert” (Payton, 1985; Thomas-Edding, 1987; Embrey *et al.*, 1996; Rivett & Higgs, 1997; King & Bithell, 1998; Doody & MacAter, 2002; Edwards *et al.*, 2004a), “experienced” clinician (Jensen *et al.* 1990; Ajjawi & Higgs, 2008; Smith *et al.*, 2008) and “master clinician” (Jensen *et al.*, 1992). The criteria used to establish its definition have produced a balance between the concepts of performance and individual skills. Considering the research literature in physiotherapy’ clinical reasoning, three main criteria for selection purposes have been used: the number of years of experience in the field; recognition by peers, or by professional bodies and academic and/ or professional qualification in a specific field. Considering the above criteria, and having analyzed it in terms of adequacy, as far as the Portuguese context is concerned, the term "expert" is used in this document, to refer to any domain specialists working within the field of musculoskeletal conditions; having at least 10 years of experience in the management

of musculoskeletal conditions; Post-graduate education in areas related to the management of musculoskeletal problems; Involvement in postgraduate and/or undergraduate training in the area of musculoskeletal physiotherapy as a lecturer or clinical supervisor.

1.5.3. Musculoskeletal Physiotherapy

Musculoskeletal Physiotherapy is the term used in this research to describe the field of physiotherapy, which relates to disorders of the musculoskeletal system. Musculoskeletal conditions comprise over 150 diseases and syndromes, which are usually progressive and associated with pain. They can broadly be categorized as joint diseases, physical disability, spinal disorders, and conditions resulting from trauma. Those conditions with the greatest impact on society include rheumatoid arthritis, osteoarthritis, osteoporosis, low back pain, and limb trauma. The term unspecified musculoskeletal problem is a non-diagnostic label, which includes all pain conditions in the musculoskeletal system (European Commission's Directorate for public health and risk assessment, 2009).

Musculoskeletal Physiotherapy is defined as a specialized area of physiotherapy for the examination, treatment and management of people with neuromusculoskeletal problems, based on clinical reasoning, using highly specific treatment approaches including manual techniques and therapeutic exercises (IFOMT, 2004; MACP, 2007; MPA, 2007). The term encompasses all the assessment and treatment modalities related to musculoskeletal conditions. It could include, mobilization/ manipulation, manual traction, massage, therapeutic exercises, patient education, or other specific modalities or procedures.

Musculoskeletal physiotherapy is one of the core areas of knowledge and practice within undergraduate physiotherapy courses. It can appear together in a defined area of academic study (discipline) or be dispersed throughout one or more course units. In this investigation, MPT course has been defined as a planned sequence of study, made up of subjects or units. The term subject tends to be used in two ways, to mean an area of study (e.g. musculoskeletal physiotherapy), or an element of study in that area. A unit (usually a 'semester unit' or a module) is a combination of classes, reading, study, writing etc, which students have to pass.

1.6. Outline of the Chapters

The thesis consists of eleven major parts, which present the context and culture of physiotherapy practice and education in Portugal and the influences on the way Portuguese clinicians interact with their patients in order to define and manage their clinical problems. Musculoskeletal Physiotherapy has been chosen as a focus for this work since this is a common area of physiotherapy practice in Portugal and other parts of the world and as such is a useful reference point from which to discuss clinical reasoning.

This chapter introduces the investigation and provides an overview of the research and the background in which it is set. It describes the reasons for the study, its significance and delineates its purpose. Terms and concepts used throughout the thesis are explained.

Chapters two to four present the theoretical framework informing this research. Chapter two offers an overview of the contextual factors, concerning the practice environment of Portuguese musculoskeletal physiotherapists. The first section of the chapter presents a brief portrait of Portugal including its geographical position and the major changes that have occurred, in particular, since the country joined the European Community at economic and cultural levels. The Health system, its services and resources, and the principles, laws and regulation are discussed in detail as they form specific conditions for the work of physiotherapists. Finally a portrait of the educational context and current physiotherapy professional education is provided.

Chapter three covers the topic of clinical reasoning. It reviews the theoretical and empirical literature related to clinical reasoning in order to analyse the main concepts fundamental to the study. The review covers what is currently understood in clinical reasoning models in musculoskeletal physiotherapy practice globally, and the factors influencing clinical reasoning. This analysis is presented considering the evolution of clinical reasoning across the world and the potential influences of context on the models of clinical reasoning.

Chapter four addresses in more detail the characteristics of the educational context. It presents a framework for curriculum analysis exploring in particular the links between educational theory and clinical practice. Since the education of physiotherapists in Portugal is

basically related to entry-level education this will be the main area of analysis. The dominant professional paradigm and its influences on the education and practice of Portuguese physiotherapists is discussed to provide a better understanding of the present culture of physiotherapy and its potential influences on the clinical reasoning model.

Chapter five presents, the philosophical framework underpinning the research approach along with a detailed presentation and critique of the methodology adopted. The rationale for employing both qualitative and quantitative measures to investigate how Portuguese physiotherapists conceive clinical reasoning is provided. The context in which this study was conducted is described and the ethical issues involved in this research are considered. The methods used in the study are outlined, including the techniques used to enhance trustworthiness, credibility and dependability of the data.

Chapters six to nine present the research findings of this study. In chapter six the clinical practice and reasoning of a sample of Portuguese expert musculoskeletal physiotherapists is presented. Chapter seven presents the results of the documentary analysis of the curricula of the fourteen accredited undergraduate physiotherapy courses in Portugal with the purpose of providing the reader with a first contextual glance at educational programmes are organized and delivered in Portugal and how musculoskeletal physiotherapy is taught. It also reports the findings of a survey questionnaire to determine the current curricula content of courses in musculoskeletal physiotherapy, in Portuguese entry-level physiotherapy programmes. Chapters eight and nine present the findings from lecturer and student interviews. Undergraduate courses were scrutinised from both student and faculty staff perspectives to see how clinical reasoning is conceived, taught and learned relative to physiotherapy interventions for musculoskeletal conditions.

Chapter ten presents an integrative summary of results, discusses the findings in relation to the research questions developed and addresses the limitations and implications of the study. Finally chapter eleven summarises key findings and highlights the study's contribution to knowledge and presents implications and applications for practice development, education, policy and practice and further research.

CHAPTER 2

An Overview of the Physiotherapy Practice in Portugal

The context in which health care professionals operate contains a number of elements, which have an important influence on the way they reason and practice. Environmental factors, such as the health care environment, health care setting, the nature of patients' clinical problems or the personal context of individual patients, as well as the personal and professional frameworks of clinicians, play an important role in the process of clinical reasoning (Higgs & Jones, 2000). Environmental factors may vary according to the characteristics of a specific population, their culture, socio-economic status, or health care system. The professional and personal framework of clinicians and the context of professionalism are also important features in the way clinicians perform their roles and tasks. An understanding of these factors and how they may influence patients' and clinicians' beliefs, values, expectations and perceptions and needs concerning clinical problems is fundamental to understanding physiotherapy practice and education, and the context of clinical reasoning amongst Portuguese physiotherapists.

This chapter provides an overview of contextual factors concerning the practice environment of physiotherapists. It also describes the present status and the main characteristics of physiotherapy education in Portugal. Section 2.1 describes a brief portrait of Portugal, including its geographic position and the major changes that have occurred, in particular since the country joined the European Community, at economic, educational and cultural levels. The health care system, its services and resources, and the principles, laws and regulations, are addressed in detail, as they form specific conditions for the work of physiotherapists. Information about the Portuguese tertiary education system including statistical data, legislation and installed capacity is also provided.

Section 2.2 provides an overview of the physiotherapy service in Portugal. In the first part of this section a brief summary of the history of the profession in Portugal, including its present status, governance and regulation, is given. In the second part, the number, geographical location and distribution of physiotherapy programmes in Portugal, as well as the different elements that give access to the practice of Physiotherapy, are reviewed. Finally, a discussion

about the current position of the physiotherapy profession in Portugal is included with reference to the international context.

Due to the limited information concerning the Portuguese culture, especially as far as physiotherapy issues are concerned, some of the information presented in this chapter is anecdotal, based on the researcher's personal observations and educational/ clinical experiences.

2.1. The Portuguese Context

Portugal is a small country situated in the South East of Europe, in the Iberian Peninsula, covering an area of about 92, 400 square kilometres. The country is formed of three territorial areas: mainland (88,889 km²), the archipelagos of the Azores (2,355 km²; nine islands), and Madeira (741 km²; two main islands). To the north and east of the mainland is Spain; to the south and west is the Atlantic Ocean. Its main cities are Lisbon, Oporto and Coimbra. The official language is Portuguese but English is widely understood in the higher socio-economic groups, and is now a compulsory subject at secondary school level.

Thirty years ago, social indicators (eg. mean life expectancy; infant mortality; women's average age at first birth; higher education enrolments) showed that Portugal had fallen behind in comparison with Europe, and was in many respects still a developing country. At that time, there was a sharp contrast between traditional Portuguese culture, which had contributed so much to Western civilisation; the intellectual elite that embodied it and the poverty of a population reduced to emigration. Many explanations are suggested for this, but one of the most striking was not only that a large number of Portuguese worked abroad, but that the energies of the elite were previously focused more overseas than on their home country (Barreto, 2002).

By the 1960s, economic expansion had begun. In the 1970s the country underwent major changes with the revolution of 1974 and the fall of dictatorship, independence of colonies and return of expatriates. In 1986, Portugal joined the European Economic Community (now European Union-EU). This triggered radical transformations in Portuguese society at all levels, cultural, economic and socio- demographic (Organisation for Economic Co-operation

and Development-OECD, 1998a). Economic policy shifted from protectionism to open free markets, which makes Portugal one of the most open economies in the world today (Barreto, 2002). In the past the two pillars of the Portuguese economy were crafts and agriculture. In the 1970s, the majority of people worked in primary sector-agriculture (43.6%). In 2004, the active population worked primarily in tertiary sector-services (56.8%). There were 31.2% of people working in the secondary sector (industry), and less than 12% in the primary sector (Statistical Yearbook of Portugal-2004, 2005). Another dynamic can be found also in education. In 1960, 40% of the population were not literate. Today this number has reduced to about 8%. Previously the number of students enrolled in secondary schools was 1, 147, 200. In 1994 this number had risen to 2, 307, 000. In higher education the numbers increased from 24,000 (1960) to 314,000 in 1995 (OECD, 1998b). In fact, expansion of participation in tertiary-level study in Portugal is, among the Organisation for Economic Co-operation and Development countries, the most rapid and dramatic. In the decade to 1995 overall enrolment increased by a factor of three. No other OECD country for which comparable data are available has experienced such rapid growth (OECD, 1998b).

With the implementation of a democratic regime, new responsibilities arose. The culture of passivity and resignation gave way to opportunities to participate actively in providing solutions to the problems that have arisen in society. Several mechanisms and institutions emerged to give voice to these new opportunities. Citizens were invited to actively participate in politics, education, and health systems, etc and public institutions, such as schools, universities, and hospitals, developed systems to promote citizen participation.

For people who visited Portugal over this period the economic and social transformations were striking, so much so that there might have been some concerns as to whether the process of change was always “under control” (OECD, 1998a). One example of this, sometimes chaotic change, was the government’s inability to respond dramatically and rapidly to a growing demand for tertiary education when new places could not be provided in public institutions (Tertiary Education in Portugal, 2006). Although the public sector progressively expanded to meet society’s increased demand, private sector education has, over the past ten years, absorbed somewhat more than a third of the growth. An example of this dramatic expansion is physiotherapy education. In 1994, there were 4 schools of physiotherapy and

about 100 enrolled students. Currently there are 14 schools with approximately 700 new students every year.

For many economists and sociologists, the accomplishments to date are impressive, but new challenges have now emerged. Portugal has the lowest per capita income in the Euro area and until the recent enlargement it also had the lowest in the EU. In 2007, the Portuguese gross domestic product (gdp) was 167, 119 million € (OECD, 2009³), and the *per capita* gross national product (gnp) was 15,373 € (Statistical Yearbook of Portugal- 2007, 2008). Despite the expansion in participation, secondary school students fall below the average in international comparisons of achievements in mathematics and science. Concern about literacy is also raised in many discussions between politicians, sociologists and educators. In tertiary education the attrition rate is alarmingly high. In 2001, 40% of University students and 42% of Polytechnic students dropped out of their studies (OECD, 1998b). Demographic problems have also arisen, with the increasing percentage of elderly and low levels in the birth ratio. This will have a major impact in health services, social care and the country's economics in the near future. Another reported concern is the low level of population engagement in the problems of Portuguese society. Despite all the mechanisms and institutions that promote active participation of Portuguese citizens, the levels of participation are extremely low. For example, participation of parents in school activities and initiatives is modest and the influence of stakeholders on universities and polytechnics is minimal (Barreto, 2002).

2.1.1. Demographic data

According to the last major demographic survey (Census, 2001), Portugal has a population of 10,356,117 million inhabitants. Of these, 5,000,141 are male and 5,355,976 female. These numbers were recently updated to 10,617,600 inhabitants (5,138,800 males; 5,478,800 females) (Carrilho, 2008). In the last five decades, major demographic changes have occurred. In 1950, Portugal had the youngest population in Europe, and in 1960, the birth ratio was the biggest in Europe (2,4 newborns per every 100 inhabitants). In 2003, the Portuguese population was one of the oldest in Europe, especially due to a low birth ratio. The birth ratio is now one of the smallest in Europe (1.1%). The percentage of younger

³ Source: OECD (2009)- consulted in <http://stats.oecd.org/WBOS/index.aspx> on 22/02/09.

people (less than 15 years old-15.8%) is below the European Union average (16,5%). In 2000, there were 102.2 elderly (65 or more years) to 100 young men (aged from 0 to 14 years). In 2007 this tendency increased to 113.6 (Statistical Yearbook of Portugal- 2007-2008). This long period of consistently declining birth rates associated with increasing life expectancy has resulted in an ageing population and has had a negative effect on the size of student enrolment (Tertiary Education in Portugal, 2006).

A traditionally emigrant country has now become an immigrant country. Between 1960 and 1973, more than half a million people left the country to work in Europe, Canada, United States, South Africa, and in several other countries across Latin America. After the eighties this process started to reverse, and in 2000, the foreign population living in Portugal was about 2% of the total population. In less than 7 years this number increased to 4%, especially due to immigration from eastern European countries. Compared to 2006, in 2007, the foreign population living in Portugal increased by 3.6%, with several different contributions from Eastern European countries (38%), Cape Vert (5%), Brazil (close to 15%) and others (38%) (Serviços de Estrangeiros e Fronteiras, 2007).

Women's role in Portuguese society has also changed dramatically. In 1960, only 20% of women had a professional life. In three or four decades this number has increased to 50%. Now, women are in the majority in the university system (56%), have the major successes (65% of the diplomas obtained belong to women), and are also the majority in many professions, especially in education and health. In four decades, a society deeply patriarchal and masculine was turned to a more balanced society in terms of gender (Barreto, 2002).

The next section outlines the health care system, its services and the dominant health care model in Portugal. An appreciation of these factors will facilitate an understanding of how Portuguese culture and the strong influence of the medical paradigm interplay together to influence the practice and reasoning of Portuguese physiotherapists.

2.1.2. The Portuguese Health System

The current system providing health care and insurance in Portugal was established in the second half of the 1970s, (Decreto Lei nº 56/79 de 29 de Março) after the democratic

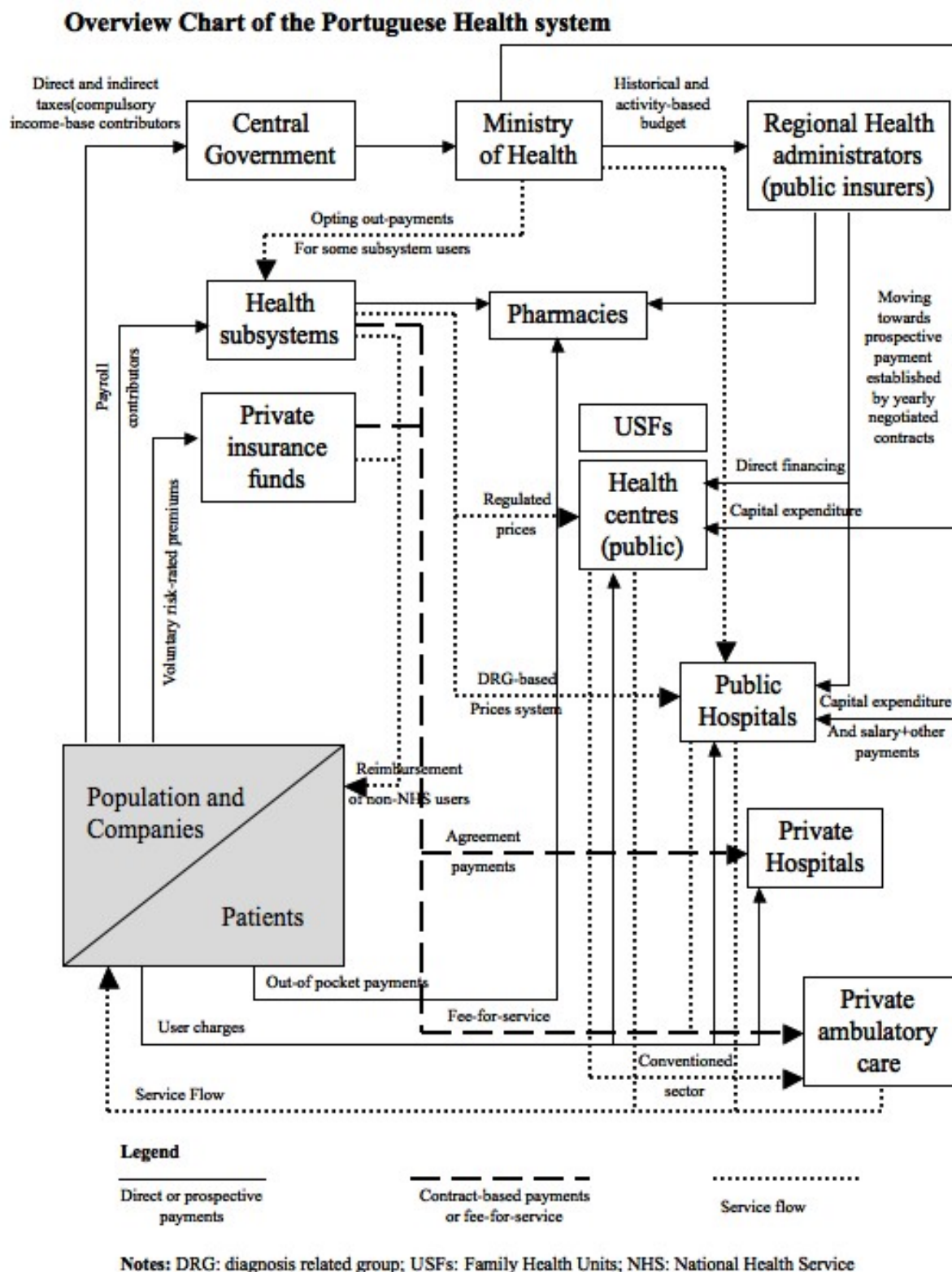
revolution, as a response to very low health care coverage and poor health status of the population⁴. The Portuguese health care system (NHS) was put in place in the late 1970s as a public-integrated model. It comprises a number of organisations and services whose aim is to provide the entire population with global and integrated health care services. These include health promotion and protection, disease prevention and diagnosis and the treatment of the sick, as well as their medical and social rehabilitation. This legislation makes provision for the existence of authorities whose role is to ensure the rational distribution, technical hierarchical organisation and overall functioning of health care services. They are also expected to promote effective integration between services. These authorities function at central, regional and local level and may have consultative, instrumental or executive roles.

In Portugal, decisions related to health care policy are taken by the Minister of Health. Responsibility for functioning, organisation and management of the National Health Service (NHS), to which the whole population have access, lies with the Ministry's central and regional authorities (Figure 2.1, p. 35).

Since the mid-1990s, health reforms have been introduced gradually and the health system has been moving towards a public-contract model, with the private sector being given an increasing role. Providers to the NHS are organised into three networks: primary health care centres, hospitals and long-term care units. Nowadays, various sub-systems, both public and private, and encompassing a number of different sectors coexist, either autonomously or on the basis of an agreement, with the health care services provided by the NHS. Private hospital structures exist alongside these sub-systems. They may be profit-making organisations, or they may develop an effective social support within the community (eg. catholic institutions).

⁴ In the early 1970s, only 40 per cent of the population was covered by insurance for health care (the lowest share in Europe) and indicators of health status were far behind other European countries (for instance infant mortality, above 50 per 1 000, was twice the European average) (Barreto, 2002).

Figure 2.1. The Portuguese health care system. Adapted from “Portugal: Health system review. Health Systems in Transition, by P. Barros & J. Simões, 2007; 9 (5), 1-140.



2.1.2.1. Health Care Services

Providers to the NHS are organised into three networks: primary health care centres, hospitals and long-term care units. Primary health care services offer a wide range of services. They are responsible for health promotion and protection as well as prevention, diagnosis and the treatment of disease. These services include public services, such as community health care centres, private organisations, profitable and non-profitable, and also professional associations (National Health Plan 2004-10, 2004). In 2004, there were 377 community health centres across the country (Statistical Yearbook of Portugal- 2007, 2008).

Hospitals are institutions providing specialised health care services. The objective underlying the organisation and administration of hospitals is the provision of medical, curative and rehabilitative care to the population. They are thus equipped with the means to accommodate patients and to provide appropriate diagnosis and therapy. It is also their responsibility to make a contribution in the fields of disease prevention, teaching and scientific research. In 2004, there were 200 hospitals under the supervision of the NHS (Statistical Yearbook of Portugal- 2007, 2008).

Long-term care units were established in 2003. This service involves any public, social, and private entities able to provide health care services aimed at promoting, restoring and maintaining, the quality of life and well-being of any citizen, in particular those suffering from chronic diseases, or having a terminal condition. This service was also established to facilitate the relationship with hospitals and primary health care services.

2.1.2.2. Health Care Staff

In 2004, the Portuguese health authorities estimated that the total number of physicians working in the NHS was 24,830. There were also 35,678 nurses and 7,319 Allied Health Professionals (Portugal Saúde, 2003). In a more recent report, which considers the total number of health professionals in Portugal (public and private), the numbers presented showed a ratio of 3.6 doctors and 5.1 nurses per 1,000 inhabitants (Statistical Yearbook of Portugal- 2007, 2008). Specific information about the number of physiotherapists in the NHS is difficult to establish with accuracy because physiotherapists are included in the 'Diagnostic and Therapeutic Technicians' category, with another 18 professions, (e.g. radiologists,

occupational and speech therapists, etc), and the numbers provided usually represent the whole of these professionals. However, according to the information provided by Department of Human Resources for Health there were 4,747 physiotherapists registered by the end of 2006, corresponding to a ratio of one physiotherapist per 2,236 inhabitants (Recursos Humanos da Saúde, 2008).

Nowadays, a qualifying degree is compulsory to carry out activities concerned with direct patient care. Medical Doctors, Dentists, Pharmacists and those in the Allied Health Professions, must all possess a university or a polytechnic degree in their own specific subject area.

2.1.2.3. Performance of the Portuguese Health Care System

As far as health is concerned, the situation in Portugal has undergone steady improvement. Life expectancy has risen consistently. Between 1980 and 2007 the values rose from 68.9 years for men and 76.6 for women to 75.2 and 81.6 years respectively (Statistical Yearbook of Portugal- 2007, 2008). Since 1970, infant mortality has decreased 90%, from 2.4 % to 0.38% (Barreto, 2002). In 2006, the infant mortality rate was 3.3 deaths per 1,000 live births (Statistical Yearbook of Portugal- 2007 2008). Another example is birth assistance, in 1960, only 15% of the newborns had medical assistance and now this number has risen to 99.9% (Barreto, 2002).

In 2006, circulatory system diseases constituted the main cause of death amongst adults (32.2%) followed by malignant tumours (21.7 %). Although these were the main causes of death, the corresponding mortality rates followed a downward trend: circulatory system diseases reached a trough in 2006, i.e. 3.1 deaths per 1,000 inhabitants, while malignant tumours declined to 2.1 deaths per every 1,000 inhabitants (Statistical Yearbook of Portugal- 2007, 2008).

According to the results of the 4th National Health Survey 2005/2006, 53.4% of the population residing in Portugal considered their health condition as very good or good (Statistical Yearbook of Portugal- 2007, 2008). In general terms, men's views on their health condition were more favourable than women's. According to the same survey, the most

frequent chronic disease was high blood pressure, reported by 19.8% of residents in Portugal, while rheumatic diseases and chronic pain were featured by approximately 16% of residents. Asthma, affecting 5.5% of the total resident population, was the most frequently mentioned problem (4.9%) within the youth population group (aged less than 15) (Statistical Yearbook of Portugal- 2007, 2008).

2.1.2.4. Perceived Quality of the Health Care Services among the Portuguese Population

Information available seems to provide a contradictory view of the health system and its services. On one hand progress have been made in the last three decades, concerning in particular, public hospitals and primary health care centres. Considering the level of socio-economic development, in a recent study developed by the World Health Organisation (WHO), the Portuguese health system was ranked twelfth among 191 countries (WHO, 2000). The report examined those countries in general health areas such as general level of health in the population, distribution of the health services across inhabitants, the general capacity of the health care services to provide effective answers to health problems and the kind of answers considering the economic level of a given person, and finally the costs of the health care system among the citizens. This was in contrast with patient/ client satisfaction concerning health care services. In the late 1990s, the Portuguese population was the most dissatisfied in Europe with its health care system (Eurostat, 2002). This dissatisfaction was largely related to waiting times, reception service and lack of equipment. Recent national surveys suggest that the degree of satisfaction has improved only moderately (Instituto da Qualidade em Saúde, 2004).

2.1.2.5. The concepts of Health and Illness among the Portuguese population

Conceptions of health and illness may vary according to a specific culture. The norms and values of the specific culture often dictate whether a person is ill or healthy. Information concerning the attitudes and behaviours of the Portuguese population towards health is very limited, but the results of a recent study exploring attitudes towards health and the representation of the healthcare services in the Portuguese population suggest that there is a contradictory position between what people know and think and what people really do (e.g. the Portuguese population seem to have good knowledge about the role of healthy life styles

in protecting their health. However, this contrasts with the lack of adoption of preventive behaviours, such as, exercise or good nutritional habits).

To the Portuguese, being healthy is associated with the absence of disease. A healthy person is someone who does not need health care services or medication. A healthy body is also related to longevity. Longevity is considered a matter of familial heritage, meaning the notion of possessing a strong body (Gonçalves & Domingues, 2004). In contrast, the illness condition is associated with sadness and isolation. In this situation there is a perception of limited function of medical doctors and healthcare services, and an emphasis on the role of the family (Gonçalves & Domingues, 2004).

2.1.2.6. Perceiving responsibility for individual's health

Taking responsibility for one's health reflects the concept of empowerment. Observation suggests that Portuguese people are quite passive in taking responsibility for their own health. In a recent study concerning attitudes of the Portuguese towards health and health management, the sample demonstrated a total dependence on the medical doctor in the management of their health. For the Portuguese population the medical doctor has a curative and prescriptive role and in the presence of their medical doctor, Portuguese patients believe that is important to tell the doctor everything about their symptoms and complaints in order to help the physician find an accurate diagnosis (Gonçalves & Domingues, 2004).

In general the Portuguese believe that their health status is largely dependent on external factors, meaning factors outside the individual's control or management. In the presence of an illness condition, the mystic and sacred, are common references, in order to justify and explain the health problem (Gonçalves & Domingues, 2004). The importance of preventive care, rest and the practice of relaxation are emphasised as key factors into promoting and protecting health. However, Portuguese people often assume a complete disregard for healthy life styles or the importance of good nutrition. Despite good knowledge of the causes of diseases, and the belief that every person needs a good reason for utilizing health services, Portuguese abuse of the emergency services is very high and a large percentage of emergency calls are inappropriate (Gonçalves & Domingues, 2004). Health indicators also show that self-medication is a common practice (Gonçalves & Domingues, 2004), and the large

majority of Portuguese (73%) do not exercise (Health Statistics, 2005). This seems to be highly dependent on age and socio-economic status. Individuals with a higher socio-economic status have better educational and cultural backgrounds, and are more able to understand their role in the protection and promotion of health and fulfil this role. Younger generations tend to be better informed and new healthy habits are being introduced progressively (Health Statistics, 2005).

2.1.3. The Portuguese Educational System

The Basic Law on the Education System⁵ dated 14 October 1986 and amended in September 1997, establishes general rules governing all levels and types of education. The law sets out its aims and scope, the conditions for admission to higher education as well as the types of institutions involved.

In higher education, the law established a binary system composed of two different sub-systems: the Polytechnic and the University. The Polytechnic has courses of three years duration and delivers degrees of Baccalaureate. In some courses, such as physiotherapy, students can complete another year and obtain a different degree, named 'Licenciatura'⁶. Universities have courses of four years duration and deliver the degree of 'Licenciatura'. Universities can also offer two other degrees: A masters degree, usually of two years duration and the PhD, of approximately 4 years duration. In some situations, the PhD degree can be undertaken following a 'Licenciatura' (Figure 2.2, p. 41).

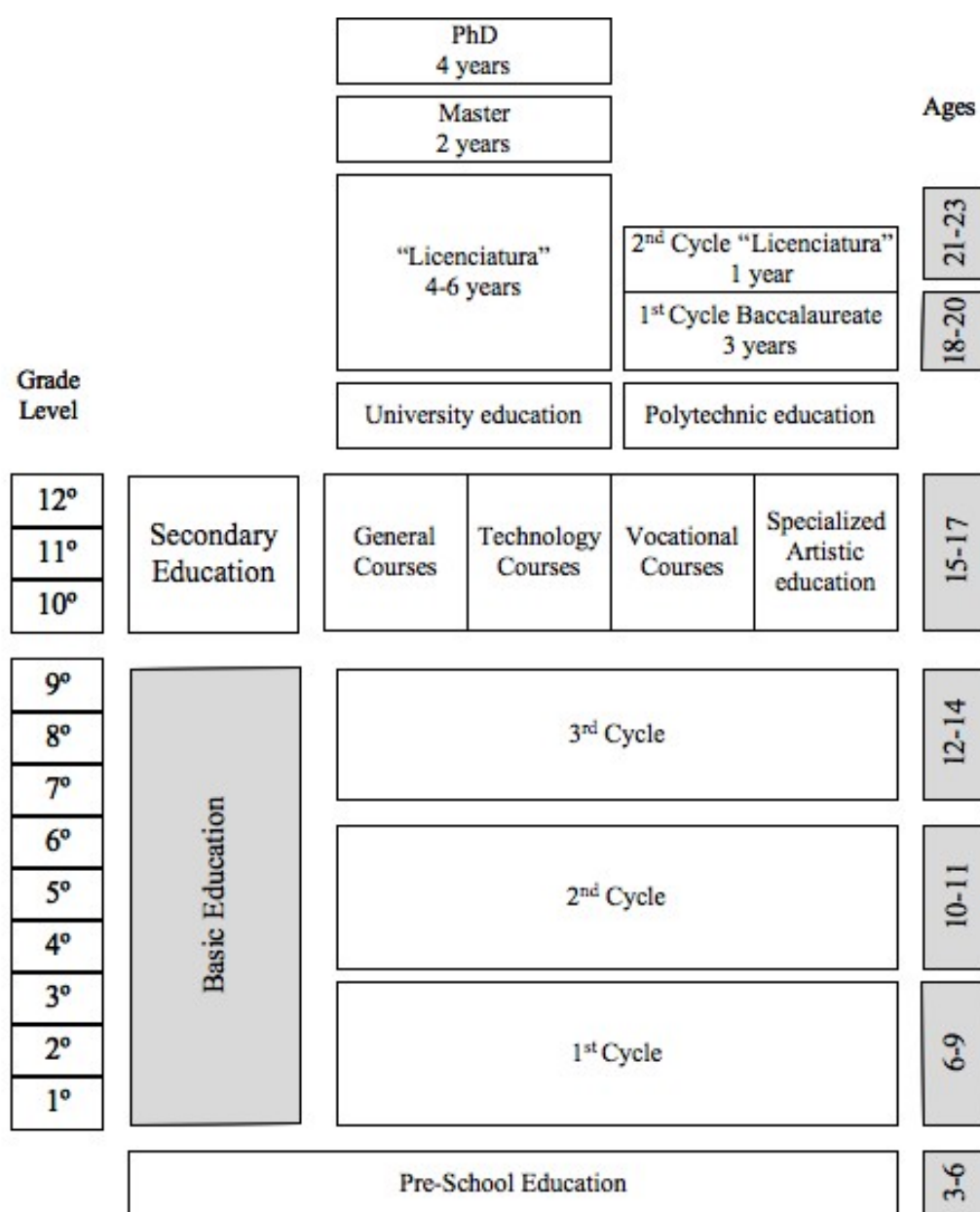
Until 2002 the Ministry of Education had overall responsibility for education at all levels (preschool education, basic education, upper secondary education and higher education). Since then, two different ministries have shared this responsibility: while the Ministry of Education is responsible for all pre-higher education levels, the Ministry for Science, Technology and Higher Education is responsible for higher education and research. Educational reforms are generally based on government initiatives resulting in decree-laws, or leading to laws to be passed by Parliament, including a systematic consultation process

⁵ The Portuguese General law relate to the whole educational system. All educational policies and procedures relate with this law (Decreto Lei 46/86 de 14 de Outubro).

⁶ The nomenclature changed recently due to the Bologna Process. The term Baccalaureate became extinct and the first higher education grade is now the 'Licenciatura'.

involving all major stakeholders. In general all proposals for new legislation are discussed by the National Higher Education Evaluation Council (CNAVES), and require consultation with the appropriate relevant bodies (institutions representing universities and polytechnic institutes).

Figure 2.2. Diagrammatic representation of the Portuguese education system, as of January 2006, before the implementation of the Bologna Process. Adapted from “Tertiary Education in Portugal. Background Report”, prepared to support the international assessment of the Portuguese system of tertiary education. A working document: Version 1.1. Ministry of Science, Technology and Higher Education, 2006.



2.1.3.1. The Higher Education Network

Higher education in Portugal is provided through a diversified arrangement of institutions (Table 2.1), including 27 universities, 40 university schools (not integrated) 17 polytechnic institutes and 76 polytechnic schools (not integrated), with a total of 160 units. This includes 14 Public universities, 6 of them organised in terms of 48 independent schools (i.e., ‘faculdades’).

Table 2.1. Number of university and polytechnic institutions, 2006. Note:* A total of 6 of these 14 universities are organized in terms of schools, including 48 independent units (‘Faculdades’, or schools). Adapted from “Tertiary Education in Portugal. Background Report” prepared to support the international assessment of the Portuguese system of tertiary education. A working document: Version 1.1. Ministry of Science, Technology and Higher Education, 2006.

	University		Polytechnic	
	Universities	Other schools (not integrated)	Polytechnic Institutes	Other schools (not integrated)
Public	14*	5	15	16
Private	13	35	2	60
Total	27	40	17	76

The system includes 15 Public Polytechnic Institutions and 2 Private Polytechnic Institutions, but Table 2.2 quantifies the network of polytechnic schools, including those integrated in universities and in polytechnic institutions, with an overall number of 173 schools.

Table 2.2. Number of polytechnic schools- 2006. Adapted from “Tertiary Education in Portugal. Background Report” prepared to support the international assessment of the Portuguese system of tertiary education. A working document: Version 1.1. Ministry of Science, Technology and Higher Education, 2006.

	Polytechnic schools integrated in Polytechnic Institutes	Polytechnic schools integrated in Universities	Other Polytechnic schools (not integrated)	Total
Public	75	15	16	106
Private	4	3	60	67
Total	79	18	76	173

2.1.3.2. Number of Students Enrolled

The 1990's were characterized by doubling the number of students' enrolled, in a way that exhibits an uneven distribution throughout the system. Enrolment in public universities increased by 62%, while enrolment in public polytechnics increased by 225% and enrolments in the private sector increased by 122%. This expansion started to slow down after the mid 1990s and in 1997 it had become negative, a trend that has not changed today. Table 2.3 shows the number of new entrants, total students and new graduates for 2001 to 2005 in public and private institutions. This period corresponds to a period of slightly declining and/or relative stagnation in the growth of students after a period of more than 30 years of consecutive growth.

Table 2.3. New entrants per type of system (public vs private). Adapted from "Tertiary Education in Portugal. Background Report" prepared to support the international assessment of the Portuguese system of tertiary education. A working document: Version 1.1. Ministry of Science, Technology and Higher Education, 2006.

System	New entrants: 1 st year; 1 st intake				
	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006
Public	65.921	67.640	64.801	63.365	63.700
Private	26.915	26.806	24.468	20.998	18.990
Total	92.836	94.446	89.269	84.363	82.690

The decreasing number of young people is diminishing the demand for higher education, and enhancing competition for students amongst higher education institutions. This phenomenon favours reconfiguration and rationalisation of the network of higher education institutions. As demographic trends will take time to reverse, possible ways to increase demand for higher education include improving success rates in upper secondary education, increasing the access of new possible applicants (e.g. mature students) and eventually making upper secondary education compulsory.

Like elsewhere in Europe, Portugal is now deeply involved with implementation of the Bologna Declaration. The implementation of the Bologna process is also providing pressure for change at the level of higher education. Parliament has passed a law adapting the Education System Act (Decreto Lei 46/86 de 14 de Outubro) to the Bologna degree structure

and a decree regulating implementation of the new degree system has been passed (Decreto-Lei 74/2006 de 24 de Março). Higher education institutions were able to start implementing the new system from 2006/07, and in 2009/10 all Higher Education Institutions should establish a course structure based on cycles included in the Bologna Declaration. In parallel with the 'Bologna reform', a major regulatory initiative was implemented from the academic year 2005/06, which limits access to students that have enforced minimum grades of 95/200 in the national access examinations. It is expected that this initiative will also contribute to diminishing the number of candidates for higher education courses. Implementation of the Bologna process has also influenced the present national system of quality assessment, which was recently implemented in order to meet the Standards and Guidelines for Quality Assurance in the European Higher Education Area (European Association for Quality Assurance in Higher Education, 2005).

2.1.3.3. Summary

The last decades have been depicted as a time of rapid reform in the health and educational systems. In the health care system there has been a rapid growth in the availability of health care services in response to the very low health care coverage and poor health status of the population. The system has succeeded in drastically improving the health status of the population and bringing it close to the European average in many respects. The same situation was observed in tertiary education. Compared to a low level of coverage among young adults observed in the mid 70's, the educational system is now open and accessible to all, and the levels of academic qualification have dramatically improved.

Following the first goal of improving the coverage of health care services, numerous shortcomings and new challenges have appeared and both systems face strong pressures to adapt. As in many other countries the health care system is facing growing cost constraints, the population is ageing, and there are changes in the healthcare task with the focus moving from acute to chronic conditions (OECD, 1998a).

On the basis of these new challenges a new health care programme was made. A key strategic orientation of the programme is the promotion of change in the way services are provided to their citizens. It recognizes that in order to develop the interventions needed for efficiently

improving the health status of the Portuguese in a participative and informed way, there has to be a change in culture, working habits and ways of making people responsible for their actions (Plano Nacional de Saúde, 2004). Apart from more participation from individuals in the health sector, there is a need to promote social and community empowerment through authorised representation of a community or a particular interest group within that community. The recent proliferation of civil society organizations dedicated to the health sector or to similar sectors indicates the potential for the strengthening of this involvement of civil society (Plano Nacional de Saúde, 2004).

The new health care programme presents a shift in health care focus from the cure of individuals presenting for service towards the prevention of illness in populations and the strengthening of the community's capacity to deal with its own health (National Health Care Plan, 2004). This raises the importance of health education and patient empowerment in place of expectations that patients adopt a passive role, common in the traditional paternalistic model of care (Owen Hutchinson, 2004).

At the educational level new challenges have been made to all the community. Following the Bologna declaration a transformation is expected from the traditional teaching models based on the teacher's knowledge and authority to a more flexible and dynamic approach centred on students' learning. The recent reforms demonstrate a major step towards encouraging institutions to be more responsive to the needs of society and the economy. These give institutions more autonomy and room for manoeuvre but require them, in return, to be more clearly accountable to society.

These challenges have a natural impact in the profile requested for the new health care professionals. It demands not only knowledge and skills and professional behaviour appropriate to the profession's values and principles but also other competences such as the ability to work in health care teams and to demonstrate their ability to interact with a range of different patients/ families and caregivers and to make decisions in various settings, within the context of a changing political or institutional environment (Higgs *et al.*, 1999).

These demands are compatible with a more collaborative model of reasoning and practice. A sound clinical reasoning is essential for the effective functioning of the collaborative

relationships that deliver quality patient care. Effective reasoning strategies, particularly those that emphasise interaction, collaboration and ethics are key to prepare new professionals to respond appropriately to the new goals of the health care services. This present research could bring insights about how Portuguese physiotherapists are responding to these challenges.

2.2. Overview of the Physiotherapy Profession in Portugal

Physiotherapy is a young profession in Portugal and physiotherapy education dates back only to 1966. According to the information provided in a leaflet issued at the time by the 'Centro de Medicina de Reabilitação', the course was of 3 years duration, admission requirements were 9 years of schooling, and the number of students on the course, every year, was 20.

Over the last 40 years the profession has been striving for a structured body of knowledge and expertise, a regulating body, a code of practice and recognition of autonomy of practice. The historical and political emergence of the profession, and its current status, governance and regulation presented in this section should facilitate a better understanding of the stage of consolidation and development of the profession in Portugal.

2.2.1. Professionalisation: The status, governance and regulation of the profession in Portugal

Professionalisation refers to the action taken to develop a profession including the establishment of formal entry qualifications and the development of a regulatory body (Richardson, 1999). The term includes such things as the number of members of a profession, specified attributes of the group and identification of traits of its members. It also conveys purposeful movement towards high standards of professionalism through a continual refinement of practice (Richardson, 1999). Higgs (1993) stated that to be called a profession, an occupational group and its members need to demonstrate the ability to engage successfully in self-directed and lifelong learning, to contribute through research and scholarship to the development of the knowledge base of the profession and to practise in a manner which demonstrates professional autonomy, competence and accountability.

Nowadays, Physiotherapy is a regulated profession in Portugal. The profession has specific legislation taking account of the fields of its activity and establishing the rules related to the activities performed. The Health authorities are responsible for Legislation and regulation of the profession. The official name of the profession is 'Fisioterapia', and the professional official title 'Fisioterapeuta'. According to the Portuguese legislation, the physiotherapist is,

“a health professional who works essentially in hospitals, rehabilitation centres, community health centres, departments of occupational health, schools, educational institutions for students with educational needs, institutions linked to sports, and institutions for the care of the elderly.”

Portaria nº 256-A/ 1986

Physiotherapists treat and/ or prevent alterations of the functioning associated with the musculoskeletal, cardiovascular, respiratory, neurological and mental health systems. In accordance with the above decree, any physiotherapeutic intervention is based on the biopsychosocial⁷ perspective, which has as a main goal the maximum functionality of the patient. Analysis of patients' problems is based on a systematic process of examination. The physiotherapist plans and executes specific programmes of intervention using amongst other means, physical exercise, specific techniques of postural re-education and movement, manipulative therapies, electrotherapy and hydrotherapy. Physiotherapists develop and collaborate in programmes taking into account the health' promotion and education for health (Portaria nº 256-A/1986).

Registration for practice is now compulsory, and is the responsibility of health authorities. In order to obtain a license to practice physiotherapy in Portugal, candidates must have graduated from an accredited physiotherapy programme. Usually, the purpose of regulation is to protect the public from unqualified people. However, the professional title has no legal protection in Portugal, so it cannot be assumed, based on the title alone, that the holder has a professional qualification in physiotherapy.

⁷ The biopsychosocial model is a general model or approach that posits that biological, psychological (which entails thoughts, emotions, and behaviours), and social factors, all play a significant role in human functioning in the context of disease or illness. Indeed, health is best understood in terms of a combination of biological, psychological, and social factors rather than purely in biological term (Santrock, 2007).

Membership of the Portuguese Physiotherapy Association (APF) is voluntary. The APF has adopted the World Confederation for Physical Therapy (WCPT) definition of physiotherapy and its code of ethics. Recently the WCPT's core and service standards of practice were also translated and adopted by the APF (2004). The code of ethics and standards of practice were established to guide practice and also to communicate the expectations of behaviour that the community can reasonably expect from physiotherapists. Beyond government regulation, there is no self-regulation in the profession and levels of critical evaluation and specialisation are low. Physiotherapists in Portugal are now striving for autonomous practice, moving away from a medical referral model, to become first contact practitioners (APF, 2002).

2.2.2. The Practice of Physiotherapy in Portugal

Physiotherapy clinical practice is concerned with the manner in which physiotherapists perform the roles and tasks of their profession in conjunction with individuals who are their clients or patients (Higgs *et al.*, 2001). Despite other elements, the roles and tasks are influenced by the characteristics of the population, the health care system, professional knowledge, and the culture of the profession in a specific country.

Literature about physiotherapy in Portugal is sparse and difficult to find. For example, there is no data to describe the labour market or the practice and roles of physiotherapists. It appears that physiotherapists work in a variety of settings including health clinics, hospitals, rehabilitation centres, and nursing homes. In addition, many are self-employed. Physiotherapists may focus their practice in particular clinical areas such as orthopaedics, cardiopulmonary disorders, neurology, geriatrics, burns, sports injuries, rheumatology, oncology, paediatrics or obstetrics.

Physiotherapists' practice work environment has changed over time. Until the last decade, the majority of qualified physiotherapists in Portugal worked in a hospital setting. Over the past 5-10 years, the physiotherapist's practice environment has changed significantly, with most practitioners now working in rehabilitation centres or in situations of self-employment. In the hospital setting, Physiotherapists work in a variety of roles, including direct patient care, patient administration or quality management. A senior physiotherapist usually manages physiotherapy departmental staff. He/She is responsible for the infrastructure (e.g., staffing,

equipment, policies and communication with other departments), management of human resources (e.g. number of patients allocated to each physiotherapist), and the guidance and evaluation of the continual professional development plan of each therapist. A common practice in hospitals is rotation/ alternation, meaning that every six months, for one or two years, all newly graduated physiotherapists will rotate from one area of patient care to another.

In community health centres the care is usually organised into programme-based teams reporting to a programme manager, who is usually a doctor or a nurse. Physiotherapists in these settings are involved in health promotion and in the care of elderly people, and patients with chronic illnesses, in their own homes. In other settings (sports clinics, homes for the elderly, and in domiciliary care), Portuguese physiotherapists work alone or with a few colleagues. His/her role is restricted to direct patient care. In these rehabilitation centres or health clinics, physiotherapists are involved with different clinical conditions. Only in a few clinics, will physiotherapists have the possibility of focusing their practice on specific clinical areas and conditions (e.g. musculoskeletal disorders).

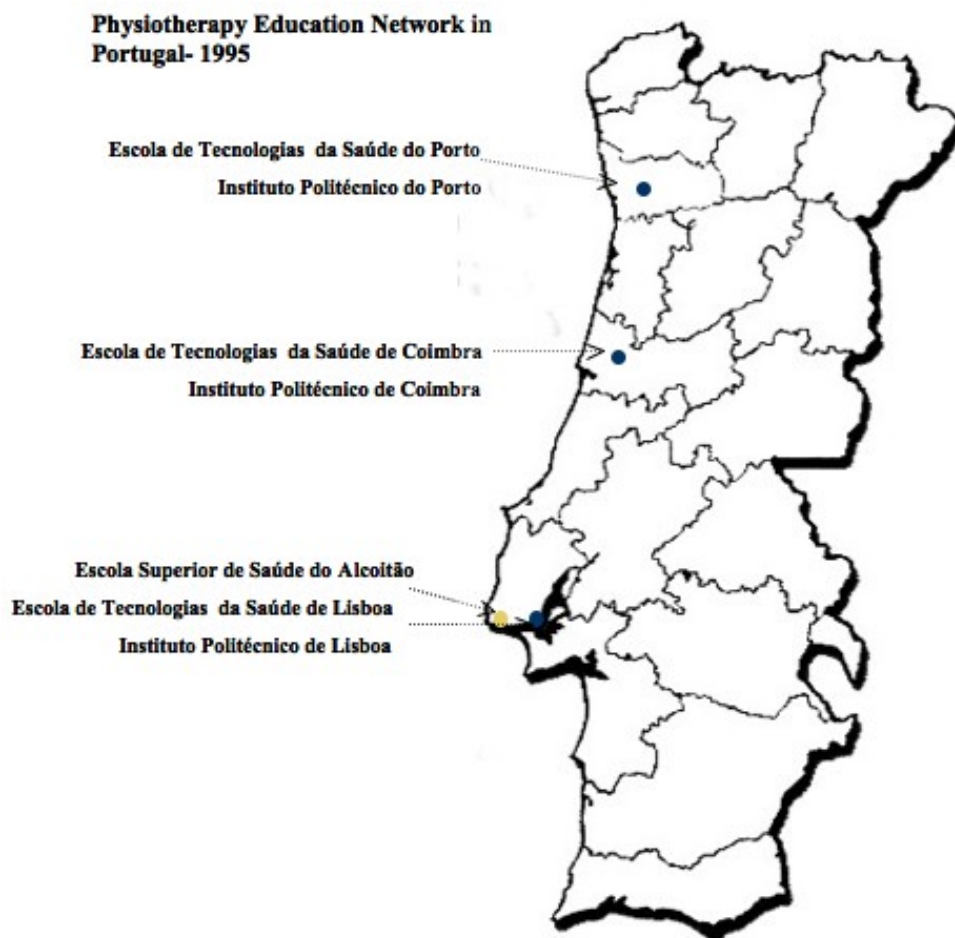
2.2.3. Physiotherapy Entry-Level Education

The first school in the country (‘Escola de Reabilitação do Alcoitão’) was created by the Ministry of Health (Portaria 22034 de 4 de Junho) and was based in the rehabilitation centre of ‘Alcoitão’. Following this first school, three other schools were created in 1982 (‘Escola Técnica dos Serviços de Saúde de Lisboa; Escola Técnica dos Serviços de Saúde de Coimbra; Escola Técnica dos Serviços de Saúde de Porto’) by the decree nº 371/82 (Decreto lei nº 371/82 de 10 de Setembro) (Figure 2.3).

Only in 1982 were physiotherapy schools recognised by the Ministry of Health, according to the Law nº 371/82 (Decreto lei nº 371/82 de 10 de Setembro). In 1986, the Decree nº 349/86 (Portaria nº 549/86, de 24 de Setembro) from the Ministry of Health regulated the functioning of physiotherapy schools in Portugal. This Decree legislated for the school’s purposes, and conditions of admittance and selection of candidates. In order to fulfil the requirements imposed by the higher education system, physiotherapy schools changed their curriculum in 1990. The new national curriculum was published in the Diary of Republic nº 208/9/90 (Despacho nº 18/90, de 8 de Setembro). According to the report of the curriculum design

committee the new curriculum was to support implementation of new learning models, based on inter-disciplinarity and the specialist knowledge base of the Allied Health Professions (Comissão Desenvolvimento dos Planos de Estudos das Tecnologias da Saúde, 1990).

Figure 2.3. Location of Physiotherapy schools in 1995.



Physiotherapy schools became part of the higher education system in 1993 (Decreto-Lei n.º 415/93, de 23 de Dezembro). At that time, there were four schools in the country, which graduated about 100 students per year. The baccalaureate programme in physiotherapy comprised three of years of study, with a total of 3,370 contact hours, and led to a degree of Bachelor in Physiotherapy (Standing Liaison Committee of Physiotherapists, 1990).

In the early 1990s the educational status of the profession in Portugal was similar to the majority of countries in Europe (Table 2.4). The number of years of high school education was 12, the length of the physiotherapy course was 3 years, and the number of total hours of study was in line with the average in most other European countries. The number of students qualifying for practice as physiotherapists each year was extremely low (100) compared to other countries with a similar number of inhabitants (e.g. Belgium). At that time, the ratio of 1 physiotherapist per 5000 inhabitants was well below the European average.

Since 1999, physiotherapists have been able to achieve a higher degree, termed a 'Licenciatura'. With this degree it became possible for physiotherapists to obtain a Masters degree in Portugal. Currently⁸ there is only one University where physiotherapists can achieve a Masters Degree or attend a doctoral programme in Physiotherapy Sciences, and many physiotherapists obtain this advanced degree in other subject areas (eg. Education; Exercise and Health; Health Management).

Table 2.4. Summary of Physiotherapy Education in Europe (1990). Adapted from “Standing Liaison Committee of Physiotherapists within the E.E.C. Physiotherapy education in the European Community”. Auxerre: Arts Graphiques, 1990.

Countries	Bel.	Den.	Fran	Greece	Irl	Italy	Neth	Port	Spain	UK	Ger
Number of Inhabitants (in Millions)	9,9	5,1	56,0	10,1	3,6	57,4	14,5	10,3	40,0	57,3	61,5
Number of Years of school needed for access to PT education	12	12	12	12	13	13	13 or 14	12	12	13 or 14	10
Number of years of PT Education	3 or 4	4	3 or 4	3,5	4	3	4	3	3	3 or 4	3
Number of total hours in PT courses	3450	3600	3330	4272	3101	3500	4200	3370	3600	2625	5480
Number of Physiotherapy schools	25	8	35	2	2	72	10	4	11	33	85
Number of students qualifying for practise as physiotherapists each year	1000	280	1465	100	60	1500	1200	100	456	922	2800

In the last ten years, the physiotherapy educational scenario in Portugal has undergone considerable change. Physiotherapy programmes transferred from colleges and hospitals to higher education institutions, the number of new schools has increased rapidly and, the number of new students entering physiotherapy undergraduate courses has grown seven fold. This significant increase in schools occurred between 1997 and 2003 without any rationale or

⁸ Since 2008 three more institutions allowed to offer a Master degree in Physiotherapy (Escola Superior de Saúde de Setúbal; Escola Superior de Tecnologias da Saúde do Porto; Escola Superior de Saúde do Alcoitão).

strategy to justify this political decision (Plano Estratégico para as Tecnologias da Saúde, 2001).

2.2.4. The Present Context of Physiotherapy Education in Portugal

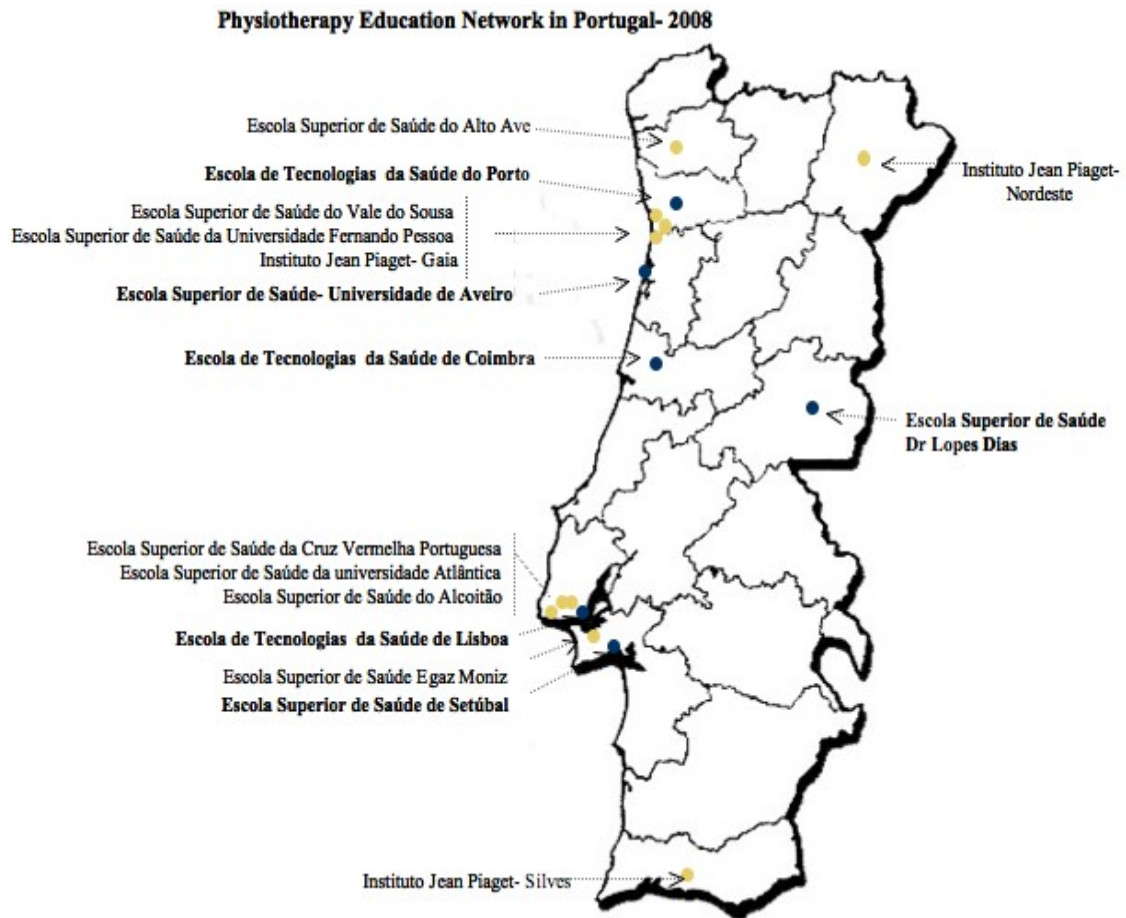
Currently, the physiotherapy educational scene is quite diverse and is still undergoing considerable change. Every school of physiotherapy in Portugal is now located in a polytechnic institution. As in other areas of study, each course of a given school has autonomy for designing its programmes, or curriculum, following a legislative document, which only requires coverage of all content areas and the provision of a prescribed number of hours of study in each of the broad content categories (Curricular Units).

In contrast with the educational scenario in 1990, in which all courses followed the same curriculum, at present, there are no required hours of theoretical and practical training for physiotherapy programmes prescribed by legislation. Each programme has the flexibility to adjust the relative amount of time spent reaching each sub-area and to decide upon the pedagogical approach to delivery of the curriculum. In this scenario therefore, undergraduate education is a responsibility of higher education institutions, authorized by the government. The Portuguese Physiotherapy Association describe the current situation as follow,

“The goals, content, format and evaluation of the education programmes provided for physical therapists are the responsibility of the faculty but should involve the active participation of the national physical therapy association”.

Texto de apoio à Jornada sobre Educação em Fisioterapia - APF (2005, p. 3).

The network of Institutions delivering Physiotherapy Courses has developed faster in the last decade, creating a diversified and heterogeneous network of institutions and study programmes. At the moment there are 14 schools providing a physiotherapy course, six of them belonging to the public sector and 8 to the private sector. In the public sector there are six physiotherapy courses, in 5 polytechnics and one in a polytechnic school integrated into a university. Figure 2.4 presents the regional distribution of higher education institutions showing that there is a strong concentration in the most populated regions, namely in Lisbon and the Oporto region.

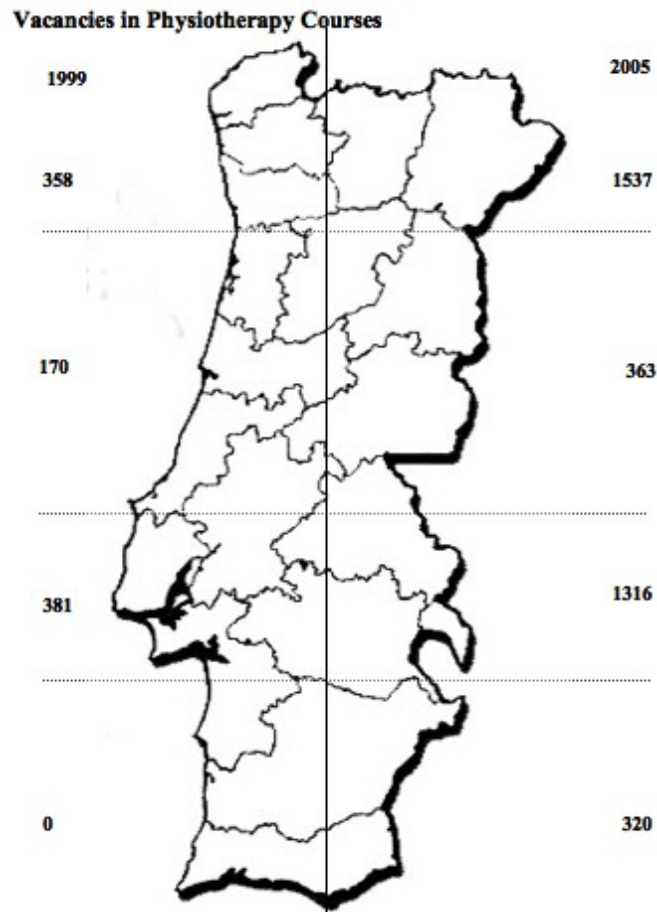
Figure 2.4. Location of Physiotherapy schools in 2008.

The national picture is one of increasing numbers of students enrolled on to physiotherapy courses. In five years the educational capacity of physiotherapy schools to produce new graduates has increased significantly. The number of places offered each year, has increased to close to 700, which gives an estimated number of more than 3000 new qualified physiotherapists in the next five years.

The total number of places offered each year in physiotherapy programmes is similar to the total places offered in Australia (Australian Institute of Health and Welfare- Physiotherapy Labour Force, 1998). Figure 2.5 shows on the left the number of places offered in 1999 and,

on the right, the scenario in 2005. The number of places offered in the physiotherapy courses is presented according to the four administrative regions of the country (NUTs⁹).

Figure 2.5. Vacancies in Physiotherapy Courses in 1999 and in 2005. Adapted from OCES (2005).



Although there is a trend towards the number of schools being proportional to the size of the population and to the number of working physiotherapists, it is not consistent throughout the world. In Europe, the number of schools varies widely; for example from one in Austria to 39 in Italy (Table 2.5). When compared to other countries in Europe, and by reference to the year 1991 (4 schools), Portugal was the country with a major increase in places offered. Compared to European countries with similar number of inhabitants, Portugal has 14 times

⁹ NUTS – Nomenclature of Territorial Units for Statistics (Decree-law n.º 244/2002, from the 5th of November). The Physiotherapy Schools Network is present in the four areas or NUTs: North; Center; Lisbon; Algarve.

the number of Physiotherapy schools than Austria, and 12 more schools than Greece, 11 more than Hungary and more than double those of Sweden (see Table 2.6, next page).

Table 2.5. Summary of statistical data concerning Physiotherapy Education in Europe (2005). Adapted from European Region of the World Confederation for Physical Therapy, 2005.

Countries	Total Number of Inhabitants	Total Number of Physiotherapists	Total Number of inhabitants per physiotherapist	Total Number of Physiotherapy schools officially recognized	Approximate number of new students entering PT schools education (each year)
Austria	8,139,130	6,000	1,357	1	400
Denmark	5,368,354	8,790	611	8	640
Finland	5,194,901	11,500	452	17	400
Finland	5.194.901	11.500	452	17	400
Greece*	10.554.404	5.000	2.111	4	290
Hungary*	10.138.844	3.000	3.380	5	475
Iceland	285.000	450	633	1	20
Ireland*	3.600.000	1671	2.154	4	26-60
Italy	57.680.000	40000	1.442	39	2300
Netherlands	16.000.000	19.000	842	11	1200
Norway	5.000.000	7.700	649	5	300
Poland*	40.000.000	30.000	1.333	10	1000
Portugal	10.335.559	2000	5.168	14	600¹⁰
Spain	43.000.000	11.000	3.909	35	3000
Sweden	8.873.052	13.000	683	7	550
Switzerland	7.200.000	10.000	720	14	300
UK	60.270.708	35.952	1.676	30	2200

The same scenario could also be found in other regions of the world. In Australia, mention has already been made of the growth in physiotherapy courses and student numbers. This is well illustrated by the following statistics: in 1995 there were 693 graduates from 6 undergraduate courses, in 2005 it is estimated that 1113 students will graduate from 16 courses comprising undergraduate, graduate entry and double degree offerings (McMeeken *et al.*, 2005). In the United States, and according to data reported by the Commission of Accreditation in Physical Therapy education (CAPTE), the number of CAPTE accredited courses has doubled in the last two decades. The number of courses has risen from just under 100 in 1983 to over 200 in 2003 (Baxter, 2003).

¹⁰ The number provided by the European region of the World Confederation for Physical Therapy (2005) (600 new students) was not consistent with the vacancies announced in the Portuguese official website for new candidates to Physiotherapy courses (778). (In www.dges.mctes.pt/DGES/pt).

The increased number of schools and new students entering physiotherapy courses has been referred to as a signal of the positive reputation of the profession (Baxter, 2003). Several reasons have been advanced for this attractiveness. Not only do physiotherapy courses offer a degree, they also confer a license to practice with no further training (Green & Waterfield, 1997). This is the case in Portugal. There is no distinction between registration and licensure as happens in other countries such as Australia or United Kingdom. In Portugal every physiotherapist who registers may adopt the title of physiotherapist, and obtains automatically a license to practice. There are no criteria to maintain the license, such as, for example, mandatory continuing education.

Table 2.6. Amount of increase in the number of places offered in physiotherapy courses in several countries in Europe. Adapted from European Region of the World Confederation for Physical Therapy (2005). Note: * data in 1991 reported the number of new students in the courses in Great Britain; data in 2005 reported the number of new students in the UK courses.

European countries	Approximate number of new students entering PT schools education (each year)	
	1991	2005
Belgium	1000	Information not available
Denmark	280	640
France	1465	Information not available
Greece	100	290
Ireland	60	60
Italy	1500	2300
Netherlands	1200	1300
Portugal	100	600
Spain	456	3000
Great Britain	922	2200* (UK)
Germany	2800	Information not available

In the Portuguese scenario caution must be exercised in reviewing these numbers and this optimism. This considerable growth in courses and student numbers has had considerable impact at different levels in the educational programmes, namely:

2.2.4.1. Availability of clinical placements for pre-qualifying students

Schools of physiotherapy are finding it increasingly difficult to secure clinical placements for their students, and clinical educators/supervisors are feeling that their capacity to adequately educate and supervise students is being pushed to the limit. The same concern has been reported in other countries. In Australia, for example, the Australian Physiotherapy Association (APA) and the Australian Bureau of Statistics (ABS) indicate that approximately 50 per cent of physiotherapists in the workforce work in private practice, yet few students can be placed in this setting (McMeeken *et al.*, 2005).

2.2.4.2. Qualifications of the teaching staff

Until 1994, Physiotherapy education in Portugal was not included in the national education system. For that reason, physiotherapists who qualified with a Diploma did not have access to higher degrees, and the qualifications of teaching staff involved in the education of physiotherapists was extremely low. With the sudden enlargement in the physiotherapy education network, which started to happen in 1997, there was an increasing number of lecturer-practitioner posts created. A consequence of the low qualification of teaching staff was the need to recruit teachers from others areas (e.g. medicine; psychology; statistics; sociology). Nowadays, there is no formal education requirement for physiotherapists entering teaching, but it is generally required that applicants for physiotherapy teaching posts hold a Master's degree or a PhD. The majority of entry-level teachers have acquired research competence though a Masters degree only. A very small percentage of teaching staff hold a PhD. It is also expected that applicants will have gained several years' broad clinical experience since qualifying as a physiotherapist. The precise requirements vary from post to post but in common they will require experience in a particular clinical area. There appears to be no formal or informal (e.g. 'in-house' education schemes) educational training for new teaching staff, nor training for updating existing teaching staff in Portugal. As a consequence, many teachers in physiotherapy programmes are not familiar with educational principles.

2.2.4.3. Employability

In Portugal authorisation for new courses and vacancies is a government responsibility, without any advice from the professional organisation. The absence of any study or report concerning the actual labour force and future needs is a matter of concern, especially in

relation to future employability of the new graduates. According to the report of the Observatory of Science and Higher Education (OCES, 2004), if the rate of admissions is maintained, by the end of 2010, Portugal will almost double the number of qualified physiotherapists to a total of 7040. This number will represent a ratio of one physiotherapist per 1470 inhabitants. This ratio is far above the average ratio in European countries (1:2000). With similar numbers other countries in Europe have faced higher levels of unemployment (European Region of the World Confederation for Physical Therapy, 2005). Despite the fact that this estimation was based on numbers of potential graduates and not on the numbers of physiotherapists practising in Portugal, there is little attrition from these programmes between admission and graduation (OCES, 2004).

2.2.5. Postgraduate Education and other areas of educational opportunities for clinicians

Like elsewhere in Europe and across the world, physiotherapists in Portugal now have access to continuing education for increasing knowledge and developing clinical expertise. Continuing education (i.e. non-formal, non-award programmes) for physiotherapists occurs throughout the country, in the form of both in-service education within the workplace and marketed courses conducted by the Specific Interest Groups under the auspices of the National Physiotherapy Association and departments of continuing education in some hospitals, schools, private entities or individuals. These courses cover many subjects, each having a different design. Usually these programmes involve clinical specialities such as manipulation, sports, cardiopulmonary and paediatric physiotherapy. In common, the courses usually promote acquisition of new approaches to patient evaluation and treatment. The majority of these courses are taught/ delivered by international physiotherapists, doctors or researchers. The Physiotherapy Professional Association courses range from local workshops and seminars to national conferences and the two-yearly congress of the Portuguese Physiotherapists Association, which brings together physiotherapy educators, researchers and clinicians from around the world for review and updating of professional knowledge and practice.

In some countries attendance at continuing education programmes is mandatory for ongoing membership of professional associations, as a method of increasing professional standards and facilitating educational development, but this is not the case in Portugal. Other means of continuing education include self-directed learning by individuals or groups of

physiotherapists through such activities as reading professional journals, case presentations and participation in Web-based learning (e.g. accessing physiotherapy and medical databases in search of advances in clinical knowledge). These other means of updating knowledge and expertise are sparse in Portugal. Until 2004, scientific and professional journals were nonexistent in Portugal (with the exception being between 1989 and 1993¹¹). Nowadays there are two online publications dedicated to publishing recent advances in science, physiotherapy theory and practice and professional issues.

Postgraduate education programmes include research degrees such as PhD and research masters programmes. As in other professions, postgraduate education for physiotherapists is widespread in developed countries and less available in developing countries. In Portugal it is limited to one faculty (Faculdade de Motricidade Humana). Since 2003, this faculty has offered a masters degree programme that leads to a Master of Physiotherapy Sciences¹². A PhD in Physiotherapy Sciences is also available in the same faculty.

2.2.6. Summary

In many aspects the developmental status of the profession is similar to other developed countries in the world. The Portuguese Association has adopted the WCPT definition and its code of ethics. Physiotherapy is now part of the tertiary educational system, and the level of new graduates assures the coverage of physiotherapy care to all the Portuguese population. However, and when compared with countries where the recent research on clinical reasoning had emerged, such as Australia, United States, Canada or United Kingdom, physiotherapy in Portugal still has low levels of development and professionalization.

For example, in Australia, two major changes dramatically improved the levels of professionalization of the profession: the transfer of physiotherapy education into tertiary education during the 1960s; and the establishment of primary contact practitioner status from 1976 (Higgs *et al.*, 1999). Undergraduate physiotherapy education has been located in the tertiary education sector in Australia for almost fifteen years. During this period there has been a concerted effort to develop a national framework that blends the acquisition of

¹¹ A journal named “Fisioterapia” was published under the auspices of the Portuguese Physiotherapy Association between 1989 and 1993.

¹² In 2008 two other schools started a Master degree in Physiotherapy (Escola Superior de Saúde de Setúbal; Escola de Tecnologias da Saúde do Porto).

knowledge, skills and practice in order to prepare students for professional physiotherapy roles. Within the Australian context physiotherapy curricula are subject to close scrutiny both by universities and by statutory regulatory authorities. Training programs are independently validated and accredited by the Australian Council of Physiotherapy Regulating Authorities to ensure competencies are attained as determined by the Australian Physiotherapy Competency Standards document (Crosbie *et al.*, 2002; Australian Standards for Physiotherapy, 2006).

In Portugal only recently the Physiotherapy schools became part of the higher education system in 1993 (Decreto-Lei n.º 415/93, de 23 de Dezembro). In contrast with other countries in Europe or in other parts of the world, the education curriculum of a given course does not have to meet the requirements of the regulatory and professional bodies. The education curriculum is determined by the institution where the course is provided, and prescribes generic information about content, types of classes and hours of study.

Another key aspect that differentiates the level of professionalization between Portugal and other countries is the contribution through research and scholarship to the development of the knowledge base of the profession. Although some recent advances have been made, the possibility for physiotherapists of acquire higher academic levels is recent and the published research, locally or internationally, is incipient. In other countries the postgraduate education, including research degrees such as PhD and research masters programs for physiotherapists is widespread.

Professional autonomy is another relevant issue that could differentiate the practice and reasoning of Portuguese physiotherapists. Higgs and colleagues (1999) stated that one important aspect concerning the level of professionalization is practising in a manner, which demonstrates professional autonomy, competence and accountability. In countries such as Australia or Canada, the role of physiotherapists has changed considerably over the last few decades with autonomous professionals replacing clinicians who applied technical skills under the direction of medical practitioners (Terry & Higgs, 1993; Paskevicius, 2002).

The above differences observed could impact not only on the grade of maturation of the profession in Portugal but also in the way the profession and its members sees themselves concerning the care they provide and their role in the system. Despite other elements, the roles and tasks of practice and reasoning are influenced by the characteristics of the population, the health care system, professional knowledge, and the culture of the profession in a specific country. This research brings insights about how Portuguese physiotherapists are approaching their reasoning and practice and what clinical reasoning processes are most emphasised.

This chapter outlined the contextual background underpinning the aim of this research. The health care and educational context where Portuguese physiotherapists operate were presented and analysed. The present status of the profession was also outlined and analysed and comparisons were made with the countries where recent research of clinical reasoning has emerged. The next chapter covers the topic of clinical reasoning. The review discusses what is currently understood by clinical reasoning models in physiotherapy practice, and the factors influencing clinical reasoning.

CHAPTER 3

Clinical Reasoning

Clinical reasoning for health professionals is a complex phenomenon that has only just begun to be described. In the last four decades a diversity of terminology, concepts and models have been proposed to interpret and explain its nature and the factors influencing clinical reasoning. The purpose of this chapter is to review the theoretical and empirical literature related to clinical reasoning in order to analyse the main concepts fundamental to the present study. The chapter is organized in three sections: Section 1 presents an overview of the main research traditions in the study of clinical reasoning. These research traditions have been informed by different paradigms, and different conceptualisations of clinical reasoning have been produced. Since the majority of research in clinical reasoning comes from medicine, Section 2 outlines the dominant influence of cognitive science in the development of a clinical reasoning theory in medicine and its influence on the Allied Health Professions. Finally, Section 3 looks at clinical reasoning in Physiotherapy. Of particular interest is the recent approach to clinical reasoning through the use of interpretative models.

3.1. Research on Clinical Reasoning and definitional issues

The majority of research into clinical reasoning has been approached through the empirico-analytical research paradigm. The empirico-analytical research paradigm, which is also known as the scientific or positivist paradigm, holds that truth or reality (i.e. knowledge) is objective and measurable, thereby utilizing observation and experiment to produce a result that, in turn, can be generalized and also leads to prediction (Higgs & Titchen, 2000). Within this paradigm, clinical reasoning research in health professions has been dominated from the beginning, by cognitive and artificial intelligence theories in the study of problem solving. Cognitive psychology presumes that the way people think about a situation determines their behaviour. It is within this frame of thought that clinical reasoning in medicine, and in other health care professions, has been investigated mainly through two major approaches: theories of information processing and theories of decision analysis (Elstein & Schwarz, 2000).

Theories of decision analysis were influenced by statistical models of reasoning in “fuzzy” situations, being centred on the identification of conditions that allow this type of reasoning. This theoretical approach will not be discussed within the present investigation due to its intrinsically prescriptive nature. Meaning that this approach seeks to describe how clinicians should make judgments as opposed to the description of how they do make judgments (information processing theory).

The information processing theory (IPT) introduced by Newell and Simon (1972) emphasises reasoning as a problem solving process. The IPT includes two fundamental assumptions: first that the task environment (the problem) is represented internally as a “problem space”, and also that the structure of the “problem space” determines the information-processing activities to be used in the search of a solution. This is to say that the task environment determines, to a large extent, the behaviour of the problem solver, which is independent of the detailed internal structure of his information-processing system (Newell & Simon, 1972). Thus, the task environment represents a major dimension in determining the type of problem solving used.

The early definitions of clinical reasoning in medicine reflected the influence of cognitive traditions. For example, Barrows and Tamblyn (1980) stated that clinical reasoning in medicine refers to ‘the problem- solving’ approach designed to adapt to the need to obtain more information to resolve an initially ambiguous diagnostic situation and the need to work with a progressive unfolding of information over time. The use of the term “problem¹³ solving” was firstly focused on the nature of the task (identifying and solving diagnostic problems), and the study of how physicians solve a problem with the purpose of analysing the psychological processes and the mental structures employed in identifying and solving diagnostic problems. The above emphasised the relevance of the task as the organiser of psychological processes and, due to this fact, the term “diagnostic reasoning” to refer to this psychological process was adopted by several authors (Barrows & Tamblyn, 1980; Carnevali & Thomas, 1993). Accordingly, medical doctors are problem solvers¹⁴ whose main task in

¹³ A problem as been defined as “a stimulus situation for which an organism does not have a ready response (Davis, 1973 quoted by Norman, 1988).

¹⁴ The term solves is a matter of discussion. For James (2002), solving a problem does not necessarily mean making the problem disappear. Problem solving is an essential human activity that helps individuals to reach a desired end state of a problem through thinking and the use of their knowledge and reasoning. In this sense,

their practice is to find a correct solution for a given problem (Barrows & Feltovich, 1987). In this sense the use of such a term as problem-solving represents the means to characterize the tasks nature (e.g. diagnosis) of a specific field or profession, and suggests that the main goal of a health professional is to find a solution or an end point for a clinical problem. This theoretical approach looks at clinical reasoning phenomena as a process that involves clinician knowledge and reasoning strategies as the key means to arrive at a problem solution. The emphasis to date has been on understanding the nature of clinical reasoning and on the development of clinical reasoning expertise.

The empirico-analytical approach has been criticized by the Allied Health Professions for lack of contextualization in the majority of tasks used to elicit clinical reasoning, and for excessive emphasis on diagnostic tasks, leaving aside other areas or aspects that should be investigated such as patient management and the role of patient participation in the formulation of the clinical reasoning process (Higgs, 1990; Mattingly, 1991b). These criticisms have led to a different approach to the study of clinical reasoning, the interpretative approach (in some studies defined as phenomenological). In contrast to the empirico-analytical research paradigm, the interpretive research approach recognizes that truth or knowledge is related to meaning and the context in which it is produced and, therefore, concedes that in any given situation there may be multiple realities, truths, or perspectives (Higgs & Titchen, 2000).

This perspective has advocated that research into clinical reasoning should address the context of behaviour. Patel and Arocha (2000) stated that without this context human action cannot be done in a meaningful way. In the interpretative/ phenomenological tradition, clinical reasoning is considered to be a social interactive process. The clinical reasoning process which such approaches describe, focuses on strategies which seek a deep understanding of patients' perspectives and the influence of contextual factors, in addition to a more traditional and "clinical" understanding of the patient condition (Higgs & Jones, 1995).

This approach has been largely influenced by the studies of Dreyfus and Dreyfus (1986) and relayed in the seminal works of Benner (1984), Mattingly (1991a), Fleming (1991a), Fleming

problem solving involves the application of knowledge and weighing of evidence in order to reach a decision that should solve the problem (James 2002).

(1991b), and Jensen and colleagues (1999). The idea is to capture subjects' experiences in terms of their interpretations of problems.

The different nature and scope of practice of the Allied Health Professions, as well the approaches and methods used to study clinical reasoning have generated different conceptualisations of the phenomena. This is seen in the following definition from Baker-Schwartz (1991, p. 1033). The author defines clinical reasoning as:

“a complex intellectual process that surpasses logical thought and is depicted as a process that involves the therapist in a phenomenological approach to make sense of the patient's condition, and evokes the therapist's use of a caring perspective in establishing a collaborative relationship with the patient”.

This brief overview illustrates the main research traditions in the study of clinical reasoning. The differences of approaches to clinical reasoning reflect the scope of practice of the profession in question, i.e., diagnosis versus evaluation, treatment versus management. Further, the approach used to investigate clinical reasoning has also influenced the development of its definitions. For instance qualitative approaches use more phenomenological descriptions of clinical reasoning. These are quite different from those focused on the cognitive elements of more positivist approaches.

3.2. Clinical Reasoning in Medicine

Studies of expertise in diagnostic medical cognition have examined differences between practitioners, with different levels of experience, in terms of their cognitive processes and skills. Many of the studies (e.g. Patel *et al.*, 1994) distinguish between *novices* (individuals who have only the pre-requisite knowledge assumed by the domain, i.e. medical students), *intermediates* (individuals who are above beginner level but below sub-expert level, i.e. residents in training), *sub-experts* (individuals with generic knowledge but inadequate specialised knowledge of the domain, for example, general practitioners or specialists working on problems outside their specific domain of expertise) and *experts* (individuals with specialised knowledge of the domain, for example, endocrinologists or cardiologists solving clinical problems that fall within their specialty). On the basis of the differences founded between those practitioners, various models have been proposed to interpret and explain the

clinical reasoning process in Medicine and in other Allied Health professions. These include hypothetico-deductive reasoning (Elstein *et al.*, 1978), pattern recognition (Barrows & Feltovich, 1987), and knowledge reasoning integration (Schmidt *et al.*, 1990).

3.2.1. The hypothetico-deductive model of reasoning

The study of how clinicians solve problems started with two seminal works by Elstein and colleagues (1978), and Barrows and colleagues (1978). Both research groups drew on the principles of information processing theory (IPT). IPT postulates sequential processing of data in a linear fashion and that cognitive processing is limited in accordance with memory structure and the relationship between Long-Term (LTM) and Short-Term Memory (STM).

To study the clinical reasoning process, both groups have employed what has been called by Elstein and colleagues “High Fidelity Simulation”. In this technique a normal person, previously trained, was used to simulate a standardized patient’s condition. In Elstein and collaborators’ study, “patient” evaluation sessions were videotaped and the clinicians (“expert” and less skilled clinicians) were observed and encouraged to “think aloud”. Each of these clinicians reached a diagnosis and developed a treatment plan. As they reviewed the videotape, the researchers asked the physicians for a detailed analysis of each question, statement and action. Finally, the verbal reports of the clinicians were subsequently analysed. In Barrows and colleagues’ study (1978), the researchers, instead of asking them to “think aloud” during the video, asked the clinicians to review a videotape of their interactions, as a “stimulated recall” of their thought processes (Barrows & Tamblyn, 1980).

In both cases the results showed that, instead of a model centred on a step-by-step basis, information gathered, hypothesis or problem list formation, and treatment planning were intermingled. Solutions were not developed after careful data collection, but hypotheses were generated early in the problem-solving process and subsequent data were gathered to evaluate each hypothesis (Elstein *et al.*, 1978). Usually hypothesis generation occurred quite early (about 10% of the way through the work-up), but it varied according to the problem and the clinician. The number of hypotheses developed ranged from 2 to 5, which suggests that

this is a chunking¹⁵ strategy used to preserve the limited resources of short-term memory (STM). This strategy allows large amounts of data to be organized.

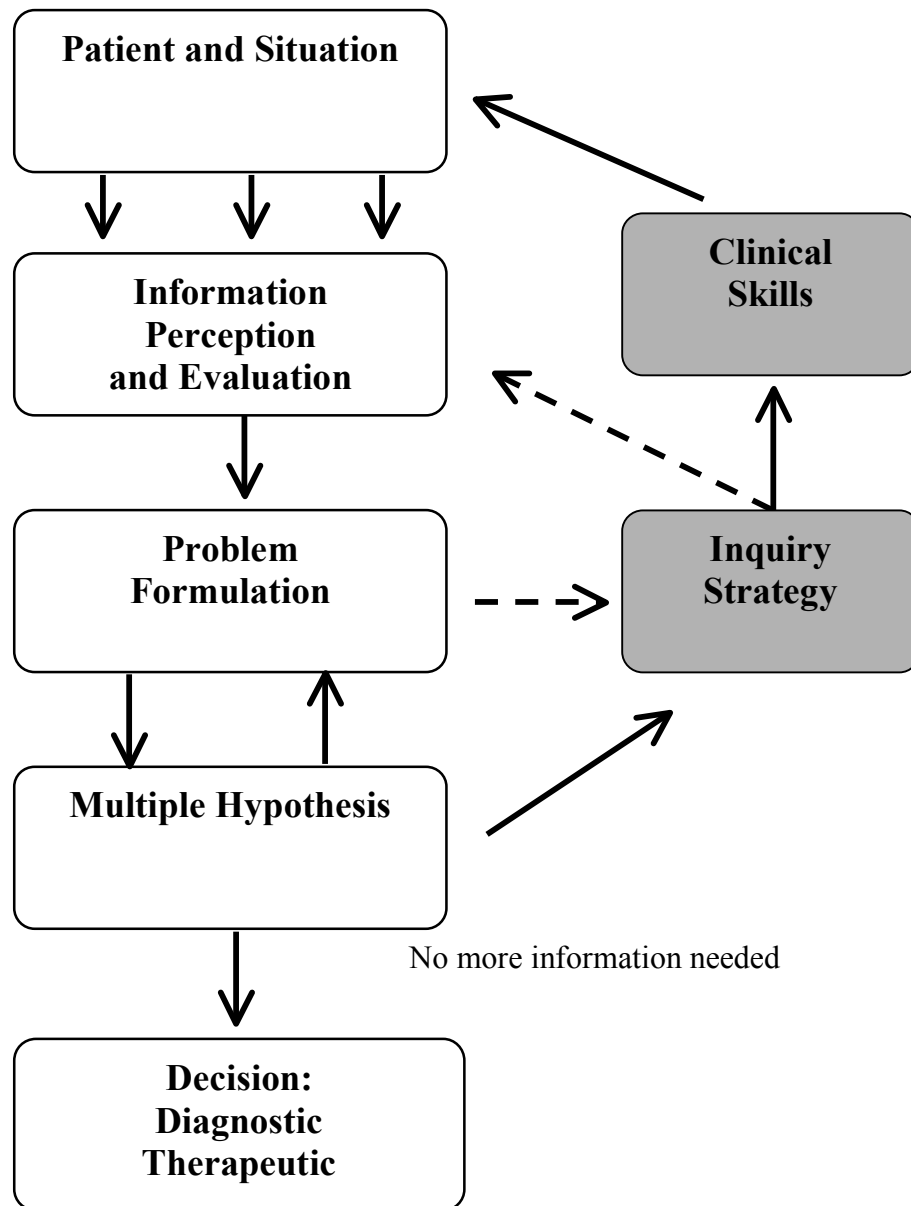
The hypotheses generated tended to affect subsequent data collection. Instead of careful data collection, subsequent data was gathered to evaluate each hypothesis, in order to confirm (rule in) or reject (rule out) the hypothesis. Then, they selected the most appropriate diagnosis and evaluated it. Diagnostic accuracy was related to thoroughness of the assessment (labelled cue acquisition) and to accuracy of analysis/inference (labelled cue interpretation).

On the basis of these research findings, a general model of problem solving, the hypothetico-deductive model emerged from both studies. Elstein and colleagues (1978) proposed a linear model based on four steps: 1) cue acquisition¹⁶; 2) early hypothesis generation; 3) cue interpretation to confirm or reject each hypothesis, and 4) hypothesis evaluation through which the choice is made between alternatives. Barrows and Tamblyn (1980) proposed a similar model but instead of a linear sequence of steps the authors described the process as cyclical (figure 3.1) where multiple hypotheses are processed in parallel. The authors also found that in some circumstances the clinicians used “shortcuts” in their inquiry process, which facilitated their efficiency. These are ‘rules of thumb’ or heuristics that allow clinicians to reduce the problem space with a few choice questions (Barrows & Tamblyn, 1980). According to the authors, their study findings also suggested that initial hypotheses were a product of the clinician’s past experience of patients’ problems, which allowed experienced clinicians to formulate more relevant hypotheses.

¹⁵ Chunking is a cognitive strategy by which a person can increase the efficiency – and thereby the capacity – of his or her short-term memory. In Chi, M. T. H., Glaser, R. & Rees, E. (1982). Expertise in problem solving. In R. J. Sternberg (Ed.), *Advances in the Psychology of Human Intelligence*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 7–76.

¹⁶ Cue acquisition refers to the process of collecting data in clinical problem solving (Elstein *et al.*, 1978).

Figure 3.1. The clinical reasoning process. Adapted from “Problem-based Learning: An Approach to Medical Education, Series on Medical Education” by H. S. Barrows & R. M. Tamblyn, 1980, p. 40.



Another important conclusion drawn from this investigation relates to the strategies that clinicians use to deal with the amount of information they collected. As the encounter with the patient progresses, the quantity of information elicited cannot be retained in the working memory along with the hypothesis being considered, unless it is organized in some form. The formulation of the patient’s problem (evolving picture of the patient from the initial concept), at any given time during the encounter, ‘encapsulates’ all the significant information obtained (Barrows & Tamblyn, 1980).

Support for the H-D model was provided by several subsequent studies. For example, Barrows and colleagues (1982) studied the clinical reasoning of 37 general practitioners and internists using four 'overt simulation patients' cases' and used methods similar to Elstein and collaborators (1978). Multiple hypothesis generation, early generation of the correct diagnostic hypothesis and preferential use of confirmatory evidence to support hypotheses were found in the study. However, and despite the amount of evidence supporting the H-D model, other studies found no differences between the reasoning process of novices and experts. Neufeld and collaborators (1981), for example, evaluated the clinical reasoning skills of 35 medical students in a problem-based curriculum. The results were then contrasted with a similar study carried out on certificated medical practitioners. All groups in both studies entertained similar numbers of hypotheses and preferentially used confirmatory evidence in their reasoning. The first hypothesis appeared early in both groups. The authors concluded that these studies revealed that the H-D model of reasoning appeared to be the process used both by novices and expert doctors. The only difference was that more experienced clinicians produced more detailed and specific hypotheses (Neufeld *et al.*, 1981).

These findings highlight the dynamic nature of the clinical reasoning process. Moreover, these findings also showed that the process is too broad-spectrum, and that not only experts have a particular type of reasoning. Other research studies in medicine have demonstrated that thoroughness in data gathering is not necessarily correlated with diagnostic accuracy (Norman *et al.*, 1982; Norman *et al.*, 1985), suggested that what distinguishes "experts" from "non experts" is the quality of the hypothesis generated and the accuracy of the early hypothesis which is a strong predictor of their final conclusion (Norman, 2005).

The work carried out by Elstein and colleagues (1978) also showed that clinical problem solving expertise varied greatly across cases and was dependent on clinicians' knowledge of particular areas. The authors found that expert ability is dependent on content ('domain-specific knowledge' or 'case specificity') and that experts and novices showed the same clinical reasoning process in non-usual cases. Therefore, a successful strategy in one situation may not be applicable in a second case situation since the clinician does not know enough about the patient's problem (Elstein *et al.*, 1978; Neufeld *et al.*, 1981).

Another criticism of the hypothetico-deductive model comes from studies by Patel and Groen (1986). These authors found that the clinical reasoning of experts in familiar situations frequently did not involve the explicit testing of hypotheses. Patel and Groen (1986) found that medical experts generated their diagnosis by studying the symptoms, whereas less experienced medical students tended to check the correctness of the diagnosis by inspecting relevant symptoms.

Research findings showed that whatever clinical reasoning was, it was definitely not skill-like, in that there was consistently poor generalization from one problem to another. In summary, the H-D model of reasoning, while interesting and useful for outlining the clinical reasoning process, was unsuccessful in distinguishing between different levels of expertise of physicians (Elstein *et al.*, 1978; Bordage & Lemieux, 1991). All subjects at all levels were doing about the same in non-usual cases (Elstein *et al.*, 1978). Therefore, these findings did not support the notion of a general problem solving process or skill associated with clinical expertise (Norman, 2005).

3.2.2. Pattern Recognition

Pattern recognition or inductive reasoning is based on the notion that knowledge storage in the memory occurs in the form of 'schemata' (Jones, 1995; Cholowski & Chan, 1995). Awareness of the problem appeared to be the main feature of this type of reasoning. When expert clinicians face a problem where cues elicit recognition of the solution, they automatically retrieve information from a well-structured knowledge base.

Pattern recognition, as an interpretation of the clinical reasoning process (in particular diagnostic reasoning) has been supported by a number of studies (Groen & Patel, 1985; Norman *et al.*, 1990; Schmidt *et al.*, 1990). For example, Patel and Groen (1986) found that directionality of reasoning is related to diagnostic accuracy. The authors introduced the terms 'backward reasoning' and 'forward reasoning'. Forward reasoning is a data driven strategy (inductive reasoning) in which data analysis results in hypothesis generation or diagnosis, using what is termed, 'if...then production rules'. Forward reasoning requires a sound knowledge base in a particular domain, which is why it is more commonly seen in expert reasoning within a particular area of expertise (Arocha *et al.*, 1993; Patel & Groen, 1986; Patel & Kaufman, 1995). Backward reasoning, in contrast is a hypothesis driven strategy in

which one reasons backwards from a hypothesis and attempts to find data that elucidate it (Patel & Groen 1986; Arocha *et al.*, 1993; Patel & Kaufman, 1995). While forward reasoning appears to be a more efficient, it is also more prone to error because it enables conclusions to be reached in the face of imprecise data and limited premises (Carnevalli, 1995; Higgs & Jones, 1995).

Patel and Groen (1986) found that the diagnostic explanations of subjects making accurate diagnoses consisted of pure forward reasoning. In contrast, subjects with inaccurate diagnoses tended to make use of forward and backward reasoning. Subsequent studies have confirmed this relationship between diagnostic accuracy and forward reasoning. Patel and colleagues (1990) examined factors, which may disrupt this pattern of forward reasoning. They examined the reasoning strategies used by expert cardiologists and endocrinologists solving problems within or outside their area of expertise. They found that an accurate diagnosis (usually from experts) was associated with pure forward reasoning in the production of an explanation of the principal component of the diagnosis. However, this was often accompanied by one or two components of backward reasoning to explain any loose ends. In contrast, inaccurate diagnoses (usually from the sub-experts) were associated with the use of both forward and backward reasoning.

In another study, Arocha and collaborators (1993) found differences between novices (medical students) with different levels of expertise. Early novices used a strategy similar to deep first search, considering and evaluating a single hypothesis at a time, furthermore they demonstrated a tendency to maintain hypotheses despite contradictory evidence. Intermediate and advanced novices use a form of broad first search as they considered and evaluated several hypotheses concurrently. However, differences between intermediate and advanced novices were found, in that intermediates were less skilled at evaluating hypotheses, and hence tended to maintain several hypotheses for long periods of time without resolving or eliminating them. Intermediates also showed a tendency to generate several diagnostic hypotheses to account for different findings. In contrast, advanced novices generated multiple hypotheses to account for the same set of findings.

Whether hypothesis testing (backward reasoning) or pattern recognition (forward reasoning) is used will depend in part on the clinician's level of practical experience, knowledge and

method of education, as well as on the nature of the clinical task itself (Arocha *et al.*, 1993; Patel *et al.*, 1991). In instances where the diagnosis is incomplete or inaccurate, clinicians are forced to test their hypothesis in what is called backward reasoning (Patel & Groen, 1986; Jones, 1995). These two cognitively oriented methods taken together are often referred to as “diagnostic reasoning” (Payton, 1985; Thomas- Edding, 1987).

The coexistence of two different strategies of diagnostic reasoning is supported by the results of a study by Patel and colleagues (1989). They found evidence that clinicians within their domain (i.e. in routine cases) show a preponderance of forward reasoning. They start with the observed symptoms and infer the diagnosis directly from these findings, using very little or no basic science information. Outside their area of specialization, however, clinical experts increasingly rely on backward reasoning. They first establish a diagnostic hypothesis from which they reason backwards in order to explain the observed findings (hypothetico-deductive reasoning). Backward reasoning apparently leads to more detailed causal explanations of the observed findings (Patel *et al.*, 1989).

3.2.2.1. Category acquisition and representation

Pattern recognition requires retrieval of relevant knowledge from memory. In order to understand and explain pattern recognition, research has focused less on processes and more on organisation and accessibility of knowledge stored in the clinician’s memory (Norman *et al.*, 1985; Higgs & Jones, 2000; Elstein & Schwarz, 2000; Edwards *et al.* 2004a). Knowledge is believed to be represented in memory as propositions, propositional networks and schemata (Irby, 1997; Charlin *et al.*, 2000). Propositions can be thought of as ideas in memory and are connected to one another through networks wherever there is a relationship. A schema contains networks of ideas or propositional networks. These can be thought of as concepts, which allow people to infer information from what they experience. Incoming information from the perceptual systems, therefore, are related to schema in memory, which are in turn activated and retrieved. If new information is received, it is expanded upon existing schemata with the establishment of more retrieval paths (Patel & Arocha, 1995).

Cognitive psychology has shown that knowledge is structured in the memory around categories. The categorization process relates to the human ability to group objects and events through the process of recognising similarity, for example, between a set of signs and

symptoms and a previously experienced or learned clinical pattern or diagnosis (Hayes & Adams, 2000). In a categorization task, individuals use perceived features of objects or situations to place them in categories. Such a task requires knowledge about the perceptible features of objects or situations and on their relationship within categories (Hayes & Adams, 2000). From this perspective, diagnosis is a categorization task in which clinicians place patients' illnesses in different classes based on their attributes. Once clinicians recognize a patient's illness as belonging to a given class of diseases, they can use related knowledge to take actions such as, planning an assessment, defining a treatment, or providing a prognosis (Charlin *et al.*, 2000). These categories facilitate organisation of information in an accessible manner in the memory (propositions, propositional networks or schemas). The process of categorization is a type of schema abstraction in which the meaning of objects, events or cases is decided and an appropriate response selected. In the presence of a clinical case, categories are retrieved through concept identification (Hayes & Adams, 2000).

Research findings show that in medicine, knowledge is usually structured as a disease classification against which the specific case can be matched. These knowledge structures serve the situation-specific purpose of enabling clinicians to understand the clinical phenomena present (Patel & Kaufman, 1995). In this sense, a medical diagnosis is essentially a theory on the acquisition and development of knowledge structures (disease categories) a student or a physician operates upon while diagnosing a case (Boshuizen & Schmidt, 2000). When a medical doctor establishes a given diagnosis, this diagnosis represents the meaning or the "true understanding" about the patient's signs and symptoms. From this point of view, the structure of knowledge is considered as a key element in construction of the capacity to make adequate diagnosis and treatment decisions (Charlin *et al.*, 1998; Hayes & Adams, 2000; Charlin *et al.*, 2000). The wiser diagnosticians are those who are able to develop a global representation of a given case derived from the relational structure of their knowledge in long-term memory.

The classical view of categorization assumes that categories are represented in the memory as sets of defining features, which are both necessary and sufficient for category membership (Hayes & Adams, 2000). According to this framework, clinicians' findings are organized around categories following a predetermined criterion or rule for membership (Custers *et al.*, 1996). This is appealing because it removes uncertainty: objects are either in a class or not.

However it is hard to find attributes providing such a certain definition for most classes (medical conditions). In most medical conditions, there is no single combination of signs and symptoms, which all patients possess. A more realistic view of categorization is that there is a probabilistic relationship between objects and class membership. Three distinct mental representations have been put forward: The prototype view of categorization; instance based frameworks (exemplars) and; illness scripts.

A prototype is a mental representation that contains the set of characteristics that are most frequently associated with category members (Hayes & Adams, 2000). According to the prototypical view of categorization, knowledge of a given category is structured in memory around clear examples referred to as prototypes, which capture the core meaning of a given category (Bordage & Zacks, 1984). In this sense, this mental representation adopts a probabilistic view in which the clinical features of a given patient could represent the characteristics that most commonly occur in one category, but could also be considered in another category.

Another model of knowledge representation is the “Instance- Based Framework” (also known as exemplars). The “instance-based” framework assumes that categorization, involves a comparison of a novel instance to some or to all of the known exemplars of the category (Hayes & Adams, 2000). In this perspective, categories are represented as collections of individual instances, or memories of previously encountered patients that are stored, and ready to be used in new cases (Custers *et al.*, 1996). As new instances are interpreted, prior knowledge constructions or schemata are tested.

A third model of representation and organisation of physicians’ knowledge is characterised as the use of ‘illness scripts’ initially described by Feltovich and Barrows (1984) and later by Schmidt and collaborators (1990). Here networks of medical knowledge, which include knowledge of pathology, clinical manifestations of the disease, variability in signs and symptoms and the constraints under which certain diseases may occur, are integrated into scripts that are as much tied together by temporal links as they are by causal relations and which, with experience, can build into ‘rich and highly elaborated’ forms (Schmidt *et al.*, 1990). Unlike knowledge networks these encapsulated illness scripts are ‘activated’ (i.e. recalled) as whole units and their use can be interpreted as a more advanced stage of clinical

reasoning expertise (Boshuizen & Schmidt, 2000). These schemas or 'illness scripts' are particularly valuable in that they provide background knowledge which helps people to interpret new instances (Schmidt *et al.*, 1990). When facing a given patient, clinicians assess their knowledge by matching the signs and symptoms to a specific disease. In this situation the clinician is engaged in a categorization process that leads to the diagnosis, in which the diagnosis is a categorization task where the clinicians place patients' illnesses in different classes based on their attributes. Illness scripts are activated as a whole instead of the individual links between concepts in knowledge semantic networks. Therefore, people whose knowledge is organized in illness scripts have an advantage over those who have only semantic works at their disposal. The use of these knowledge networks enhances the ability of clinicians to interpret clinical data, since recognition of the clinical pattern is matched against learned abstractions rather than specific instances which may be difficult to match clearly (Higgs & Jones, 2000).

Higher knowledge organisation developed by 'experts' allows the solution of a typical problem through recognition of clinical patterns. In a situation like this, knowledge base becomes highly structured in the form of "schemas". Each schema will be retrieved and easily accessed when a similar problem is seen in clinical practice. However, if the clinician is dealing with an atypical problem, both the 'expert' and the 'novice' rely more on the hypothetic-deductive method of reasoning to solve it (Jones, 1994). The end product is an integration of new information into existing organized knowledge creating new schemas (Anderson, 1990).

3.2.3. Knowledge integration Model of reasoning

Following the 'first generation' of clinical reasoning theory drawn from the cognitive psychology approach, a second emerged, which can be broadly depicted as the content (or knowledge) oriented perspective (Higgs & Jones, 2000). This area of research in the field of clinical reasoning focuses on what the expert practitioner knows and how this knowledge is related to the efficacy of action or clinical decision making (Bordage & Lemieux, 1986; Jensen *et al.*, 1992). This approach was first influenced by the studies of Chi and collaborators (1982) in chess and physics. Chi and collaborators (1982) stated that the problem solving difficulties of novices can be attributed to inadequacies of their knowledge bases and not to limitations in the architecture of their cognitive systems or processing

capabilities. Underlying the relationship between memory, performance and expertise was the matter of acquiring a large set of representative cases, which can be applied by analogy to a new problem situation (Norman, 2005).

Sharing the same assumption, several authors have tried to replicate these studies with medical practitioners. The results showed that although some differences between “experts” and “novices” were found, it was not possible to establish a direct association between the amount of information stored in memory and the performance demonstrated by “experts”. Norman and colleagues (1989) investigated the relationship between memory and expertise. The authors suggested that expertise effects might be more likely to arise when subjects are not aware of the fact that their memory of the cases is to be tested. The incidental memory test condition required subjects to recall case information (laboratory data) after they had provided a diagnosis. They found that 3rd year medical students recalled nearly twice as much information in the intentional condition (recall information when they are aware of being tested), whilst the experts (nephrologists and cardiothoracic specialists) recall was superior in the incidental condition (recall information when they are not aware of being tested). Overall, experts recalled more data than novices; however, this effect was far stronger in the incidental condition. Experts and novices both recalled more critical and abnormal data than non-critical and normal data; nevertheless the experts recalled more non-critical data than the novices.

Boshuizen and Schmidt (1992) provided a possible explanation for these contradictory findings¹⁷. The authors proposed that experts have access to extensive case knowledge, but this knowledge remains “encapsulated” until needed. Encapsulation of biomedical knowledge results when medical knowledge has to be integrated into clinical knowledge. At this stage, clinicians tend to make direct links between patient findings and clinical concepts that have the status of hypothesis or diagnoses in their reasoning process (Boshuizen & Schmidt, 1995). Since the majority of cases used in these research tasks are relatively common cases,

¹⁷ In the health sciences some researchers have taken the stance that knowledge used by experts in familiar cases is not propositional knowledge (Propositional knowledge refers to theoretical or scientific knowledge) in textbooks but is the knowledge that clinician’s adapt and shape, in order to integrate their understanding of signs and symptoms, and responses to treatment into their clinical knowledge bases (Patel & Kaufman, 1995), while others maintain that with clinical experience propositional knowledge becomes encapsulated in clinical (non-propositional knowledge- includes professional craft knowledge or knowing how to do something and personal knowledge about oneself as a person and in relationship with others found) knowledge (Boshuizen & Schmidt, 1995).

“encapsulated knowledge” does not emerge with these usual recall tasks (Boshuizen & Schmidt, 1995). To unfold this type of knowledge and address expertise effects, task demands should increase, either because of time constraints, or increase case complexity (Norman, 2005).

Boshuizen & Schmidt (1995) developed a model of clinical reasoning expertise in medicine, which attempts to describe the development from novice to expert, providing a theoretical framework for this development. In their first stages, medical students acquire large amounts of biomedical knowledge in the form of concepts, which are linked together in a knowledge network. During this stage students tend to generate a large number of hypothesis but they have difficulties integrating this information in the representation already developed. Encapsulation of biomedical knowledge results in the following stage of development of clinical reasoning skills, in which medical knowledge is integrated into clinical knowledge. At this stage, students tend to make direct links between patient findings and clinical concepts that are considered hypothesis or diagnoses in their reasoning process (Boshuizen & Schmidt, 1995). Also at this stage, a transition takes place from a network-type of knowledge organisation to another type of structure referred to as “illness scripts”. Illness scripts have three components, the first one refers to enabling conditions of disease (the conditions and constraints under which this disease occurs); the second component is the fault (the physiopathological process that is taking place in a specific disease, represented in an encapsulated form); The third component refers to the consequences of the fault (signs and symptoms of a specific disease) (Boshuizen & Schmidt, 1995).

When a clinical problem triggers one or a few illness scripts, these scripts are matched to the subsequent information provided by the patient. Activated illness scripts provide a list of phenomena to look for in history taking and during physical examination. In this sense, illness scripts not only incorporate matching information volunteered by the patient, but also generate expectations about other signs and symptoms the patient might have. Contrary to illness scripts, knowledge structures that students activate do not automatically generate a list of signs and symptoms that are expected. An active search through their networks is needed in order to generate such a list of symptoms that might verify or falsify the hypothesis entertained. These differences show that novices have more difficulty in organizing the data collected from patients, to generate, define and develop relevant hypotheses resulting in less

accurate diagnoses than experts. The following table (3.1) summarises these differences between novices, intermediates and experts.

Table 3.1. Knowledge restructuring and clinical reasoning at subsequent levels of expertise level. Adapted from “The Development of Clinical Reasoning Expertise “ by H. Boshuizen & H. Schmidt,1995, p. 28.

Expertise level	Knowledge representation	Knowledge acquisition and (re) structuring	Clinical reasoning	Control required in clinical reasoning
Novice	Networks	Knowledge accretion and validation	Long chains of detailed reasoning steps through pre- encapsulated networks	Active monitoring of each reasoning step
Intermediate	Networks	Encapsulation	Reasoning through encapsulated network	Active monitoring of each reasoning step
Expert	Illness scripts	Illness script formation (Instantiated scripts)	Illness script activation or Instantiation	Monitoring of the level of script instantiation

The research approach used to describe knowledge acquisition and clinical reasoning processes of experts and non-expert medical doctors has been replicated across other Allied Health Professions. The following section addresses in detail, what has been carried out in the field of physiotherapy.

3.3. Clinical reasoning in Nursing and the Allied Health Professions

Despite the initial influence of the cognitive paradigm, in particular through the information processing approach, and the clinical reasoning models described for medicine, the Allied Health Professions have taken up alternative research paradigms in their efforts to describe clinical reasoning from various perspectives of their practices (e.g. the interpretive paradigm used by Benner *et al.*, 1984, in nursing). How these descriptions of clinical reasoning ‘sit’ conceptually with the cognitive models outlined above is discussed below. A particular emphasis is placed on physiotherapy, nursing and occupational therapy.

3.3.1. Clinical reasoning in Nursing

Fonteyn and Ritter (2008) offered a comprehensive review of clinical reasoning in nursing. The authors observed that a variety of studies using information processing theory (IPT) and phenomenology have been implemented to explore the clinical reasoning of nurses. From a nursing perspective, they describe clinical reasoning as,

“the cognitive processes and strategies that nurses use to understand the significance of patient data, to identify and diagnose actual or potential patient problems and to make clinical decisions to assist in problem resolution, and to enhance the achievement of positive outcomes” (p. 236).

Findings from several studies examining nurses’ clinical reasoning using the IPT principles, revealed that, similar to medical doctors much of the nurses’ reasoning effort focused on generating a diagnostic hypothesis (e.g. Padrick *et al.*, 1987). There is also evidence to support the use of pattern recognition, as an interpretation of the clinical reasoning process of nurses (Benner, 1984; Benner & Tanner, 1987; Fonteyn & Fisher, 1995). In contrast, findings from studies of expert nurses’ clinical reasoning (Benner & Tanner, 1987; Fonteyn, 1991) showed that most of the nurses’ reasoning tasks were not aimed at diagnosis and hypothesis generation. Rather, nurses reasoned to distinguish between relevant and irrelevant patient data, to determine the significance of patient data, and to make decisions that assisted in accomplishing the overall treatment plan for each patient. Nurses used their knowledge and experience from previous cases to form relationships between the elements of patient data, to determine patient status, to identify actual and potential patient problems, and, consequently, to plan care, and make decisions to achieve optimal patient outcomes (Fonteyn & Ritter, 2008).

Benner and Tanner (1987) found that experienced nurses had developed a method of reasoning that often provided them with an “intuitive” grasp of the whole clinical situation, without having to follow the step-by-step approach of the nursing process (analytical process). The authors described intuition or having an intuitive grasp as the ‘direct apprehension of a situation based upon a background of similar and dissimilar situations and embodied intelligence and skill (Benner, 1984, p. 295). Intuition is therefore the result of experience and is used by experts (Benner, 1984). Therefore, an expert is able to progress rapidly to the centre of a problem and is not distracted by irrelevant data.

Intuitive reasoning has been reported in subsequent studies (Rew, 1990; Pyles & Stern, 1991), and there appears to be general acceptance that intuitive decision-making is advantageous to nursing practice (Benner, 1984; Young, 1987; Rew, 1990; 1991; Benner *et*

al., 1992; Corcoran-Perry & Bungert, 1992; Jacavone & Dostal, 1992; King & Appleton, 1997). For example Benner (1984) in studying the clinical reasoning of nurses with different degrees of experience showed that in nursing practice theoretical knowledge as well as intuition and practice experience helped to improve performance.

Benner (1984) used hermeneutic phenomenology to study levels of expertise as it was experienced by nurses at different stages of their careers. She studied 67 nurses of varying years of experience (51 experienced nurse clinicians; 11 new graduates and 5 senior nursing students). Benner (1984) made use of the levels of expertise model developed by Dreyfus and Dreyfus (1986), and identified the same five stages of skill development in the process of becoming an expert (novice, advanced beginner, competent, proficient, and expert), and the primary factor in movement from one level to another was experience.

Novice decision-making is slow, rule-driven and decontextualized because novices are unable to identify the most important elements in the situation and thus treat all information as equally important. Over time, practitioners build a repertoire of experiences, which serve as pattern matches in memory against which new situations can be evaluated. Their decision-making improves and they become less dependent on the rules and more sensitive to context. The more extensive the nurse's experience the greater the nurse's ability to recognise and give meaning to clinical events and therefore formulate hypotheses (Benner, 1984; Corcoran, 1986; Tanner *et al.*, 1987). However, Benner (1984) reported that not all practitioners progress to the expert level, regardless of their length of experience. As long as decision-making remains primarily rule driven, it does not progress beyond the competent level. Movement into the last two categories depends largely on the development and use of intuition. Experts have long since abandoned rules and make decisions intuitively which are tailored to fit the context.

Intuition rejects rationality as the predominant mode of reasoning in nursing, and yet, appears to retain at least some of the characteristics of cognitive science theory. For example Benner and Tanner (1987) noted that intuitive reasoning is composed of six components which all work in unison. These are: Pattern recognition; similarity recognition; common sense understanding; skilled know-how; sense of salience and deliberative rationality. Pattern recognition is the recognition of relationships in a situation. Similarity recognition is the

recognition that relationships exist despite obvious differences. Common-sense understanding is the result of a deeper understanding of a situation. Skilled “know-how” is the ability to visualise a situation. Sense of saliency is the ability to recognise what is important. Lastly, deliberative rationality is the ability to anticipate events. The characteristics work in synergy in expert practice (Benner & Tanner, 1987).

In conclusion, while Benner’s notion of intuitive reasoning is interesting, it parallels many forms of reasoning described in the literature. The research on clinical reasoning in nursing also suggests that there is a strong relationship between analytical and phenomenological paradigms. For example, information processing theory or the analytical perspective, seeks to explore the content of the clinicians’ mind whereas phenomenological skills acquisition theory seeks to explore clinicians’ experiences of reasoning (Greenwood, 1997). These perspectives emanate from differences in research methods, the philosophical approach of the discipline and the theoretical background of the investigator carrying out the research.

3.3.2. Clinical Reasoning in Occupational Therapy

Research into clinical reasoning in Occupational Therapy has been approached according to the main frameworks presented: empirico-analytical and interpretative. The studies that followed the empirico-analytical approach, draw heavily on a cognitive process approach to describing clinical reasoning (Rogers & Masagatani, 1982; Rogers, 1983), or draw on concepts such as situated cognition which has been described as the basis for pragmatic reasoning (Schell & Cervero, 1993; Schell, 1998). For example, Hagerdon (1996) describes the results of a qualitative study that illustrated a strong link between reasoning in occupational therapy to the cognitive psychology literature on reasoning in medicine. The author studied the clinical reasoning of 6 experienced occupational therapists evaluating a new referral of a common case. The “think aloud protocol” (see page 66/67 for description in Elstein et al.’s study) was recorded and subjected to qualitative analysis. Hagedorn (1996) found that experienced occupational therapists made both implicit and explicit predictions even in the early stages of the treatment process. The main form of reasoning used in this study by the subjects was diagnostic/ procedural reasoning.

In another study, Rogers and Holm (1991) applied the H-D model to the reasoning process of occupational therapists and assumed the generalisability of this clinical reasoning model. The

authors outlined a model of occupational therapy comprising cognitive operations identified as cue acquisition, hypothesis generation, cue interpretation and hypothesis evaluation.

The diagnostic approach described in the above studies was criticised by Schell and Cervero (1993) for being based on data from other professions, and for ignoring the personal and practice contexts of occupational therapy. These contexts are important as they activate particular types of knowledge, which are specific to a profession (Schell & Cervero 1993). Fleming (1991a) stated that the diagnostic (procedural) reasoning founded in Occupational Therapists, however, may still not be diagnostically focused in the traditional medical sense. Fleming (1991a) suggested that occupational therapists do not focus on diagnosis, but rather, on how diagnosis will influence the present and future function of their clients. The occupational therapist's focus, therefore, is more individualised to the specific needs of the client, which moves them away from the statistical, probabilistic perspective of medical reasoning. Hence, while occupational therapists use a process similar to medical doctors (H-D reasoning and pattern recognition) when thinking about the client's physical disability (medical problem), they use other forms of reasoning when considering other aspects of the client's life (Fleming, 1991a).

In contrast to these more positivist approaches, other researchers, such as Mattingly (1991a) and Fleming (1991a) have attempted to describe both scientific and phenomenological forms of reasoning in Occupational Therapy. Mattingly (1991a) criticised the medical approach for its excessive emphasis on diagnostic tasks, leaving aside other areas or aspects that should be investigated such as patient management and the role of patient participation in the formulation of the clinical reasoning process. For this author clinical reasoning in medicine can be described as "applied science or scientific reasoning, where knowledge and theory are used to generalise and classify patients' signs and symptoms into known physiological processes and diagnostic patterns" (Mattingly, 1991a). This type of reasoning, focusing on the cause/effect relationship, results in the intervention being based on the diagnosis with the aim of obtaining good health. With problems that cannot be solved one of the most important clinical management activities is decision making. Mattingly (1991a) distinguished between the biomedical entity of disease and the meaning of the illness experience. The presence of both entities during the clinical encounter, form a continuum that runs from the biomedical to the phenomenological ends of the spectrum.

In describing the clinical reasoning of occupational therapists, Fleming (1991a) identified that therapists seemed to think in three tracks (reasoning strategies), which were named procedural, interactive and conditional. Mattingly (1991b) added a fourth type of reasoning: the narrative reasoning. For Fleming (1991b) a reasoning strategy was a method or the approach wherein there is a selection of a structure or organisation for one's reasoning process. Here the term reasoning process refers to the particular goals and traditions in which research in clinical reasoning has been carried out. For Mattingly and Fleming (1994) clinical reasoning involves the questions: "how do therapists think?" and the "what do therapists think about their practice as a practice".

Mattingly and Fleming (1994) found that therapists often thought in *narratives* when working with clients and when describing or creating therapy stories with colleagues. Therapists used narratives (story telling and story creation) to convey and discuss therapy events and activities and associated reasoning with clients, client caregivers, and colleagues.

Procedural reasoning describes the reasoning used when selecting assessments and treatments to use with each client. More than simply the reasoning that surrounds a therapist's interactions with the client, *interactive reasoning* is concerned with understanding the client as a person. Finally, *conditional reasoning* is described as the most complex form of reasoning and is related to the therapist's understanding of the client's condition, how changes in the condition are dependent on the client's participation in therapy and, most importantly, the temporal aspects of the client's story or an understanding of the client's past, present and possible futures. Mattingly and Fleming (1994) claim that all these forms of reasoning can be used during the clinical encounters. Expert therapists shift rapidly between these forms of reasoning and show a capacity to use different forms of reasoning simultaneously.

The notion of the three-track mind developed by Mattingly and Fleming (1994) found support from Unsworth's research (2001a; 2001b; 2004). The author gave examples of how therapists used these modes of thinking in isolation, in rapid succession or simultaneously. On the basis of Unsworth's findings clinical reasoning in Occupational Therapy has been described as a largely tacit, highly imagistic and deeply phenomenological mode of thinking (Mattingly, 1991b). However, this interpretative approach has also been criticized, especially

for not considering the distinction between process and content (Roberts, 1996). The author suggested that the literature is not consistent in terms of content and process since it seems to emphasise the nature of the content as opposed to the process of reasoning. For Roberts (1996) reasoning strategies are defined as the methods used by clinicians to select and handle information (e.g. hypothetico-deductive). This assumption is largely influenced by the limited capacity of the cognitive system to handle properly the amount of information that is provided in a patient-clinician encounter (Elstein *et al.*, 1978).

3.3.3. Clinical reasoning in Physiotherapy

In physiotherapy, clinical reasoning was firstly defined as thinking skills and knowledge (facts, procedures, concepts, principles and patterns) used to make clinical decisions and judgements through evaluation, diagnosis and management of a patient's problem. Later on, Higgs and Jones (1995, p. xiv) defined clinical reasoning as “the thinking and decision making processes which are integral to clinical practice”, or as “the thinking underlying clinical practice” (Jones, 1995, p. 18).

Research into clinical reasoning in Physiotherapy is sparse and mostly related to the empirico-analytical approach. According to the cognitive tradition, research studies concerning clinical reasoning in physiotherapy have focused on two major areas: generic aspects of the clinical reasoning process, or general reasoning skills (Payton, 1985; Thomas-Edding, 1987; Jensen *et al.*, 1992; Rivett & Higgs, 1997; Doody & McAteer, 2002); and the factors influencing expertise (King & Bithel, 1998; Noll *et al.*, 2001).

3.3.3.1. Hypothetico-Deductive reasoning and Pattern Recognition in physiotherapy

The initial studies performed with physiotherapists provided evidence that clinical reasoning in physiotherapy should similarly involve a combination of hypothesis testing and pattern recognition (Payton, 1985; Thomas-Edding, 1987). Payton (1985) conducted a descriptive study with ten American expert physiotherapists with two main objectives: to analyse the clinical reasoning process and to verify the similarities between that process and the process described for medical doctors by Elstein and collaborators (1978). The author observed ten expert physiotherapists (recognized by one physical therapy academic faculty as clinical experts in some aspect of physiotherapy), from different areas of practice, during the initial

encounter with a patient. The patient-therapist encounter was audio taped and immediately after the session, an interview was conducted based on the information recorded. The researcher asked the clinicians to describe their thoughts, considering the nature of the patient's problem, the significance of any assumption and the reasons for specific questions. This interview was also audio-taped. The data collected were then analysed, looking for the sequential process of hypothesis formulation and treatment planning. Results showed that these experts went through the same process as physicians when determining the cause of a patient's problem. Payton (1985) also reported that the majority of hypotheses were generated during the first half of the encounter and the number of hypothesis formulated varied between one and five. The hypotheses formulated were described in pathological terms (e.g. degeneration of cartilage), pathokinesiological terms (e.g. decreased mobility), pathophysiological terms (e.g. pain) and psychosocial realms (e.g. compensation syndrome).

Similar results were found by Thomas-Edding (1987) in a study carried on in Australia, that compared the clinical reasoning processes of 24 experts (>3 years) with the processes of 24 novices (students who had experienced at least one clinical placement). The sample was videotaped during patient examinations (each therapist was videotaped with two different simulated patients, one orthopaedic and one neurological, both including a simple and a complex case). After examination the participants were asked to produce a list of prioritised problems as well as a treatment plan. The data analysis concentrated on several aspects of the examination process, on time spent and also on the qualitative description of the therapists' questions and comments made to the patient. The study findings confirmed differences between experts and novices in terms of data acquisition, as they were referred to in medical research literature. The findings showed that experts spent more time with orthopaedic patients than novices did in activities related with history taking: carefully addressing relevant cues and looked for development of a global picture of the patient. Novices tended to keep asking routine questions, not tailored to fully understand the patients' needs. Considering the similarities between the clinical reasoning process of medical doctors and the same process in physiotherapists, several conceptual hypothetico-deductive models were proposed to describe the clinical decision making process in physiotherapy.

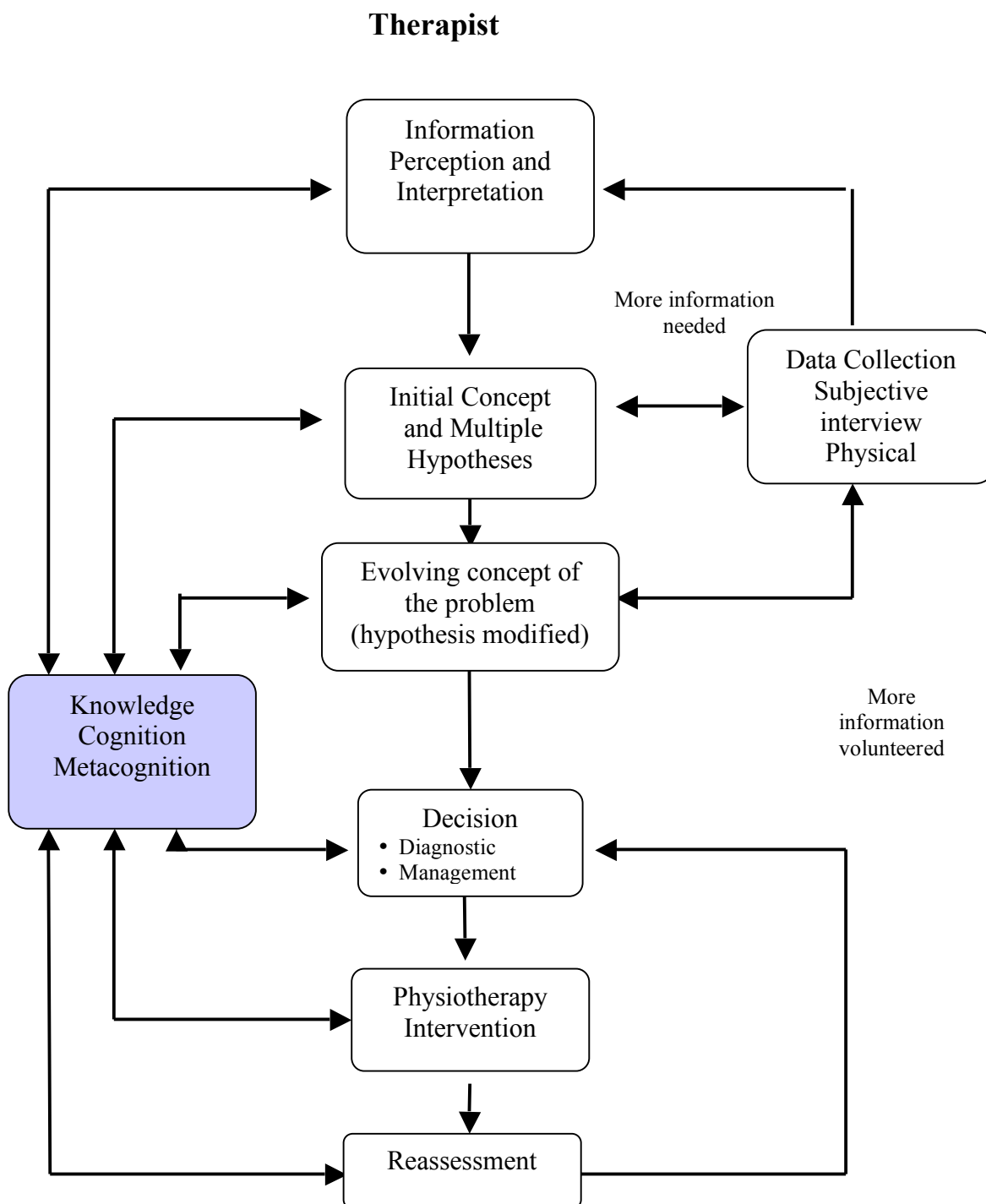
For example, May and Newman (1980) used seven sequential steps to describe the process: problem recognition; problem definition; problem analysis; data management; solution

development; solution selection and implementation; and outcome evaluation. Rothstein and Echtertnach (1986) proposed a conceptual model of clinical reasoning to logically guide therapists' evaluation and treatment planning activities. Their hypothesis oriented model was established on the following problem solving steps: 1) Collect initial data; 2) Generate a problem statement and establish goals related to function and disability; 3) Further data collection; 4) Generate working hypothesis about goals; 5) Plan re-evaluation methodology which includes examination of impairment and disability; 6) Plan treatment strategy; 7) Plan tactics to implement the strategy; 8) Implement tactics; 9) Reassess; Continue or modify treatment or generate new hypothesis accordingly.

More recent discussions in the physiotherapy clinical reasoning literature have attempted to expand on the H-D model of clinical reasoning described by Barrows and Tamblyn (1980) through integration of knowledge, cognition and metacognition (Higgs, 1990; 1992; Jensen *et al.*, 1992; Jones, 1994; Higgs & Jones, 1995). Cognition refers to the thinking skills of analysis, synthesis and evaluation of data. Metacognition is the awareness of thinking and the ability to assess one's knowledge base. Jones *et al.*' model (1995) (figure 3.2., next page) emphasises the strong relationship between clinicians' knowledge, cognition (e.g. data analysis and synthesis) and metacognition (e.g. awareness, self monitoring, and reflective processes) within all aspects of the H-D clinical reasoning process.

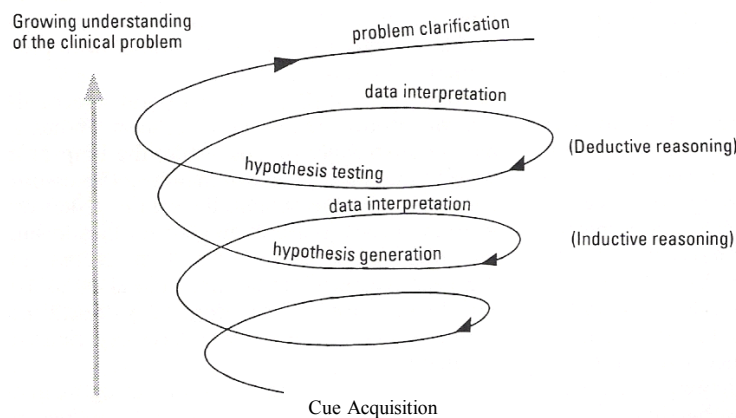
In this model, clinical reasoning begins with initial data/cue acquisition. This preliminary data gathering will be responsible for establishing an initial working hypothesis. These working hypotheses are possible interpretations about the nature of the problem and may address physical, psychological or social issues related or not with the diagnostic activity. As patient cues emerge and specific hypothesis are considered, the hypothesis should be tested for the remaining features of the pattern through further patient inquiry, physical tests and ultimately with physiotherapy intervention (Jones, 1992; Jones *et al.*, 1995).

Figure 3.2. The clinical reasoning process. Adapted from “Problem-based Learning: An Approach to Medical Education, Series on Medical Education” by H. S. Barrows & R. M. Tamblyn, 1980.



Another model represents clinical reasoning as an upward and outward spiral (Figure 3.3). The authors created this representation to characterize clinical reasoning as both a cyclical and a developing process. With the spiral analogy these authors have tried to emphasise the constructive character of the clinical reasoning process in order to achieve a progressively broader and deeper understanding of the clinical problem. Throughout the reasoning process the core elements of knowledge, cognition and metacognition interact (Higgs & Jones, 1995). Again, these models represent the H-D model as more cyclical in nature, in comparison to the linear model described by Elstein and collaborators (1978).

Figure 3.3. Analysis of the hypothetico- deductive model. Adapted from “Clinical reasoning” by J. Higgs & M. A. Jones, 1995, p. 12.



Further to Payton's studies (1985) and to those of Thomas Edding (1987), some other studies have provided evidence concerning the use of a hypothetico-deductive model of clinical reasoning in physiotherapy clinical practice (Rivett & Higgs, 1997; Doody & McAteer, 2002; Edwards *et al.*, 2004a).

Rivett and Higgs (1997) in a study involving nineteen Australian physiotherapists (eleven experts and eight non experts) found evidence of hypothesis generation and pattern recognition in both groups. All subjects independently observed a videotape of a clinician taking a history from a patient with a musculoskeletal problem. Subjects concurrently recorded their thoughts on data collection forms at 7 predetermined intervals. The frequency

and categories of hypothesis were then measured and compared across the two groups. They found that both groups generated hypotheses early in the encounter and used the H-D process. There were also no statistically significant differences between the two groups in terms of the number of hypotheses generated across categories.

More recently, Doody and McAteer (2002) developed a research study with the main purpose of investigating the clinical reasoning of physiotherapists working in a musculoskeletal outpatients department. The authors used high fidelity methods (Elstein *et al.*, 1978) to observe on-site ten Irish experts and ten undergraduate students, evaluating and treating a different previously unseen patient who was complaining of a musculoskeletal disorder in the initial evaluation. All these sessions were videotaped and field notes were taken by the researcher. Following the observed procedure clinicians and researchers reviewed the videotape. A semi-structured interview was conducted and the video was stopped at pre-determined intervals to ask non-directive questions in order to stimulate participants to verbalize their thoughts. Data was then transcribed and analysed using the components of the clinical reasoning process as proposed by Elstein and colleagues (1978) as a guide to develop initial codes. The authors found evidence for all the components described in the hypothetico deductive model of Elstein and colleagues (1978) in experts and novices. However, the clinical reasoning process of expert physiotherapists did not end with hypothesis evaluation, since these clinicians linked treatment to a previously evaluated hypothesis. Only the experts showed evidence for the use of pattern recognition or forward reasoning. The authors also reported that instead of a sequential process, clinical reasoning appeared to be cyclical.

The cognition involved in hypothesis generation included a combination of specific data interpretations or inductions and synthesis of multiple cues or deductions. All these findings seem to support the H-D model proposed by Jones (1992) and the dynamic nature of clinical reasoning in physiotherapy. However, Higgs (1992) stated that physiotherapists placed a greater emphasis on treatment and subsequent evaluation rather than diagnosis.

With a different purpose, King and Bithell (1998) in the United Kingdom studied five physiotherapists who had undertaken a formal specialist training, and five experienced physiotherapists in musculoskeletal therapy, with the aim of establishing the extent to which the characteristics identified by Glaser and Chi (1988) were also synonymous with expertise

in physiotherapy, and these characteristics, if found in groups of experienced musculoskeletal clinicians, had been influenced by formal post-graduated education. The authors used a dynamic case history in a written format, in which details were typed onto paper sheets in a sequence normally used in clinical practice. The case notes were subdivided in five sections corresponding to different stages of subjective and objective examination. Independent specialists were invited to review the case and provide a diagnosis. A structured interview was carried out following each of the five sections of the case study. Each interview was audiotaped and then transcribed. Transcriptions were analysed looking for evidence of the characteristics of expertise described by Glaser and Chi (1988). King and Bithell (1998) found differences in this process of categorization between a group of specialists and a group of generalist physiotherapists in musculoskeletal conditions. The specialist group, while identifying relevant clinical information, was immediately able to think about other important features to confirm or refute a given diagnosis hypothesis. Non-experts usually obtained the patient's features in isolation.

Noll and collaborators (2001) undertook a study based in the United States with the goal of describing the clinical reasoning process of an experienced McKenzie¹⁸ therapist. This physiotherapist was observed during her assessment and treatment of six clients with low back pain. Analysis of the physiotherapist's decision-making process was performed through retrospective interviews and reflective analysis of the therapist's clinical reasoning during each encounter. A working model of the physiotherapist's clinical reasoning was created from the integration of theoretical elements in the literature and the data. The authors reported that the physiotherapist employed a pattern recognition strategy and forward reasoning process in making a diagnosis. Through analysis of this framework, two core dimensions of her clinical reasoning were revealed: the influence of clinical experience and the influence of advanced training in a specific philosophy of treating the spine.

Similar results were reported by Embrey and colleagues (1996). The authors designed a qualitative study to study the clinical decision-making processes used by paediatric physical

¹⁸ The McKenzie method of physical therapy is one of the most widely practiced in Low Back Pain patients. Developed by Robin McKenzie, a physical therapist from New Zealand, it recognizes 3 primary syndromes: postural, dysfunction, and derangement. In addition, a concept known as centralization is a main tenet of the McKenzie system and is defined as "a rapid change in the location of pain from a distal or peripheral location to a more proximal or central position. The therapy attempts to centralize the pain, with the goal of a more rapid recovery and return to normal living (Werneke, Hart & Cook, 1999).

therapists in the United States. The clinical decision-making processes of three experienced therapists and three inexperienced therapists were assessed as they worked with 18 children with diplegia. Retrospective think-aloud procedures were used to elicit verbalizations, which were then transcribed, coded, and analyzed. On the basis of the study findings, four characteristics of clinical decision making were identified: (1) Movement scripts¹⁹ provided insights into the clinical application of cognitive schemata based on previous experiences, (2) procedural changes occurred rapidly during within-session decision making, (3) psychosocial sensitivity was important for positive interaction during therapy, and (4) self-monitoring appeared to be pivotal in making clinical decisions as therapists self-assessed their practice. The authors found that inexperienced therapists possessed fewer, “movement script schemata” than the more experienced therapists and were less likely to use schemata spontaneously. The inexperienced therapists also made fewer procedural changes during therapy and relied on lists of activities to guide therapy session. They also found that experienced therapists were more spontaneous and paid more attention to psychosocial issues whereas the inexperienced group were more activity oriented (Embrey *et al.*, 1996).

The above findings suggested that these forms of reasoning allow the physiotherapist to equate not only the physical aspects but also the meaning of problem in terms of functionality and its impact on the patient’s life style. Both biomedical and the phenomenological paradigms illuminate the nature of clinical reasoning and the way clinicians manage clinical problems.

3.3.3.2. Knowledge Organisation in Physiotherapy

In physiotherapy, Jones (1992; 1995) proposed a model of knowledge organisation based on different categories of hypothesis. Each category represents a different area of examination and/or treatment to generate a hypothesis for testing. They also formed a structure by which knowledge can be effectively organised. Accordingly, each of these categories represents the clinicians’ knowledge structure that mediates the clinical reasoning process and where clinical patterns exist within all the categories of hypothesis. These categories included (1) the source of symptoms and/ or dysfunction, (2) contributing factors, (3) precautions and

¹⁹ Movement script was a term introduced by Embrey and colleagues (1996) to describe the cognitive schemata (large meaningful patterns) used by paediatric physical therapists in making clinical decisions. These movement scripts were used by experienced and inexperienced paediatric physical therapists to describe movements and postures of children with diplegia.

contra- indications to physical examination and treatment, (4) management, (5) prognosis, and (6) mechanisms of signs and symptoms.

According to Jones (1995) the model would assist clinicians to relate relevant information to particular types of clinical decisions. In a clinical situation, therapists recognize patient cues, which in turn elicit hypotheses in one or more categories (Jones *et al.*, 2000). In this context a hypothesis can be regarded as a working interpretation or possible answer to a clinical question that the practitioner is considering at a particular point in time (Rivett & Higgs, 1997). Thus the notion of clinical reasoning strategies, as a way of organizing the tasks of clinical practice, is complemented by the notion of hypothesis categories as a means of organizing the clinical knowledge required for those tasks. Other emerging knowledge, both theoretical and research- based can be included in this organisation.

Jones and collaborators (1995), called attention to the importance of both diagnostic and phenomenological factors in clinical practice, suggesting that the hypothetico-deductive process broadly underpins other strategies that can be considered as inquiry and/or management strategies, rather than a different clinical reasoning process. According to Jones and colleagues (1995), these categories will elicit relevant information, not only on the biomedical dimension of the patient's problem but also towards other dimensions that help clinicians to construct a meaning about the patient's problems or about several components of a problem.

Although the concepts are still evolving, subsequent research (Rivett & Higgs, 1997) validated the use of these hypotheses in the clinical practice of manipulative physiotherapists. The authors found evidence to support all but one (mechanisms of signs and symptoms) of these categories of hypothesis. The authors also found evidence for a new category; reassessment (Rivett & Higgs, 1997). More recently Gifford and Butler (1997) and Jones and colleagues (2002) have added some new categories, such as functional limitation and/or disability, patho-biological mechanisms, and physical and psychological impairments and their associated sources.

3.3.3.3. The Interpretative Approach to Clinical Reasoning in Physiotherapy

In contrast to the traditional research approach in medicine, several authors have taken up alternative research paradigms in their efforts to describe clinical reasoning from the various perspectives of their practices (e.g. the interpretive paradigm used by Edwards *et al.*, 2004a). How these descriptions of clinical reasoning 'sit' conceptually with the cognitive models outlined above is discussed below.

Jensen and colleagues (1990) designed a study based in the United States, to develop a conceptual framework and a data collection tool to begin a systematic analysis of the work of the physical therapist. The authors collected data through non-participant observation, field notes records and audiotape records of eight physiotherapists with varying levels of experience (2- 13 years), working in adult, out-patient orthopaedic settings in the United States. The data were collected during one therapeutic session per patient over a total of 19 sessions. An initial conceptual framework representing the components of the physiotherapy practice environment was developed from a review of literature and analysis of data collected during pilot observations. The first level of the framework represented components of the physiotherapy practice environment, which included characteristics of both the physiotherapist and the client. Also in this first level were organisational factors such as type of clinical setting, payment system, geographical location, support personnel and time constraints.

The second level of the conceptual framework represented tools used by the physiotherapist such as communication techniques, manual techniques and other treatment modalities. At the third level was a dynamic therapeutic intervention also termed the 'black box' (Jensen *et al.*, 1990, page 315) through which the factors of level one and two are filtered. It was to further study this 'black box' of therapeutic interventions that the observational instrument and conceptual framework described below were developed.

Observation, field note records and audiotape recordings of therapists engaged in practice were the methods used for the study. Integrated transcriptions of both the verbatim data from the audiotapes and the non-verbal and environmental data from the observer's field notes were coded. The data yielded coding categories for physiotherapist and patient statements.

Five themes representing a small part of the initial conceptual framework also emerged from analysis of the data. These themes were seen as tentative and as representing possible dimensions of the overall treatment encounter that might differentiate experienced clinicians from novices. Two themes (allocation of treatment time and impact of the therapeutic environment) had to do with organisational factors mentioned in the first level of the framework. The other three (types and uses of information gathered from the patient, degree of responsive therapeutic interaction and therapist integration of social and/or miscellaneous interaction with therapeutic interaction) related to client - therapist interactions that occurred during treatment. In this first study, the authors found that experienced clinicians spent more time with their patients, particularly in activities related to seeking information and evaluating, in providing “hands-on” care and educating patients, and were more efficient in how they use their time, a fact consistent with the findings reported by Thomas- Edding (1987).

In a subsequent study, Jensen and collaborators (1992) used a similar qualitative research design to investigate differentiating features of American master and novice physical therapists in orthopaedic settings in three different regions of the United States. In this study, a sample of three master clinicians and three novice clinicians was observed treating at least three patients. The researchers collected data through onsite observation, audio-taped evaluation of all treatment sessions, patient interviews, interviews with clinicians regarding perceptions of their own decision making and clinical skills, and reviews of patient records. Jensen and collaborators (1992) founded five attributes that differentiated the therapeutic interventions of experienced and inexperienced physiotherapists. These authors characterized the physiotherapist therapeutic intervention both as a complex cognitive skill (knowledge) and as “improvisational performance”. One attribute, confidence in predicting outcomes was related to possible differences in knowledge and four attributes, ability to control the environment, focuses verbal and non- verbal communication, evaluation and use of patient illness and disease data, and importance of teaching to hands- on- care, were related to “improvisational performance. For the authors, improvisational performance referred to “what actually happens when the therapist is treating patients” (Jensen *et al.*, 1992, p. 718).

The results presented by Jensen and collaborators (1990; 1992) showed that the expert not only collects information related to pathology that helps validate or invalidate a diagnosis,

but also gathers illness data that reflects patients' perceptions of how the disease affects their lives. From this point of view, the context in which the problem exists and the way it is manifested by the patient seems to be an important factor in understanding the physiotherapists' clinical reasoning process. Here context refers to the particular set of conditions and events associated with development, and maintenance of a problem, as well as with those aspects of the individual's life (e.g. physical, psychological and social), which are in turn affected by the problem.

More recently, Edwards and collaborators (2004a) used similar investigation procedures (qualitative study, using a grounded theory, case study methodology) to study the clinical reasoning in three different fields of physiotherapy (manipulative/ orthopaedic, neurological and domiciliary care). Two Australian physiotherapists from each discipline, who met certain criteria of expertise, were observed over at least 2 days during their normal work. Data were collected in the form of observed treatment sessions, interviews with therapists (both of which were audiotaped), field notes and written reflections. Six other experienced physiotherapists, most with academic backgrounds, were also interviewed on the same issues of clinical practice.

Data were collected in three different ways: Initially through observation of treatment sessions and semi structured and unstructured interviews. Secondly, data was collected from written material from each of the 6 physical therapists in order to identify potential sources of knowledge (eg, mentors, clinical and life experiences) that may have influenced the therapists' professional development in a manner expressed in their clinical practice. Thirdly, data collection, the authors used semi structured interviews with 6 other expert physiotherapists (2 therapists from each of the same 3 fields) 12 months after the initial fieldwork, using the same questions regarding issues of practice that were used for the primary sample. Data were then analysed and reported by means of a case study approach. Coding of data was used to identify clinical reasoning strategies and knowledge frameworks. Case studies, representing the clinical practice of each therapist, were constructed using a descriptive framework. From these individual case studies, composite case studies (incorporating the views of the six interviewed physiotherapists) were constructed. From these, a final thematic cross-case comparison was performed. Data collection and analysis were performed in an iterative manner with each stage of the findings being compared with

existing theory from relevant literatures (e.g. clinical reasoning, adult learning and critical social theory).

In this study the authors found that individual expert therapists in all three fields employed a range of clinical reasoning strategies, such as, diagnostic reasoning; interactive reasoning, predictive reasoning; narrative reasoning; pragmatic reasoning; ethical reasoning; teaching as reasoning; and collaborative decision making. According to the authors, clinical reasoning strategies can be regarded as specific foci of thinking or action in the diverse tasks of clinical practice in physiotherapy (Edwards *et al.*, 2004a). Edwards and colleagues (2004a) considered these strategies under the broad headings of “diagnosis” and “management”:

Diagnosis

- *Diagnostic reasoning* is the formation of a diagnosis related to physical disability and impairment with consideration of associated pain mechanisms, tissue pathology, and the broad scope of potential contributing factors.
- *Narrative reasoning* involves the apprehension and understanding of patients’ “stories,” illness experiences, meaning perspectives, contexts, beliefs, and cultures.

Management

- *Reasoning about procedure* is the decision making behind the determination and carrying out of treatment procedures.
- *Interactive reasoning* is the purposeful establishment and ongoing management of therapist-patient rapport.
- *Collaborative reasoning* is the nurturing of a consensual approach toward the interpretation of examination findings, the setting of goals and priorities, and the implementation and progression of intervention.
- *Reasoning about teaching* is thinking directed to content, method, and amount of teaching in clinical practice, which is then assessed as to whether it has been effectively understood.
- *Predictive reasoning* is the active envisioning of future scenarios with patients, including exploration of their choices and the implications of those choices.

- *Ethical reasoning* includes the apprehension of ethical and practical dilemmas that impinge on both the conduct of intervention and its desired goals, and the resultant action toward their resolution.

Clinical reasoning strategies were combinations of cue-based reasoning where there was interdependence among various strategies at any given time. These clinical reasoning strategies may be found combined in any number of ways according to particular situations that arise in clinical practice. The authors stated that clinical reasoning strategies represent a paradigm shift from the cognitive process to the role of dynamic interaction between clinician and patient (Edwards *et al.*, 2004a). The concept of clinical reasoning strategies recognizes that clinical reasoning is a complex activity comprising numerous tasks and responsibilities and, in addition, clinicians can adopt a variety of strategies or approaches to reasoning Edwards and colleagues (2004b). On the basis of research findings the authors proposed a dialectical model of reasoning²⁰ in which different paradigms of knowledge and reasoning processes are interplayed, and this interplay is expressed in each of the various clinical reasoning strategies.

The work of Jensen and collaborators (1999) and Edwards and collaborators (2004a) brought some important issues to the discussion of the nature of the clinical reasoning process in physiotherapy. On the basis of information provided, Jones and collaborators (2000)²¹ proposed a revision to the hypothetico-deductive clinical reasoning model developed by Jones and Higgs (1995). The revised model emphasised the collaborative nature of the reasoning process and a new description of clinical reasoning strategies as used in physiotherapy practice (Figure 3.4., page 99).

²⁰ The term “dialectical reasoning” was used in Edwards’ study to describe an interplay between the different paradigms of knowledge and reasoning processes that are expressed in each of the various clinical reasoning strategies (Edwards *et al.*, 2004a).

²¹ The date presented could bring confusion to the reader since the model was published previously to the research findings reported by Edwards (2004a). In fact, the collaborative model was first presented by Jones, Jensen and Edwards (2000) in their chapter concerning “Clinical Reasoning in Physiotherapy- In: Higgs & Jones. *Clinical Reasoning in Health Professions* (2000), but the model draws heavily on the findings reported in Edwards’ research. These findings are referred to in the chapter as being *in press*. Edwards’ original findings were first published in 2004.

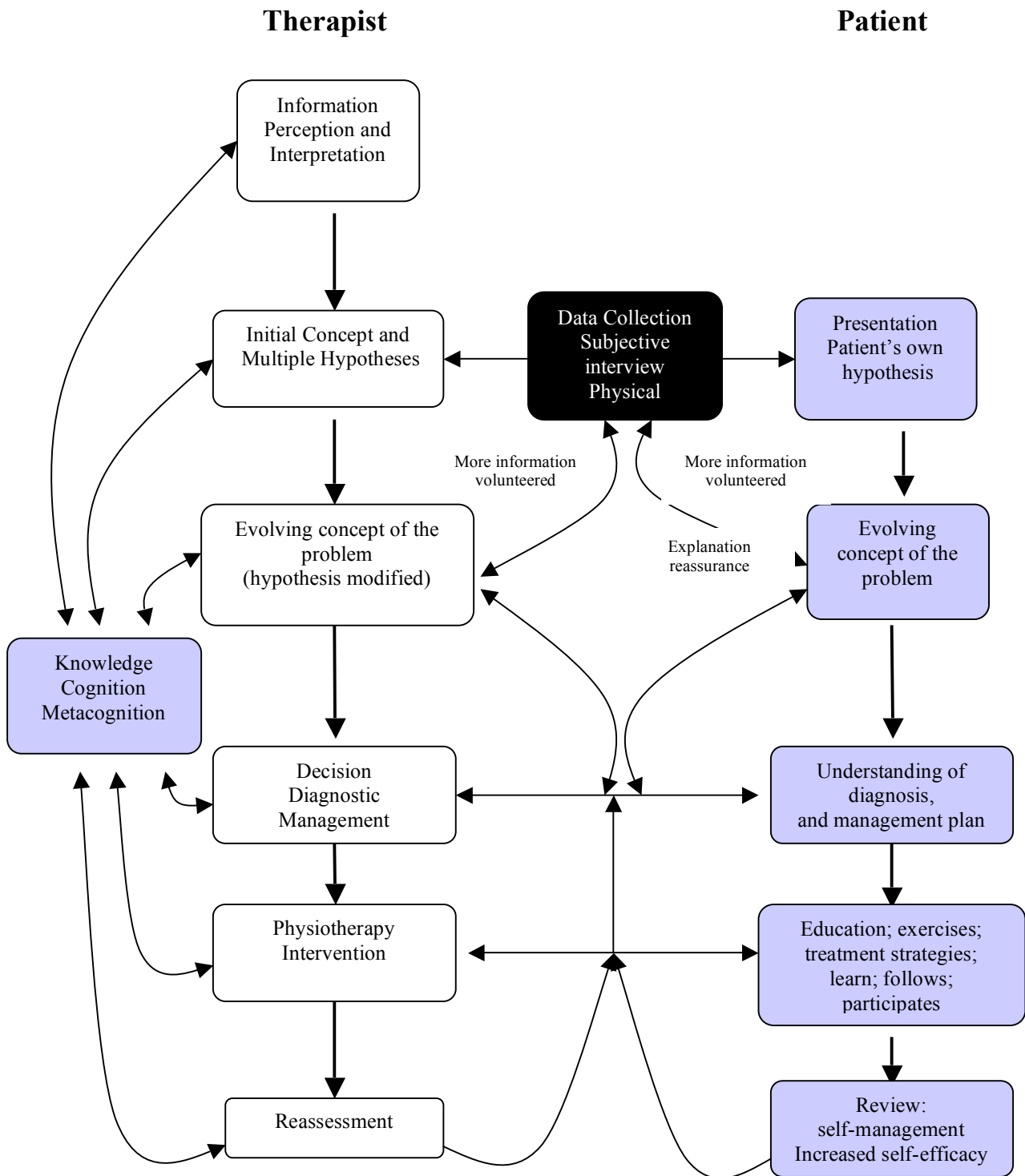
3.3.3.4. A collaborative model of reasoning

In the collaborative model of reasoning, the hypothetico-deductive orientation described previously in this chapter was maintained, but three new dimensions were added: mutual decision making, or the role of the patient in the decision making process; contextual interaction, or the interactivity between decision makers and the situation or environment of the reasoning process; task impact, or influence of the nature of the clinical problem or task (e.g. diagnosis versus patient involvement) on the reasoning process.

The new model emphasises the importance of context and the uniqueness of the clinical reasoning process. The context in which health care professionals operate contains a number of elements, which have important influences on the way they reason and practice. An example of these elements are: the personal context of individual clients; the unique multi-facet context of the client's clinical problem; the specific context of health care system; and the increasing body of professional knowledge.

In this model the therapist's clinical reasoning is paralleled by the reasoning process occurring in the patient. That is, patients have their own ideas and interpretations of their problem(s), which have been shaped both by previous experience and through the advice received from medical practitioners, family and friends. As the therapist progresses in the data collection process, strengthening hypotheses begin to be transformed in such a way that they can be understood by both therapist and patient (Jensen *et al.*, 1997). This transformation occurs as a reasoning process. From the mutual understanding of the hypotheses related to the overall problem(s), comes shared management options and commitment to the treatment/ problem solving plan. In this sense, collaboration is at the core of the model.

Figure 3.4. Collaborative clinical- reasoning process. Adapted from “Clinical Reasoning in Physiotherapy” by M. Jones *et al.*, 2000, p. 119.



3.3.3.5. Instrumental and Communicative Approaches to practice

The work of Edwards and collaborators (2004a; 2004b) was influenced by the critical social theory of Mezirow (2000), which distinguished between two different forms of learning and action: instrumental learning and action, and communicative learning and action. Instrumental learning and action (like hypothetico-deductive reasoning) has as its purpose the determination of cause-effect relationships, which lead to predictions about observable events that are either correct or incorrect. Hypothetico-deductive or instrumental reasoning and action involves physiotherapists engaging in critical reflection of underlying assumptions (i.e. hypothesis testing) behind the content and process of their own decision-making and knowledge structures. In instrumental action and learning, therefore, therapists' reasoned decisions, actions and subsequent learning are structured in a way where concepts of normality or what is seemingly correct underpin generalized interpretations. That is, treatment techniques may be selected and applied with their effects measured and predicted through reassessment often based on population 'norms' (Edwards *et al.*, 2006).

Communicative learning and action, however, is concerned with understanding what others mean when they communicate their perspectives about such things as intention, motivation, experience and values (Mezirow, 2000). It does not aim to establish cause-effect relationships but to increase insight and a common understanding of a situation through a mutual learning process between therapist and patient. In communicative learning and action, the learner (either therapist or patient) when confronted by an unfamiliar experience or dilemma (eg, ongoing pain) becomes aware through critical reflection of underlying assumptions or perspectives that he or she holds about particular situations (eg. past experience and beliefs concerning injury or physical therapy intervention). In this sense, communicative reasoning and action, involves physiotherapists endeavouring to understand the assumptions underlying patients' beliefs and decision-making and to communicate their own assumptions to the patient (Edwards *et al.*, 2004a; Edwards *et al.*, 2004b).

Instrumental and communicative action and learning encompass different views of knowledge. Edwards and collaborators (2006) used the "lens" metaphor to explain how clinicians could use both instrumental and communicative actions in clinical practice. When employing instrumental action and learning, such as, performing a specific joint test, clinicians look through a clinical reasoning 'lens' which enables them to see a decision or

action with respect to assumptions about knowledge, which are objective, measurable, predictive, and generalizable. When employing a communicative form of action and learning, clinicians use a ‘lens’ of reality as ‘context dependent’, ‘socially constructed’ and the notion of ‘multiple realities’ sheds a different analytical light on the interpretation of experience (Edwards *et al.*, 2006).

According to Edwards and collaborators (2006), the terms instrumental and communicative emphasise the respective implementation of hypothetico-deductive and narrative decision-making processes in various forms of clinical management. Despite acknowledging the importance of both types of actions, physiotherapists are generally more familiar with instrumental approaches to practice. Reasons for this are not clearly understood but may be related to the influence of the biomedical model in physiotherapy education and practice (Shepard & Jensen, 1990; Edwards *et al.*, 2006). For example, there is evidence that musculoskeletal physiotherapists’ perception, reasoning and management approaches may be constrained in clinical practice by a biomedical (or instrumental) reasoning ‘lens’ (Jorgensen, 2000; Rainville *et al.*, 2000; Ostelo *et al.*, 2003; Daykin & Richardson, 2004; Frost *et al.*, 2004; Latimer *et al.*, 2004; Houben *et al.*, 2005).

3.4. Summary

Cognitive theories, as much as they have contributed to the clinical reasoning theory, have failed to explain differences or variations observed between experts and novices. Holyoak (1991) summarise the inconsistencies found in contrasting studies of experts and non-experts in the following areas: 1) In some situations experts achieve mediocrity (Elstein *et al.*, 1978); 2) In some studies expertise and memory are not linked (Norman *et al.*, 1989); 3) Sometimes the search strategies for data gathering are highly varied and not identical for all novices and all non experts (Norman *et al.*, 1982; Norman *et al.*, 1985); 4) Despite the importance of the deep domain of specific knowledge, in some situations, this knowledge may not transfer knowledge across domains (Elstein *et al.*, 1978; Neufeld *et al.*, 1981). Despite the inconsistencies referred, clinical reasoning research using the cognitive empirico-analytical approach has demonstrated a number of common clinical reasoning processes and a variety of theories and models have been proposed to describe how individuals make clinical decisions. These models have been adopted and disseminated across allied health care professions with particular influence in the educational process of the new graduates.

However, many of the studies reported in the literature review had small numbers of subjects, used non-randomized samples, which limits the power of their findings (Higgs & Jones 2000), and there is little information about how these findings help novices to develop expertise (Norman *et al.*, 1987; Schmidt & Boshuizen, 1993).

Generally speaking, both the acquisition of knowledge and the way in which that knowledge is organised seemed to be important for solving diagnostic problems (Bordage & Lemieux, 1991; Schmidt *et al.*, 1990; Boshuizen & Schmidt, 1992; 1995). In physiotherapy, most of what is known relates to the instrumental approach to clinical practice, i.e. the hypothetico-deductive reasoning, and experience, domain specific knowledge and a well-organized knowledge have been identified as major factors in the clinical reasoning expertise. However, some researchers and theorists have questioned whether the hypothetico-deductive reasoning is appropriate for describing the processes used in physiotherapists' clinical reasoning (which appear to be largely task/domain-specific/contextual).

Moreover it is important to note that the design of these studies was built on the assumption that the complexity of a patient's condition can be reduced to a few basic complaints, such as particular signs or symptoms and that clinical reasoning is a matter of providing the right diagnosis and by consequence, appropriate treatment actions. It was with those assumptions in mind that expert' reasoning was firstly described and expertise defined. This approach has been criticized by areas outside medicine, by its excessive emphasis on diagnostic tasks, leaving aside other areas or aspects that should be investigated such as the role of the patient participation on the formulation of the clinical reasoning process (Higgs, 1990; Mattingly, 1991a). Restricting the understanding of decision making to diagnostic task poorly represents the nature of decision making as used in the real world of physiotherapy practice (Smith *et al.*, 2008).

Furthermore, the vast majority of clinical reasoning research has been done using simulations. Apart from Jensen (1990-1999) only in the recent years have researchers begun to investigate clinical reasoning in the actual situation (Edwards, 2004a). Simulations, however good, cannot duplicate the complexity of the real clinical setting (Tanner, 1983), and Jensen (1992) and others have noted the importance of context to clinical reasoning.

In contrast to this reductionist approach to clinical reasoning research, recent interpretative

research into clinical reasoning in physiotherapy has been focusing on the process itself, as it is experienced by its participants (clinicians and patients), rather than its end point of diagnosis. The findings recognized clinical decision making as a complex phenomenon comprising a range of reasoning processes or ways of thinking (Thornquist, 2001; Edwards *et al.*, 2004a) that vary according to the different tasks clinicians deal in their daily work and the difficulty and complexity of the decision (Smith *et al.*, 2008). The findings also indicate that decision making in practice requires an individualized patient-focused approach to patient's needs and characteristics not only in terms of the physical aspects but also the meaning that the problem has to the patient life (Smith *et al.*, 2008). The therapist must interpret observations of the patient's behaviour and actions in order to enter the patient's life-world and establish a collaborative process (Smith, 1986; Crepeau, 1991).

In summary, recent understanding of the clinical reasoning concept includes not only the understanding of the patient perspective but also the understanding of the nature of our own thinking and decision making as practitioners (Edwards *et al.*, 2006). The nature of the research approach used in recent physiotherapy studies about clinical reasoning implies that readers should decide whether or not the context and findings being described are sufficiently representative or similar to other practice environments. To date there are no studies in Portugal concerning clinical reasoning and it is unclear if the existing research is relevant and applicable to the Portuguese physiotherapy context. The present status of the profession in Portugal, the complex nature of physiotherapy decision-making, its contextual nature, and the absence of research in musculoskeletal physiotherapy in Portugal supports the need for further investigation of clinical reasoning from a Portuguese perspective, to more fully understand its nature.

CHAPTER 4

Clinical reasoning in undergraduate physiotherapy curricula

Current understanding about the nature of clinical reasoning in physiotherapy and other health professions challenges the traditional frameworks of professional education, and practice, as well as the role of new graduates. In this chapter, the educational impact of the underpinning research is discussed, considering the professional paradigm of Portuguese physiotherapists and its potential influences on how educational institutions are promoting clinical reasoning strategies in the next generation of physiotherapists. Since the education of physiotherapists in Portugal is basically related to entry-level education this will be the main arena of analysis.

The chapter is divided into four sections. The first section addresses the role of clinical reasoning in the acquisition of clinical effectiveness, knowledge generation and life-long learning, as well as the capabilities students should achieve to deal with the current and future challenges of the health care system. Section 2 discusses the professional paradigm and its influences on the education and practice of Portuguese physiotherapists in order to provide the reader with a better understanding of the dominant culture existing in the profession. It emphasises the potential influences of the beliefs and values underlying curriculum design and socialization processes in the clinical reasoning of Portuguese physiotherapists. Section 3 addresses the rationale of curriculum design and evaluation. The main characteristics of a curriculum and its underlying beliefs, values and ideologies are explored, in order to provide a framework of analysis for the present educational environment in Portugal. A final section deals with the curriculum evaluation framework used in this research in order to capture the current understanding of clinical reasoning among teachers and students and how it is being promoted in physiotherapy schools.

4.1. The role of clinical reasoning in undergraduate physiotherapy programmes

Clinical reasoning is widely advocated by different healthcare professions as a core competence of health professional education and effective practice (Higgs *et al.*, 2004; Ajjawi & Higgs, 2007; Ryan & Higgs, 2008; Smith *et al.*, 2008). It provides a tool for guiding students to deal with the knowledge, skills and attitudes required for their practice in order to turn them into competent physiotherapists (Carr *et al.*, 2000; Higgs *et al.*, 2004).

Besides its role in clinical competence and expertise, sound clinical reasoning is also recognized as central to professional autonomy and accountability. It enables practitioners to employ their existing capabilities in the task of making the countless decisions embedded in practice, and it provides a means of learning from practice; of testing and extending current knowledge and skills, providing opportunities for clinicians to engage in a lifelong learning process (Royeen, 1995; Higgs *et al.*, 2004; Ajjawi & Higgs, 2007).

Ajjawi and Higgs (2007: 137) stated that,

“...being both autonomous and accountable requires the combination of the ability to be self-critical and set internal standards in the pursuit of quality care, a commitment to ongoing professional development, and the ability to make context-relevant decisions in conditions of human complexity where protocols, guidelines and scientific evidence are tools rather than rules for practice”.

Recent research literature concerning clinical reasoning has emphasised aspects of clinical practice other than the biomedical/ hypothetico-deductive reasoning approach or pattern recognition, such as interaction, collaboration, teaching or ethical reasoning (Edwards, 2004a; Ajjawi & Higgs, 2007; Smith *et al.*, 2008). As a result of this development of understanding about the nature of clinical reasoning in allied health professions, other factors have emerged as relevant for clinical expertise for example, the capability of integrating and effectively applying thinking and learning skills to make sense of, learn collaboratively from, and generate knowledge within familiar and innovative clinical experiences (Christensen *et al.*, 2008a).

Considering the above developments, current understanding of clinical reasoning calls for education that focuses on preparation for practice considering the complexity of health care

environment of today and tomorrow. All over the world different authors argue that physiotherapy curricula need to focus on development of generic thinking and learning skills in addition to technical profession- specific content (Higgs *et al.*, 1999; Solomon & Baptiste, 2005; Christensen *et al.*, 2008a).

To meet the emerging challenges and expectations discussed above, current and future entry-level physiotherapists should be skilled clinicians who can react to change, integrate evidence into clinical decision-making, communicate effectively, educate and consult patients/families/carers and the health care team, and eventually assume administrative responsibilities (Higgs, 1999; Solomon & Baptiste, 2005). Clinical reasoning has a major contribution to make to this process, but it cannot be thought of only as the use of knowledge in practice, but also a means for generating and refining knowledge through practice (Higgs *et al.*, 2004).

According to Christensen and collaborators (2008a, 104),

“learning from clinical practice requires thinking and learning skills to be integrated and applied to both the *doing* of the clinical reasoning (for example dialectical thinking, and complexity thinking) and the *processing* of the experience of clinical reasoning (for example, reflective thinking, critical thinking and complexity thinking).”

Christensen and collaborators (2008b) supported the idea that the development of clinical reasoning abilities should be a priority for educators responsible for the quality of new members of the profession. In research conducted with the purpose of exploring how development of capability in clinical reasoning can be facilitated in the context of professional entry-level physiotherapy education, the authors identified key dimensions of capability, namely, reflective thinking, critical thinking, dialectical thinking, and complexity thinking (Christensen *et al.*, 2008a). These dimensions were often underdeveloped, disconnected or absent in the conceptions of and reflections on clinical reasoning of participants in the study. The authors concluded that their findings served to draw attention to the “lack of adequate attention to the learning of clinical reasoning” in the students’ courses (Christensen *et al.*, 2008a).

Another key finding reported in Christensen and collaborators’ study with Australian students, was that the learning and practice of clinical reasoning has high variability.

Students' opportunities to develop their clinical reasoning capability are more related to chance (for example in what concerns the quality of a clinical placement) than with a core component of their professional course, which often turns clinical reasoning learning into a self-directed journey for the participants (Christensen *et al.*, 2008a).

Ajjawi and Higgs (2007) also reported that clinical reasoning processes have not been transferred strongly enough into clinical practice and have been taught with a theoretical emphasis only. The authors emphasised the need to explicitly teach in formal education, the advanced skills of clinical reasoning required to function effectively in the workplace context. On the basis of these findings the authors contended that clinical reasoning should be recognised as a complex phenomenon that needs to be explicitly addressed in formal education in the classroom as well as in clinical education settings. Also, recognition needs to be given to the responsibility of academic teachers and clinical educators to continue to develop these advanced skills throughout their practice careers (Ajjawi & Higgs, 2007).

Academic physiotherapists need to possess well-developed clinical reasoning competences and the ability to reflect. These are considered relevant characteristics of expertise and are of great importance in the educational process. Correspondingly delivery of clinical reasoning abilities together with the theory to practice transfer is crucial for the physiotherapy entry-level education (Ajjawi & Higgs, 2007). Several authors argue that these skills cannot be developed solely through traditional teacher-centered teaching methods and demand that educators examine the process through which professional education occurs (Solomon & Baptiste, 2005). Traditional curricula tend to constrain clinical reasoning capability, whereas other curriculum approaches, such as, problem based learning, can facilitate students' processes of acquisition, organisation and retrieval of knowledge, and, to a certain degree, the transfer of knowledge and competencies across different problems (Schmidt, 1983; Norman & Schmidt, 1992; Regehr & Norman, 1996).

In the health professions, traditional curricula are usually "subject-based", in which theory and practical components of curriculum are taught prior to clinical placement (Shepard & Jensen, 1990; Morris, 2003), and where the main focus is on acquisition of clinical competencies (Higgs *et al.*, 2004). This type of curriculum design constrains knowledge integration and transfer to clinical contexts, development of effective clinical reasoning,

development of self-directed learning skills, and decreases interest in and motivation for learning (Barrows, 1986). For example, in occupational therapy students often express difficulties in integrating the knowledge acquired in different clinical and theory courses, such as pathology and occupational therapy theory, which compromise their ability to use communicative approaches to reasoning (Neistadt & Atkins, 1996).

This view of professional competence influenced by a theoretical knowledge tradition and the ideals of positivism, takes a dualistic perspective on knowledge as product, transferable from research, through education, into professional practice. In this framework professional competence is science based, implying the application of scientific theories to define problems in professional practice (Sandberg, 1994). Given the influence of the above tradition (biomedical) and its underlying assumptions, on the way new graduates interpret health and illness, their role as physiotherapists, as well as patient-physiotherapist relationship, there are reasons to believe that there are problems in the Portuguese undergraduate curriculum, regarding the way teachers and students cope with the current understanding of clinical reasoning. A traditional biomedical perspective tends to emphasise instrumental approaches to reasoning and practice (Shepard & Jensen, 1990; Neistadt, 1995; Hunt *et al.*, 1998) and may hinder development of an integrated conceptual framework of biomedical and psychosocial thinking, with consequences for musculoskeletal therapists' inquiries, interpretations and decision making in clinical practice (Edwards *et al.*, 2006).

4.2. Influences of the professional context on students' development of clinical reasoning

Every profession has its own frames of reference for understanding, its own tacit rules for how arguments are made, and its own traditions for what counts as a valid form of reasoning. These constitute the discourse of the profession (Saljo, 1994), and represent what has been called the professional paradigm (Noronen & Wikström-Grotell, 1999). A professional paradigm is the conscious internal model, which guides physiotherapists in their practice. In this sense, a paradigm gives the profession an identity, by defining the nature and purpose of the field of expertise. It represents the cultural core of the discipline and guides professional practice (Noronen & Wikström-Grotell, 1999). The development of one's professional identity, the adaptation of the value system of physiotherapy, and understanding of the role of physiotherapy within a specific healthcare system form the bases of professional culture

(Noronen & Wikström-Grotell, 1999). As participants in the educational process undergraduates gradually become members of the cultural and discursive community they are about to enter as professionals. The norms as for what is regarded as important and relevant are not determined by individual professionals; rather these norms constitute the socially shared and institutionally set framework within the limits of which professionals act out their roles (Mishler, 1986).

Despite similarities in professional identity across the world, differences in health care ideologies and in professional culture of a given country, produce differences in 'what lies within the field of vision of the profession', meaning for example, which factors are considered important in relation to health and illness (Jorgensen, 2000). It could be argued that the identity and value system of the profession in Portugal is strongly influenced by the traditional biomedical view of health and illness. Such a model has had a profound impact on how patients, and the society in which they live, interpret illness, as well as on physiotherapy practice and the patient–physiotherapist relationship. Illness, according to this model, is construed in terms of diseased or dysfunctional body parts separate from the overall integrity of the patient's body and the lived context (Thornquist 1994; 2001; Marcum, 2004; Edwards *et al.*, 2006). The dominance of this perspective has strong influences on educational programmes, the context of professionalism and the roles and tasks of Portuguese physiotherapists in their daily practice.

4.2.1. The Influence of the biomedical model in the education and practice of physiotherapy

Traditionally, the influence of medicine on physiotherapy has resulted in clinical practice models structured according to the biomedical model (Sim, 1990; Roberts, 1994). This model is based on a set of theoretical principles about human body functioning and the disease process, such as the normal/ abnormal, separation of body/ mind, reductionism, or the sequential progression. These principles are the basis of knowledge organisation in physiotherapy, influencing educational and clinical conceptions (Pratt, 1989; Richardson, 1992; Roberts, 1994; Thorquist, 1994).

From their beginnings, Physiotherapy education and clinical practice in Portugal have been very strongly influenced by the biomedical model of health and illness. Nowadays, the curricula of the majority of physiotherapy schools are still organized under a medical knowledge structure, meaning basic sciences, clinical sciences and internship. The majority of the curricular units are related to knowledge of normal (structure and function) and to knowledge and understanding of the abnormal or dysfunction. Identifying ‘abnormalities’ is a key role of any physiotherapist. From observed abnormalities physiotherapists formulate their goals and intentions of treatment.

The emphasis on ‘objective’ facts in physiotherapy education has influenced not only its subject-matter and the sequence in which it is presented, but also the order of priority in which it is placed. Disciplines such as anatomy, physiology and pathology have become the matrix of physiotherapy thinking. Thus, the aims of history taking and application of diagnostic procedures are to discover physical or movement abnormalities. The interweaving of psychological factors or social background does not seem to be meaningful enough in this context to be regarded primarily and in detail. Therefore issues of sociology and psychology appear minimized in educational programmes, and remain marginal (Burger, 2001).

Traditionally, the biomedical model of health and dysfunction has viewed patients’ disability and impairments as a reflection of their underlying tissue and system pathology (Main & Spanswick, 2000). This knowledge organisation emphasises signs and symptoms, with a focus on diagnostic reasoning. Recent advances in knowledge concerning the influence of psychosocial factors in health and illness, and the need to develop a biopsychosocial approach in physiotherapy practice, have led to increased awareness of collecting data about these factors. However, in many clinical situations, these factors are considered from the perspective of how they may be obstructing the normal recovery process and contributing to the patient’s clinical condition (Jones *et al.*, 2002).

This duality between the physical world (body) and the contextual factors in the physiotherapy practice has been confirmed in the literature. Thorquist (1994) carried out a qualitative study with Norwegian physiotherapists about how they analyse body and contextual findings from their clinical examination and concluded that they constituted two different worlds. The main concern of physiotherapists related to physical findings, but after

the definition of the patient's problem, the physiotherapist turns to other issues more related with phenomenological aspects of the patient's life.

It is reasonable to suggest that it is this generalization, which is the power of theory-based reasoning. The reasoning is directed towards classification and application of the best means (for example, treatment) to reach the end (for example, good health). But this may not always be congruent with the patient's concerns. In situations where the clinician is unable to find objective findings to justify the patients' complaints, patients are regarded as troublesome. By applying to them the term 'noncompliant' this problem is projected short-sightedly into the outer world (viewed by the physiotherapist) as objective attributes of the patient (Burger, 2001).

This dominant view of health and illness defines a specific way to see the world. Through professional education students and clinicians learn to give attention to selected features of the professional world and to reason about it in particular ways. This view or professional culture also develops through the structure of social interactions, which repeatedly take place in physiotherapy departments or during professional development activities (Richardson, 1999). In this sense those professional activities provide and promote socialization to the professionals. By defining the identity, nature and purpose of the field of expertise, they also shape the context of professionalism.

4.2.2. Professional Socialization and Professionalism

Professional socialization refers to the development of individuals as they become members of a profession (Higgs & Bithell, 2001). Professional socialization starts at the beginning of the educational programme and is a continuous, life-long process of learning formal knowledge, skills and rules, as well as informal and tacit knowledge, norms, values and loyalties within the profession (Ohman *et al.*, 2002). The process of socialization occurs through a network of situational social exchange from which students imperceptibly assimilate the values, attitudes and beliefs of their profession and develop a commitment to a professional career (Richardson, 1999). This process of situational social exchange will lead them to identify particular problems and to use particular methods and strategies to solve or manage them. In this sense, professional education will determine how new graduates

perceive the purpose of their profession and the paths which they see as working towards achieving their professional goals (Richardson, 1999).

Richardson (1999) suggested that members of a group would think similarly and, by their actions and interactions, reinforce behaviours that are acceptable to the group. These interactions and influences may convey underlying expectations and values that determine how a therapist behaves in a given situation. Acquisition of this set of principles, attitudes and behaviour standards and patterns, through socialisation and its application in practice, is closely related with the notion of ‘professionalism’.

Professionalism is a term commonly used to define the manner adopted by professionals in the conduct and organisation of their work. In contrast with professionalization, the term professionalism is used to characterize the professional behaviour that will maintain the status of a profession in a static practice environment (Richardson, 1999). Campbell (1983) stated that, “professionalism embodies an acquisition of understandings, skills and techniques, which enable clinicians to relate to the community they serve” (p. 249).

Beyond specific behaviours and attitudes other authors emphasise professionalism as an ideology, characterized by the traits and features of an “ideal type” profession (Eraut, 1994). Accordingly, professionals are expected to practise with integrity, personal tolerance, to communicate effectively, and to demonstrate social responsibility, accountability and recognition of their limitations. This means that as individuals, health care professionals' personal values may vary, but as members of their professions, they are expected to share and uphold those values that characterize the practice of their profession.

Following the above perspective, professionalism usually encompasses those attributes and behaviours that serve to maintain the interest of the patient above one's own self-interest, namely:

- A commitment to the highest standards of excellence in the practice of the health profession and in the generation and dissemination of knowledge.
- A commitment to the attitudes and behaviours that sustain the interests and welfare of patients.

- A commitment to be responsive to the health needs of society.

In physiotherapy, the American Physical Therapy Association proposed a set of core values for the practice of physiotherapy: Physiotherapists should consistently demonstrate core values by aspiring to and wisely applying principles of altruism, excellence, caring, ethics, respect for others, communication and accountability, and by working together with other professionals to achieve optimal health and wellness in individuals and communities (Stern, 2006). In this framework, the interest of the patient lies above self-interest, and is considered an indispensable attribute of a health professional transcending his/ her technical abilities, scientific knowledge, and even his/ her attitudes of compassion and caring. In this sense, and to remain professionals, dignity and understanding must permeate all professional interactions, meaning all clinicians' thinking, teaching, learning, and listening.

The above perspective emphasises the role of the patient in the decision process and challenge the nature of the clinician-patient relationship. At its most fundamental level, the practice of physiotherapy and other health professions should not be regarded as a science, or an art, even though each of these elements is essential. The practice of physiotherapy is rooted, instead, in a relationship between the patient as a person and the clinician as a professional.

The above notion has been explored recently under the concept of agency relationship (Ryan, 1994; Vick & Scott, 1998). The concept of agency relationship has become widely accepted in health-economics, as the health-care market seems to fit into the standard agency relationship that is characterized by a principal (ill-informed individual) and an agent (informed individual), who are attempting to maximize their utility functions. The patient/principal sets the objective and the health professional/agent is the decision maker who is supposed to act on behalf of the patient and maximize his/ her utility. The agency relationship arises because of the asymmetry of information between the health professional, who possesses superior health information, and the patient, who possesses superior information on his/ her preferences over treatment options. A health professional working as a perfect agent would make the same decision as the patient would were the patient to be party to the same clinical expertise as the health professional.

Traditionally, physiotherapists like other health care professionals, started their careers having in mind the idea of working in the patients' best interests. Working in patients' best interests might be thought of as a kind of paternalism if anyone other than the patient determines 'best interests'. This is especially problematic as patients' interests could be said to lie fundamentally in achieving the best clinical outcomes, a matter on which health professionals are trained to know more than patients. However, evidence about best interests now also includes findings which show that other types of patient-centredness may actually also be in their best interests. For example, involving patients in decisions about their care may affect behaviour (Mead & Bower, 2002). Also it is important to remember that improving health status may well depend on patient preferences and values. This means that in order to fulfil patient' needs, clinicians should be willing to take reasonable risks to themselves when required to do so to meet the needs of patients. This does not mean doing the most for patients but doing what will benefit them clinically.

Trede and Higgs (2008) points out that in today' health care practice the influence of the biomedical discourse remains dominant and in many situations the decision making power is exclusively assigned to health professionals. Clinicians who see themselves as the expert authority who know best might find it confronting to have patients collaborate and "contaminate" their decisions based on best practice. They assume that patients come to them to get advice and comply with it. In these circumstances the focus of the decision-making is based on certainty and prediction of biomedical aspects and the patients' collaboration is only necessary when outcomes of decisions are unpredictable and uncertain. However, taking a collaborative approach means understanding the patient in a wider context (his or her illness experience, perceptions, values, social and psychological circumstances), and then bringing that understanding to bear on the medical issue. This involves a more complex relationship between the clinician and the patient, which may be difficult to develop and sustain in traditional biomedical environments, and where the professional paradigm is almost exclusively focused in providing the patient with the best technical abilities and scientific knowledge.

The above challenges the traditional view of professionalism in health professions. From the conventional representation of the paternalistic health professional practising in the interests of the patient, clinicians are now invited to rethink their role and the nature of the relationship

with their patients, giving more attention to sharing their power and decisions and looking for the patients as partners rather than a passive recipients of care (May *et al.*, 2004). Considering the level of professional development of the Physiotherapy profession in Portugal and the current professional paradigm, the notion of professionalism in Portugal seems to be strongly rooted on the medical model, where the main role ascribed for the patient is to adhere to clinicians' orders and advice. This dominant culture embodied in physiotherapy in Portugal influences the way clinicians' practise, reason and develop expertise. It also shapes the concept of expertise, the focus of reasoning, and how this develops through models of professional practice.

4.2.3. A Model of professional practice

Models of professional practice convey different views about the respective roles of professional and patient, the goals of specific types of healthcare, and the beliefs and values that ought to underpin the practice. Historically, physiotherapy practice was rooted in the biomedical model of care (Sim, 1990; Roberts, 1994; Moore, 2004). In this model, the notion of expertise is closely linked to the main roles of the physician. New graduates are invited to improve their knowledge and ability to make diagnoses and manage health diseases. To peers and patients, the notion of being an expert is closely related to the ability to find the patient's problem and to correct the cause of that problem. An expert in a specific field (eg. musculoskeletal disorders) is someone with deep biomedical knowledge and mastery in performing physiotherapy techniques.

Working in this model, physiotherapists focus their practice on understanding patient's symptoms or the patient's disease. Assessment is usually driven by the clinical problem (e.g. pain), looking for 'abnormalities' that could justify its origin. Discovering the origins of a patient's problem helps the clinician to define the appropriate treatment to apply. Marcum (2004, p. 311) stated that "working from the biomedical model, today's clinicians' operates primarily as a technician, whose clinical gaze is focused neither on the patient as a whole nor on the patient's living context but exclusively on the diseased body or body part". Through this model, physiotherapists emphasise the clinical-technical competence supported by a more scientific knowledge base within the context of professionalism (Higgs & Bithell, 2001).

The biomedical model of the body has also had a profound impact on the patient–physiotherapist relationship. In the biomedical model the patient has a passive role. In clinical encounters the physiotherapist is the authority figure with all her/his technical knowledge, skills and expertise to discover the cause of the patient’s complaints, or to treat and ensure recuperation. Examination, diagnosis and treatment are issues that concern the physiotherapist. In this model, health professionals work on the assumption that patients’ acceptance of professionals’ advice would improve or ensure a positive outcome whereas rejection might compromise health or recovery. The practitioner assumes a paternalistic role, implicitly keeping the patient’s best interests in mind while focusing on the disease or condition with little weight given to the patient’s concerns or beliefs (Barr & Threlkeld, 2000).

A more contemporary viewpoint sees practitioners and patients as partners in designing an intervention to maximize outcomes while considering the ‘problem’ within the context of the patient’s life. This patient-centred approach emphasises physical, personal and social aspects of patients’ conditions (Jette, 1994). The patient-centred approach emphasises the role of patients in decisions made during the clinical encounter. For example, agreed goals, are a common feature of physiotherapy programmes. Therapist and patient decide together what the aims of treatment will be, and work towards these stated goals (Partridge, 1997).

The patient-centred approach is frequently used by expert practitioners who believe teaching and guiding patients is more effective than ‘doing for’ them (Jensen *et al.*, 1999; Jensen *et al.*, 2000). In fact, there is evidence from the literature that involving patients in the decision making process about their treatment may be beneficial in two related ways: firstly in terms of the extent of adherence to programmes of treatment and management, and secondly in encouraging patients to take more control over their own treatment and management (Partridge, 1997; Klaber Moffett & Richardson, 1997).

In terms of cooperation, transition from a clinician-centred care model to a patient-centred approach has necessitated a shift in thinking from the notion of patient compliance, with advice and directions provided by physiotherapists, to the concept of collaboration, where

goals and strategies for therapy are jointly planned and negotiated (Payton *et al.*, 1998; Richardson, 1999; Edwards *et al.*, 2004b).

Moore (2004) argues that in practice there is probably a spectrum of paternalistic and autonomous activities that take place in each clinical intervention involving both clinicians and patients. In spite of adopting one or another model of practice, clinicians need to learn how to practise in this spectrum. Moore (2004) stated that in some circumstances it may be necessary for the clinician to assume a paternalistic role, focusing on the patient's condition with the patient's interests at heart, and with very little opportunity to explore patient's concerns, issues and or beliefs.

The way in which a profession views and interprets expertise is deeply embedded in the way the profession is conceptualised, practised and managed. Despite advances through a more biopsychosocial approach, physiotherapists in Portugal seem to keep the focus of their practice on understanding patient's symptoms or the patient's disease (biomedical paradigm). This perspective influences the way clinicians conceive the focus and reason for their practice, their notion of professionalism, but also the way the profession prepares the next generation of future physiotherapists.

4.3. Professional entry-level education

Professional entry-level education is a major determinant of the shape of the profession's future. The purpose of professional entry-level education is to graduate competent beginning physiotherapy practitioners (Higgs *et al.*, 2001). Beginning practitioners are health science graduates who have achieved the level of competence and range of expertise expected on entry to their profession, as well as a lifelong commitment to professional development and competence enhancement (Higgs *et al.*, 1999).

Professional education programmes can, and are expected to, have a key role in contributing to students' understanding of the profession they seek to enter. Students' understandings of professions such as physiotherapy develop over time and are not only cognitive, but also embodied (Richardson, 1999; Lindquist, 2006) not only individual, but also related to and derived from the profession (Richardson, 1999). Through entry-level education

physiotherapy students become clinicians who practise according to a model of what they believe physiotherapy is and what they think physiotherapists do. Teachers and clinical educators convey their model of physiotherapy to students, at undergraduate and postgraduate levels, through different components of the curriculum. In this sense, the curriculum physiotherapists decide to offer to students will depend to a large extent on the view of the profession within which they work and is underpinned by a set of values and beliefs about what students should know and how they come to know it (Fraser & Bosanquet, 2006; Prideaux, 2003a).

The changing nature of the cultural, historical, political, economical and environmental context in which physiotherapy is practised must be taken into consideration in physiotherapy curriculum design and evaluation. The healthcare context of physiotherapy education clearly influences the type of graduate we should be seeking to produce and the challenges these graduates will face in the workforce. In other words, the curriculum in physiotherapy does not exist in isolation but reflects the changing nature of society and its emerging themes and it is an important tool to understand the beliefs, values and professional perspectives concerning new graduates in physiotherapy.

4.4. Defining the Curriculum

The literature is enormous and rich concerning curriculum definitions and there is no general agreement on which aspects of a course constitute its curriculum. Indeed, the many available definitions tend to emphasise different aspects as can be seen from the following examples.

Tanner & Tanner (1980, p. 14) defines curriculum as “the planned and guided learning experiences and intended learning outcomes, formulated through the systematic reconstruction of knowledge and experiences, under the auspices of the school, for the learners’ continuous and wilful growth in personal social competence.”

Barrow (1984, p. 11) provides a clear definition in describing the curriculum as a programme of activities by teachers and learners – so designed that learners will, as far as possible, achieve specific educational and other school objectives.

A more recent definition of curriculum is offered by Kelly (1989, p. 11) in which he stated that curriculum relates to “the overall rationale for the educational programme of an institution“.

Harden (1999) suggested that the traditional concept of a curriculum included two elements: the content or what the students studied; and the examinations, which were designed to assess the extent to which students had learned the content. This view of the curriculum has been further expanded to include the learning methods and educational strategies adopted, and later to include the aims and objectives of the programme (Harden, 1999). The above concept of the curriculum refers to the totality of the education programme and, as such, is considered appropriate for the preparation of a student who will enter a practice-based profession. This broad definition includes the intended and unintended information, skills, and attitudes that are communicated to students in schools. This definition also permits consideration of curricula based on several content sources and planned for different purposes of education.

On the basis of the previous definitions it appears that the curriculum is a broad concept, which includes all the planned learning experiences of an educational institution (Prideaux, 2003a). If the curriculum is defined more broadly than syllabus or course of study then it needs to contain more than mere statements of the content to be studied. Prideaux (2003a) refers to four important elements in a curriculum: content, teaching and learning strategies, assessment processes, and evaluation processes. The process of defining and organizing these elements into a logical pattern is known as curriculum design (Prideaux, 2003a).

4.5. Curriculum Design

The contexts for designing and implementing a curriculum are diverse. They usually reflect the nature of the subject, the ethos and policies of an institution, between institutions and employers, and a range of external influences that reflect the needs of professions, employers and society more generally. The latter are particularly important in encouraging change and movement away from traditional forms of teaching, learning and assessment, but also in changing the traditional views about the role of a profession.

The philosophy and rationale that underpin a curriculum are arguably the most important aspects of the design process. Course philosophy and rationale are normally embodied in a

set of principled statements that represent what the course and course team believe in and stand for. Such statements contain within them the educational and social principles and disciplinary values that have shaped decisions about the course, including the curriculum's designers' views of what is important for a student to achieve and how it is achieved. Done well, the principled statements within the course philosophy and rationale should rationally underpin, guide and flow into all other aspects of curriculum design and decision making, including learning goals, content, teaching and learning methods, assessment strategy and methods, evaluation and course review.

Usually the approach to curriculum design begins with the question, *'What do we want students to be able to do as a result of learning?'* The intended learning outcomes for students then become the objectives for designing a curriculum that will enable these outcomes to be achieved and an assessment process that enables these things to be demonstrated, and the quality of students' achievements to be evaluated. In contrast to many other countries, such as United Kingdom, Canada or Australia, there are no professional or educational standards that help in organizing undergraduate physiotherapy courses in Portugal. In any course the teaching staff can give a different emphasis to particular aspects of the profession, selected topics to include or exclude and decide about the whole curriculum's structure and organisation. Since curriculum design could be approached in very different ways, knowing the principled statements, course philosophy, learning goals, and the way a given curriculum is structured and organized could provide insight into the core beliefs of a given course and facilitate understanding of the educational and social principles, and professional values that shape decisions about the course.

In this study it was particularly relevant to address how undergraduate courses approached curriculum design since different notions of curriculum encompass different views or emphasis of the educational process. Considering current clinical reasoning research, these different perspectives could facilitate or restrain specific approaches to reasoning and practice. Kelly (1989) provided a framework that defined three main viewpoints that teachers could hold when designing a curriculum: curriculum as content, curriculum as a product, and curriculum as a process.

4.5.1. Curriculum as content

The view of the curriculum on the basis of content underlines a perspective of education as transmission (Kelly, 1989). This is an approach centred on acquisition of knowledge “whether seen as intrinsically valuable or economically useful” (Kelly, 1989, p. 110). From this perspective knowledge is conceived as existing independently. It represents a body of theory, which has been developed, refined and tested over time. The emphasis is placed on the technical, rational aspects of knowledge, which helps to give greater control over the world, rather than on personal or professional knowledge. Education is seen as introducing students to activities that are worthwhile. In curriculum design and planning, content and its selection are central aspects of this model. If knowledge consists largely of information, facts and concepts, the role of the teacher is to go through it, select what is most important for students to know and transmit that to them.

Traditionally, the design of most health care courses has followed the structure of knowledge in the discipline. Programmes are divided into units and topics based around important concepts, and each topic structured in some rational way (Toohey, 1999). Because information is considered important in its own right, traditional curriculum designers often pay little attention to whether or not students use the information in any real-life context (Beane, 1991). The important point to notice here is that whatever logical basis is used to structure the course, it exists within the subject matter itself and the way in which the discipline is usually organized. It is not related to student interests, the way people learn or the ways in which problems present themselves in everyday life.

4.5.2. Curriculum as a product and education as instrumental

Kelly (1989) suggests that this type of curriculum can be seen as a way of turning the practice of education into an instrumental activity, meaning that this model of curriculum planning assumes educational process as linear and reduces education to a set of pre-specified objectives. The objectives model does not take into account the inner characteristics of human behaviour and acts as if those characteristics were similar to inanimate objects. This leads to teaching that cannot be described as education, but may be described as training or ‘indoctrination’ (Kelly, 1989).

More recently this view of the curriculum has recently changed to include a more open perspective based on the intended learning results and outcomes- ‘outcome-based’ education (Harden, 1999). Harden (1999, p. 7) uses the following definition: “Outcome-based education is an approach to education in which decisions about the curriculum are driven by the outcomes the students should display by the end of the course. In outcome-based education, product defines process”.

In the curriculum design and development process, educational outcomes should be clearly specified. Decisions about content and how it is organised, educational strategies, teaching methods, assessment procedures and educational environment should be made in the context of the stated learning outcomes. Thus outcome-based education has two main requirements (Harden, 1999):

- Learning outcomes are identified, made explicit and communicated to all concerned, including students, teachers, the public, employers and other stakeholders.
- Educational outcomes should be the over-riding issue in decisions about the curriculum.

Staff should consider course content, teaching methods, educational strategies and time allocated, in terms of learning outcomes achieved by the course. It should be made explicit, for example, through study guides, how the course contributes to the learning outcomes.

In general, outcome-based education can be summed up as ‘results orientated thinking’ and is the opposite of ‘input-based education’ where emphasis is on the educational process rather than results. In outcome-based education, the outcomes agreed for the curriculum guide what is taught and what is assessed (Toohey, 1999).

4.5.3. Curriculum as a process and education as development

This approach creates the notion of education as a way of promoting human development, and as a process of continuous growth and development through articulation of the principles of procedure and practice. This model allows an interactive relationship between teacher and students and provides the teacher with a set of principles for a constant professional judgment, promoting flexibility, appropriateness and therefore development (Kelly, 1989). The essence of this approach encompasses the principles inherent in the pre-specified overall

aims to inform and guide subsequent practice. It sees the individual as an active being, who is entitled to have control over his or her destiny, and consequently sees education as process by which the degree of such control available to each individual can be maximised (Kelly, 1989).

The different viewpoints that underpin curricula design, as described by Kelly (1989), raise several issues concerning a wide range of areas: epistemological assumptions of knowledge; validity of knowledge claims and justification of educational prescriptions. These issues are centred in aspects related to ideology, culture, value systems, instrumentalism/ indoctrination, inadequacy of the learning process and linearity in the process of education. They reflect a given professional paradigm that shapes reasoning and practice of future physiotherapy graduates.

4.6. Curriculum evaluation in health education

Curriculum evaluation can be defined as the systematic appraisal of the quality of teaching and learning (Popham, 1993). It refers to the process by which a judgement is made about the merit of a curriculum or its appropriateness for the individual, group, organisation offering it, or the society within which it operates (Coles & Grant, 1985; Melrose, 1998).

In general the purposes of curriculum evaluation are to help educators of health professionals improve educational programmes, through identification of weaknesses and strengths in the teaching and learning process, to validate courses or programmes, or to promote curriculum change. Wells (1989) grouped these differences in purpose by saying that curriculum evaluation is aimed at two broad areas: 1) establishing student achievement of the programme' learning intentions; 2) monitoring students' learning experiences whilst they are undertaking a programme of study.

Generally speaking, the outcomes of curriculum evaluation provide the rationale for decision-making that may justify maintaining certain components of the programme as they are, or suggest modifications or reorganisation. Curriculum evaluation should provide data on the appropriateness, effectiveness and efficiency of those aspects being evaluated. Evaluation may focus on school curriculum programmes, units and activities. While evaluation is an

ongoing process, it may also take place at the conclusion of a programme, unit or period of time. Regular and systemic evaluation will lead to programmes that are current, relevant and sensitive to the changing needs of students, stakeholders and society.

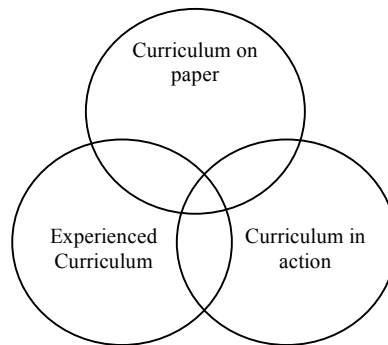
Curriculum evaluation has been a major area of concern especially among medical and nurse educators. In nursing literature curriculum evaluation has been approached differently in three broad areas: outcome analysis following basically the ‘behavioural objectives’ tradition drawn from Bloom *et al.*’s taxonomy of knowledge domains (Tomlinson & Birchenhall, 1981; Anderson & Krathwohl, 2001) content evaluation, where specific content, such as pharmacology content in nursing programmes, is addressed; process evaluations where the process whereby content is delivered and experienced by students, teachers and clinical supervisors, has been analyzed (Roxburgh *et al.*, 2008).

Compared to the amount of educational literature on medical and other healthcare professions, literature on curriculum design in physiotherapy is scarce. Broberg and collaborators (2003) reported that in the past 10 years before the publication date of his article, only one article had been published describing a comprehensive curriculum model for physiotherapy. Besides that the majority of studies concerning physiotherapy curriculum addressed particular areas of content, such as, inclusion in undergraduate physiotherapy programmes of: pain topics (Scudds *et al.*, 2001); joint manipulation (Boissonnault *et al.*, 2004), anatomy (Mattingly & Fleming, 1994), and rheumatology (Westby, 1999; Almeida *et al.*, 2006).

4.7. Models for curriculum evaluation in health education

Curriculum evaluation can be undertaken from a variety of perspectives and using a range of methods. It usually involves a complex process of data collection and analysis for the purpose of making judgements about its merit on the basis of which developments may occur (Coles & Grant, 1985). In the medical literature, Coles and Grant (1985) provided a model of curriculum evaluation (figure 4.1) in which the curriculum is divided into three overlapping circles: the “curriculum on paper”, the “curriculum in action”, and, the “experienced curriculum”.

Figure 4.1. The curriculum according to Coles and Grant (1985). Adapted from “Curriculum Evaluation in Medical and Health-care Education” by C. R. Coles & J. G. Grant (1985). *Medical Education*, 19 (5), 405-22.



The “curriculum on paper” includes what is written about the curriculum in documents, committee reports, etc., and what faculty says about the curriculum’s aims and goals and planned educational material. This curriculum (also called intended curriculum) includes much of what is taught and it is publicly announced in school syllabuses, course brochures, or school websites. For a given programme, the “curriculum on paper” may include what might be part of a course syllabus or reading materials, including learning objectives and planned teaching, learning and assessment strategies.

The curriculum in action is defined as how the curriculum on paper is actually implemented in practice. It consists of what is successfully implemented from the curriculum on paper in resultant formal educational sessions and informal moments of both educational and values transmission (Murray-Garcia & Garcia, 2008). Such sessions include what actually is covered in the course of lectures, small-group sessions, and other activities outlined in the curriculum on paper. The curriculum in action also encompasses aspects that programme planners did not plan or intend to communicate to learners, including informal or spontaneous dialogues or sessions related to the curriculum on paper and its implicit values (Murray-Garcia & Garcia, 2008). It includes beliefs, values, expectations that are passed down from academic and clinical school members to students. These values, beliefs and expectations are not part of the “curriculum on paper” but nevertheless are learned by students as part of their academic and clinical experiences (Murray-Garcia & Garcia, 2008). Physiotherapy students will be influenced by the socialisation model transmitted by academics and clinical educators according to what they believe physiotherapy is and what they think physiotherapists do. The way teachers, clinical educators and other physiotherapists speak, act or react to various

situations, do not form part of students' formal learning but are very important to their socialization as members of a profession.

Finally, the “experienced curriculum” is what students actually do, how they study, what they come to believe most strongly they should be doing or focusing on, the learning that occurs, and the outcome of their learning from the students' perspective. It is defined by content students read and see acted out, intentional or not, and is closely tied to an educational institution's written and unwritten reward system.

Students and new graduates of physiotherapy will be the product of interaction between these three types of curricula. Their graduate profile and vision of the role of the profession in health care are regulated by what is formally thought, the ethos of the schools they experienced, what they were not taught or allowed or were conscious of learning. Coles and Grant's model indicates the importance of different aspects -what is written on paper, what is presented through teaching, and how all this is learned by the students (Remmen, 1999). Accordingly, a curriculum cannot be seen as merely a list of objectives. In fact, what students learn can be quite different from what they are supposed to learn. What they are supposed to learn is determined by choices that have been made, and are being made constantly, in the organisation and process of physiotherapy education.

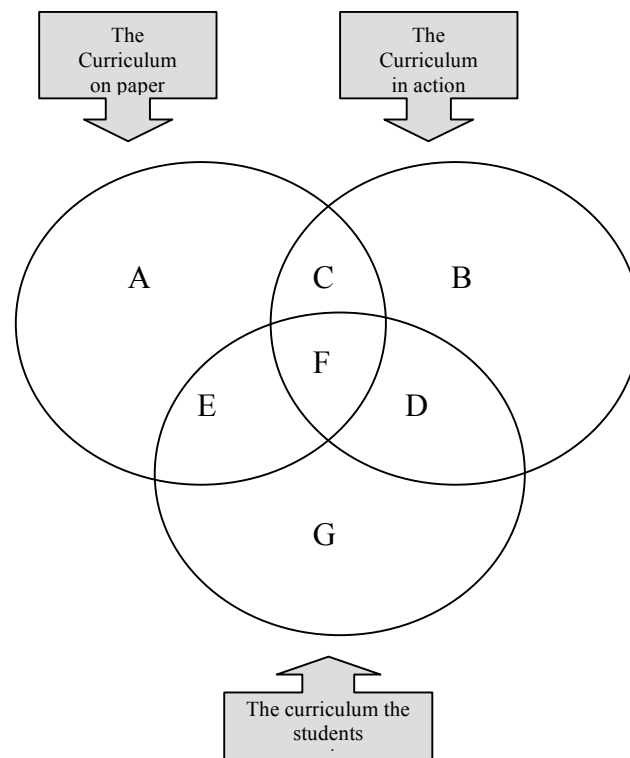
4.8. A model to evaluate how clinical reasoning is emphasise in the Portuguese undergraduate curricula

Considering the aim and goals of this investigation and the absence of information concerning the curriculum of undergraduate physiotherapy courses in Portugal, Coles and Grant's model falls somewhat short of the purpose, which is to investigate the current understanding of clinical reasoning among teachers and students and how it is promoted and achieved, in undergraduates' musculoskeletal courses. Such understanding should permit description of relations between different parts of a curriculum. Furthermore, the central importance of the ethos, or school philosophy concerning clinical reasoning strategies should be adequately addressed.

Murray- Garcia and Garcia (2008) provided an adaptation of Coles & Grant's model better suited to the purposes of this investigation (figure 4.2.). The authors elaborated on the 'mismatch' between the rings, which help provide more insight into the different components of a particular school/ course curriculum regarding issues of clinical reasoning. Considering the initial Coles and Grant diagram (figure 4.1.), each of the areas was sectioned by the overlapping of the three general components and labelled in figure 4.2. as (A) through (G).

Area (F) represents the ideal area, which means that what has been planned was also taught and learned, both in formal curricular activities and in the informal relations and discussions with the teachers, clinical educators and other staff. This area defines what the school/ course wants to maximize, wherein what it was intended would be taught is actually taught and modelled and is, ultimately, learned (experienced and internalized) by the student (Murray-Garcia & Garcia, 2008).

Figure 4.2. Adapted from "The Institutional Context of Multicultural Education: What Is Your Institutional Curriculum?" by J. L. Murray-Garcia & J. A. Garcia, 2008, p. 647. Based on the original model of Coles and Grant (1985).



Area (A) defines curricular goals that may have been written in a programme syllabus, but did not get put into action and, thus, were not experienced by students. This curricular ideal is, thus, never put into action, nor does the student experience it (Murray-Garcia & Garcia, 2008).

Area (B) represents the undesirable behaviour not directly experienced by students. It involves that which was spoken or acted out by teachers, clinical educators and other staff, but was not intended as part of the curriculum, or was even contradictory to the values and beliefs of the curriculum on paper (Murray-Garcia & Garcia, 2008).

Area (C) represents those components of the curriculum's written goals and ideals that have indeed been put into action but have not yet been directly experienced by students (Murray-Garcia & Garcia, 2008).

Area (D) reflects aspects of institutional curriculum not intended by or consistent with the formal curriculum on paper but, nonetheless, taught and experienced by trainees and students (Murray-Garcia & Garcia, 2008). For example, students can learn, in an informal way, a lot about things they were not expected to learn. A part can be 'experienced' by the students, but is neither mentioned in the students' guide (curriculum on paper or intended curriculum) nor taught (curriculum in action), and is also referred to as the 'hidden' curriculum. The hidden curriculum may also have a greater effect on the development of students' characters. It is related to the ethos of the school, and is important to the stability and effectiveness of academic institutions. Academic and clinical educators, consciously and unconsciously, are constantly modelling personal and professional behaviours from which students draw quite profound cues on how professionals are supposed to behave, for example expectations for life long-learning, critical thinking, or openness to innovation (Shepard & Jensen, 1990).

Area (E) represents things learned, consistent with the programme's ideals, even though programme planners did not formally teach them. Finally, area (G) represents the part of the institutional curriculum not formally taught, not intended, but nonetheless experienced by students (Murray-Garcia & Garcia, 2008). It could involve courses that are not offered, topics that are ignored, but also reasoning processes or illness perspectives neglected by schools/courses. This area overlaps with concept of "null curriculum". To Eisner (1994), what is not

taught, gives students the message that these elements are not important in their educational experiences or in the profession. So courses/ schools have consequences not only by virtue of what they do not teach, but also by virtue of what they neglect to teach. What students cannot consider, what they do not process and are unable to use, have consequences for the kinds of professional lives they lead.

Running in and around these circles is an ethos, or philosophy, of institutional vision about practice and reasoning held by teachers and students in a particular school/ course. The above model will assist in addressing and identifying those dimensions of school/ course curricula that characterize the current perspectives of clinical reasoning held by musculoskeletal physiotherapy teachers and students as well as the strategies used to promote them in undergraduate musculoskeletal courses in Portugal.

4.9. Summary

Chapters two to four outlined the background underpinning the aim of this research. Through the review of theoretical and data based literature some of the factors influencing the scope of physiotherapy practice in Portugal were described and analysed (chapter 2). After a period where the main goal was the coverage of health care to all the population, the systems are now confronted with a new strategic orientation towards a more positive approach to health education and promotion. These changes have important implications for health professional education programs and professional practice. In an environment of increasing demand for collaboration and patient' empowerment, professionals are required to change their traditional ways of practising and move to a more collaborative patient centred model.

The present status of the physiotherapy profession in Portugal was also addressed and comparisons were made with countries where recent research on clinical reasoning has emerged. The current level of autonomy of Portuguese physiotherapists as well as the close links with a traditional biomedical model of practice and reasoning were present as factors that could constraint the implementation of a collaborative patient-centred approach.

In chapter 3 clinical reasoning models were presented. The chapter reviews the theoretical and empirical literature related to clinical reasoning in order to analyse the main concepts fundamental to the study. The review covers what is currently understood in clinical

reasoning models in musculoskeletal physiotherapy practice globally, and the factors influencing clinical reasoning. In contrast with the preliminary studies who investigated the clinical decision making process in physiotherapy (Payton, 1985; Thomas Edding, 1987; Rivett & Higgs, 1997; Doody & McAteer, 2002), recent research showed that the reasoning processes extend beyond the view of clinical decision making as determining diagnoses of physical dysfunctions and pain and choosing interventions (Smart & Doody, 2003; Edwards *et al.*, 2004; Smith *et al.* 2008), and is now regarded as being a collaborative activity (Jensen *et al.*, 2000; Edwards *et al.*, 2004a; Edwards *et al.*, 2004b; Ajjawi & Higgs, 2008; Smith *et al.*, 2008).

Finally in chapter 4, the role of clinical reasoning in the acquisition of clinical effectiveness, knowledge generation and life-long learning, as well as the capabilities students should achieve to deal with the current and future challenges of the health care system have been addressed. Particular attention has been given to the traditional biomedical model and its influences on the education and practice of physiotherapists. It emphasises the potential influences of the dominant professional paradigm on the reasoning process of physiotherapists and new graduates that could constraint an implementation of a collaborative patient-centred model of practice.

4.9.1. Rationale of the present study

Clinical reasoning in Physiotherapy is now characterized by the use of multiple skills or strategies representing a diversity of thinking and actions in a variety of tasks and relating to many issues that exist in clinical practice (Edwards *et al.*, 2004a; Ajjawi & Higgs, 2008; Smith *et al.*, 2008). These skills or strategies range from the act of making a diagnosis to management issues and to collaborative or ethical decision-making (Edwards *et al.*, 2004a; Ajjawi & Higgs, 2008; Smith *et al.*, 2008). The use of those different strategies allows the clinician and the patient to develop a more informed position about the clinical condition and facilitates the establishment of a purposeful relationship allowing the patient's experience to be integrated in the decisions related with the health care provided.

Edwards (2001) described the process as dialogical were clinicians continually move between those tasks (procedure, interaction, collaboration, teaching, prediction, and resolution of

ethical or pragmatic dilemmas), sometimes through employing combinations of reasoning strategies and sometimes oscillating between strategies (hypothetico-deductive or narrative). The clinicians' capability to engage in dialectical reasoning is influenced by a multitude of contextual factors (Jones, 1995; Higgs & Jones, 2000; Higgs & Titchen, 2000). Among others the personal and professional frameworks of the clinician seemed to play an important role in the reasoning and practice of physiotherapy. For example, the recognition of these different tasks and the different reasoning strategies needed to deal with these tasks seemed to be linked with the frame of reference of the individual clinician (what the clinician see as their practice and their role in the health care system) (Higgs & Jones, 2000).

However, and despite acknowledging the impact of these factors, researchers agree that there is little evidence on which to base this conclusion (Higgs & Jones, 2000). Since the majority of the clinical reasoning research has been undertaken in countries such as Australia or USA, and there are considerable differences in the contexts of physiotherapy practice and professional education between Portugal and those countries (see chapter 2), it is unclear if the existing research is relevant and applicable to physiotherapy in Portugal or to other countries with similar levels of professional development of Portugal. To date there has been no investigation in Portugal into how Portuguese expert clinicians practise and how reasoning maps in the collaborative model of reasoning and practice and neither how teachers and students cope with this. The contextual nature of clinical decision making, the critical nature of decision making and the absence of specific research in physiotherapy into physiotherapy in Portugal demands that these models should be challenged when faced with other professional cultures and practice environments.

4.9.2. Organization of the study

Considering the lack of knowledge about the reasoning and practice of Portuguese physiotherapists, the first study aimed to investigate the clinical decision making processes of a sample of expert therapists in musculoskeletal physiotherapy practice. This study particularly focused on describing the decision-making processes (hypothetic-deductive and narrative) clinicians' use in their clinical practice. The objective of this study was to gain an insight into the current approaches to clinical reasoning and practice in Portugal. Accordingly a qualitative approach with observation, semi- structured interviews and field notes was

undertaken with four expert therapists in musculoskeletal problems. This study informs the other studies in this thesis.

The knowledge and understanding gained through this early research and through reflection informed the design of the following studies. Since the findings of the first study suggested that a sample of Portuguese physiotherapists were more likely to use an instrumental approach to clinical practice and reasoning, further research was needed to provide more information of how Portuguese physiotherapists approach clinical reasoning and practice. Literature suggests that familiarity could be related with the educational and training processes within the physiotherapy profession (Shepard & Jensen, 1990; Neistadt, 1995; Hunt *et al.*, 1998). Educational process is strongly influenced by health care context, the educational system, and by the dominant professional culture (Noronen & Wikström-Grotell, 1999). The influence of the traditional biomedical view of health and illness, and its underlying assumptions in the Musculoskeletal Physiotherapy curriculum of entry-level education could have a profound impact on how new graduates interpret illness, as well as on the patient–physiotherapist relationship (Thornquist, 1994; 2001; Marcum, 2004; Edwards *et al.*, 2006). Since the curriculum that physiotherapists decide to offer to their students will depend to a large extent on the view of the profession and discipline within which they work, the curriculum is an important tool to understand the beliefs, values and professional perspectives concerning the new graduates in physiotherapy and ends this became the focus of the studies 2 to 4.

Despite Musculoskeletal Physiotherapy being a well-established component of physiotherapy practice in Portugal, there is only anecdotal information about what is taught in the entry-level programs. There have been no prospective published investigations concerning its content, intended learning outcomes, or teaching/ learning and assessment strategies used within physiotherapy entry level curricula. Neither is it known how much time or content is devoted to Musculoskeletal Physiotherapy within Portuguese entry-level physiotherapy programs. Moreover the perceptions of physiotherapy teachers about their ‘vision’ of clinical practice and reasoning, and how students perceived that vision, are not known.

Accordingly, musculoskeletal programmes in each course were explored in depth by a survey questionnaire and curricula documentary analysis to capture the educational processes and

actions underlying current educational practice across undergraduate level courses in musculoskeletal physiotherapy (Study 2). Having developed a questionnaire survey and carried out a documental analysis of the “curriculum on paper”, study 3 involved an in-depth analysis of the teachers (curricula on action) and students (study 4- curriculum students experienced).

The aim of those studies was to explore assumptions underlying current Musculoskeletal Physiotherapy curricula in Portuguese entry-level physiotherapy programs, in relation to approaches to clinical practice and reasoning, and how these assumptions are perceived by teachers and near graduate students. The objective was to see whether the physiotherapy courses were promoting hypothetico- deductive and/ or narrative approaches to reasoning and practice in relation to musculoskeletal conditions.

CHAPTER 5

Methodology

This chapter consists of four sections: The first presents the origins of the research interest, initial perspectives and a personal reflection on the journey through the research process. It offers a story about transformation, starting from the lens of positivism and discovers new worlds through literature, observations, interviews and self-reflection.

The second section presents the methodological background to the study. It provides the theoretical perspective that helped define the methodological approach and research methods. It also examines the researcher's position addressing philosophical questions relating to ontology, and epistemology, especially with reference to the limits and validity of knowledge. The study is then situated within the interpretative paradigm of inquiry (Lincoln & Guba, 1985; Crotty, 2003; Creswell, 2007).

The third section provides an explanation of the research strategy used. It includes the rationale for the choice of methods and the particular forms in which they are employed. A final section describes and justifies the strategies used to enhance transparency and the trustworthiness of the data.

5.1. Personal Reflection

5.1.1. Becoming a Specialist

Reflecting on my professional past I 'grew up' in what could be called a positivist environment. Positivism, with its pursuit of unique answers to finite questions, dominated my professional education. During these formative years I was encouraged to believe that the 'hard sciences' are of greater value than the 'soft sciences', that order and objectivity are desirable, and that uncertainty and subjectivity are incompatible with sound research. Objectivity and proof were seen as essential features to develop the credibility of my profession. During subsequent years, as a teacher and musculoskeletal physiotherapist, I became enthusiastic about the discourse of 'hard science', sharing with my students the need for more evidence-based practice. As a clinician, my main concern was to develop

knowledge and skills to help me explain, or identify cause–effect relationships. When I started reflecting on my experience as a clinician and researcher, I accepted this knowledge uncritically as a form of true knowledge. I was not aware of the assumptions about knowledge I made or of their implications for my methodological choices. My first contact with clinical reasoning literature was in line with that process. Positivism is the dominant paradigm found in the literature on clinical reasoning (Edwards *et al.*, 2004a). I saw clinical reasoning as a purely cognitive hypothetico- deductive process that helps the teacher turn novices into experts. Knowing more about the process seemed to be the key in order to teach students the ‘right steps’ of formulating hypotheses, test those hypotheses and then achieve a diagnosis. My initial research ideas reflected this early perspective. My efforts were focused on identifying gaps in the clinical reasoning literature and establishing an appropriate research question. I drew on critics of other health professions regarding the emphasis on the biomedical aspects of the patient’ problem and on finding the cause of a patient’s complaints.

My initial ideas were influenced strongly by the knowledge organisation model proposed by Jones (1992). Rather than identifying differences in the type of hypothesis categories between experts and novices I was interested in moving forward to verify how physiotherapists use their knowledge when dealing with the particular characteristics of a patient’s condition, and through this explore how clinicians integrate the biomedical and phenomenological aspects of the patient’s problems. When I started to analyse clinical reasoning literature critically and think about my own practice as a musculoskeletal physiotherapist, I realized my perspective about clinical reasoning was too narrow. I was assuming clinical reasoning was basically related to the ability to recognize patients’ signs and symptoms in order to find a clinical diagnosis. I was also assuming that knowledge is basically a domain of clinicians’ minds with no interference from the specificities of context, the patient or clinician. I was accepting the hypothetic-deductive reasoning process as a universal model that any clinician should follow in order to achieve a competent status.

Very soon I started to feel uncomfortable with some of my assumptions, considering my own experience as a teacher and physiotherapist. My perspective seemed to me oversimplified and limited as a framework for understanding the complexity of physiotherapy clinical reasoning. More than verifying the clinical reasoning process and the way it is taught in undergraduate courses I was interested in exploring the decision-making processes clinicians’ use in their

clinical practice and how these processes are emphasised in the undergraduate musculoskeletal physiotherapy programmes in Portugal. With these criticisms in mind I started to think about the particularities of the Portuguese health care context, the personal and professional framework of each clinician and of the physiotherapy professions status in Portugal. This led me to realise that the positivist perspective was not yielding useful insights or information in response to my questions. I had to embrace a more relational, contingent approach and move towards a qualitative research paradigm.

5.1.2. Engaging in critical self-reflection and critical discourse

The above inconsistencies made me rethink my perspective on clinical reasoning and expertise, but also about my professional role and identity, and I experienced a strong feeling of disempowerment. I started to realize that I practised according to a model of what I believe physiotherapy is and what I think physiotherapists do. I realized that my perspective was focused on the experience of didactic teaching about the clinical reasoning process, ignoring the fact that different realities are socially constructed by individuals. This made me think about my past as a student and teacher and about the influence of the context in which ‘I was born’ as a physiotherapist. Why did I value a cognitive approach to clinical reasoning so much? Why did I see clinical reasoning as an objective and observable identity? Why did I value theoretical knowledge so much when compared with other types of knowledge? Reflection on past experience provided an insight that is one of the major assumptions of my research project: that clinical reasoning is essentially a quest for meaning. On the basis of this realisation I changed my perspective about my research work. I started to think about how my past experience as a student, musculoskeletal physiotherapist and educator could affect my current research work. I started to accept that my past would guide my interpretation of a specific reality.

Reality is shaped by social, political, cultural, economic, ethnic, and gender values, crystallized over time (Denzin & Lincoln, 2000). Critical theorists believe in the historic realism, assuming an apprehendable reality consisting of historically situated structures that are limited and confined as if they were real. These historical structures have a strong impact on the assumptions and values held by both practitioners and academics (Trede & Higgs, 2008). Knowing more about myself helped me to make clear my biases and assumptions. I accepted these biases and assumptions as embedded and essential to the interpretive process.

This position changed the way I saw the researcher's role. Instead of trying to be detached from the investigation I accepted my own prejudices as a relevant part of the study. This position also changed the way I saw the participants in the study. Instead of sources of data I started to carefully build a relationship with participants during my data collection process. It is within that embodied relationship that the data were generated and interpreted in this research. In data analysis, and especially during my interaction with the sample of experts, I worked with participants to bring life to the experience being explored, moving from parts of experience, to the whole of experience iteratively to increase the depth of engagement with and the understanding of texts. This process involved one of co-construction of the data with participants as they engaged in a hermeneutic circle of understanding. Personal experience as a clinician and a teacher provided important knowledge of some clinical reasoning in musculoskeletal physiotherapy that was used to inform the study. This knowledge and understanding represented the past horizon at the start of the study. The hermeneutical situation represented the prejudices the researcher brought into the study and "constituted the horizon beyond which it was impossible to see" (Gadamer 1981, p. 272). A fusion of horizons occurred as new knowledge was gained through interpretation of data collected throughout the study, ultimately resulting in deeper appreciation of the current understanding of clinical reasoning among musculoskeletal physiotherapists.

Instead of a discrete and unique framework, this investigation is grounded on multiple theoretical influences or prejudices, with their own criteria and assumptions. First, it draws on clinical reasoning theory, and its influences. In particular the influences from cognitive psychology, and the recent developments in clinical reasoning theory in allied health professions. These theories helped clarify the content and process of clinical reasoning, and the context in which clinical reasoning occurs. For example, the context of the patient's clinical problem, the wider health care environment, or personal and professional framework of the clinician (Higgs & Jones, 2000).

Secondly, there is contextual theory related to the current status of the Portuguese health system and physiotherapy practice in Portugal. The dominant biomedical perspective and its influence on professional culture are reflected in the current notion of expertise, or in models of clinical practice. This literature helped to build a conception of the cultural context of the profession in Portugal. There is also a personal perspective/ framework developed throughout

my years of practice as a musculoskeletal therapist, teacher and clinician. Critical theory is strongly embedded in my perspective as a physiotherapist and a researcher. There is a latent idealism in the discourse, an idea of a ‘right way’ of being a physiotherapist.

Finally, there is the methodological framework of this investigation. The research was positioned within a interpretative hermeneutic approach to discover the meaning within academic and clinical contexts of practice in Portugal.

5.2. Research purpose and questions

In light of the above this research set out to investigate the clinical reasoning process of a sample of Portuguese expert physiotherapists. It aimed to identify and analyse the current understanding of clinical reasoning held by teachers and students, and examine how this is realised in the undergraduate curriculum. A key purpose was to explore what clinical reasoning strategies are most emphasised relative to physiotherapy education and practice in musculoskeletal conditions. In addition, the research sought to illuminate current practice and education in Portugal.

The following research questions were posed:

1. What clinical reasoning strategies are apparent in clinical management of musculoskeletal problems by Portuguese physiotherapists?
2. What kind of approaches to reasoning and practice are being promoted in undergraduate musculoskeletal courses and how is this achieved?
3. What do Portuguese physiotherapy educators understand by the concept of clinical reasoning in musculoskeletal physiotherapy?
4. What do Portuguese physiotherapy students understand by the concept of clinical reasoning in musculoskeletal physiotherapy?

5.3. Methodological framework

A paradigm is a set of beliefs and assumptions about the nature of reality, about the knowledge, goals and aims of the research process, which guide subsequent actions (Guba & Lincoln, 1989; Guba & Lincoln, 1994). Kuhn described a paradigm as a “unitary package of

beliefs about science and scientific knowledge...an overarching conceptual construct, a particular way in which scientists make sense of the world or some segment of the world” (Kuhn, 1996, p. 175). Paradigms are human constructions. They represent a worldview that defines, for its holder, the nature of the “world”, the individual’s place in it, and the range of possible relationships to that world and its parts (Denzin & Lincoln, 1994, p. 107). This investigation adopted a mixed design because this approach encourages the use of multiple worldviews or paradigms and provides additional perspectives and insights that are beyond the scope of any single technique (Cresswell, 2000).

Creswell (2000) defines mixed methods research as,

“.....a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases in the research process. As a method, it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone” (page 5).

The use of a combination of qualitative and quantitative research approaches to research raises epistemological and ontological questions since they represent different types of paradigms, each with its own values and techniques that guide how research is conducted, analyzed, and reported (Creswell, 2007). Positivism is the dominant paradigm found in the literature on clinical reasoning (Edwards *et al.*, 2004a). Positivism assumes clinical reasoning as a phenomenon to be studied. According to this paradigm, knowledge about clinical reasoning is gained through scientific and experimental research, thereby utilizing observation and experiment to produce a result that, in turn, can be generalized and also leads to prediction. The main attempt was to describe the critical performance under standardized conditions, to analyse it, and to identify the components of the performance that make it superior (Ericsson & Smith, 1994). The interpretative perspective advocated that research on clinical reasoning should address the context of behaviour. Without this context, human action cannot be expressed in a meaningful way (Patel & Arocha, 2000). The idea is to capture subjects’ experiences in terms of their interpretations of the problems. Accordingly qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.

Given their ontological and epistemological differences, many researchers have felt that quantitative and qualitative approaches could not and should not be combined (Creswell, 2007, p. 15, called them “purists”). However, limitations in using only single methods have led to increasing interest in combining qualitative and quantitative approaches to address complex research questions (Strauss & Corbin, 1990; Patton, 1990). Creswell (2007) suggested that the choice of a mixed methods research design encourages researchers to think about a paradigm that might encompass all of quantitative and qualitative research, such as pragmatism, or using multiple paradigms in research. A pragmatic view holds that the choice of any particular combination of procedures or methods depends upon factors like the characteristics of the data, the objectives of the research, the kind of research question, the preferences and skills of the researchers and the time and resources available to them. Hammersley (2000) pointed out that the concern of the pragmatist is more to open up the world to social enquiry and hence to be less purist in terms of methods and preconceptions (about theory and method). Such researchers are oriented to the production of research results that link to practical and policy ends. Thus a pragmatic rationality will more readily embrace a mix of methods if the research questions and practicalities of the research context suggest it. Because of the lack of information about physiotherapy practice and education processes in Portugal these two approaches were seen as complementary, being able to provide data to supplement, expand, and inform the study, where in some instances, using one method alone would not be sufficient (Patton, 2002; Denzin & Lincoln, 2005). In this sense, triangulation of the data sets provided a detailed overview of clinical and educational perspectives surrounding clinical reasoning approaches to practice and reasoning. Mixed methods research design integrates one or more qualitative and quantitative techniques for data collection and/or analysis (Morse & Richards, 2002; Borkan, 2004).

A review of the types of knowledge sought by this study led to the choice of the interpretive paradigm as the principal approach. Interpretive studies seek to gain an understanding of the meaning of a lived experience (Crotty, 2003). Consistent with the interpretive paradigm, the study’s intent was to develop an understanding of the shared reality of musculoskeletal physiotherapists’, teachers’ and students’ many and diverse experiences. Professional practice requires different reasoning strategies beyond the simple application of an hypothetico-deductive reasoning. Hence, clinical reasoning strategies used or promoted in professional practice and education may be better studied through an interpretive lens

compared to an empirical lens. It was the contention of this investigation that eliciting and interpreting insiders' perspectives could accomplish a deeper understanding of this social world than a purely objective stance would allow. This thesis also contends that both practice and education of MPT physiotherapists are socially and experientially constructed concepts. That is, their meanings can and do change with time and context. These individual interpretations are deeply embedded in a rich contextual network that cannot be separated and generalized out to a mass population. In this sense the approach facilitated understanding of these complexities, and brought the voices of participants to the fore.

The interpretative paradigm encompasses a number of research approaches, which have a central goal of seeking to interpret the social world (Higgs, 2001), such as, for example, descriptive phenomenology, ethnography, or interpretative hermeneutics (Maggs-Rapport, 2001).

Chapters 2 and 4 present an historical overview of the current health care and educational context of physiotherapy in Portugal and discuss the potential influences of the dominant professional paradigm on the reasoning process of physiotherapists and new graduates. Considering the research purposes of this investigation there are some questions that come to mind: How does the clinical reasoning process reflect the historical context of the profession in Portugal? How does the clinical reasoning process reflect the culture (both professional and national) in Portugal? What are the intended and unintended outcomes of the way in which adult education and learning opportunities are structured?

Interpretative hermeneutics was selected as an appropriate research approach since the research goal was to interpret how Portuguese physiotherapists understand the construct of clinical reasoning. Interpretative hermeneutics provided a method of engaging participants in bringing awareness, describing and interpreting a particular aspect of their clinical practice (decision making) and making this accessible to the interpretation by the researchers (Smith *et al.*, 2008). It allows the researcher to explore participants' interpretations and add his/ her own.

Ethnography, which might focus on understanding and portraying a broader concept like culture of a workplace, or phenomenology, focusing on understanding pre- reflective

experiences and feelings (the essence of a phenomenon) and lived experience of being a musculoskeletal physiotherapist in Portugal, were considered less suited for this purpose.

5.3.1. Hermeneutic approach

Hermeneutics is the theory and practice of interpretation. The use of hermeneutics has grown from its roots in the interpretation of Greek classical literature. Although traditionally known as a method of interpretation of scriptural passages, the rules and principles of hermeneutics have become used not only for understanding written information, but also for interpreting human practices, events, and situations (Koch, 1996; Crotty, 2003). Hermeneutics is concerned with the life world or human experience as it is lived. In Heidegger's²² view hermeneutics focused on questions of ontology, or "being in the world" and existence (Pascoe, 1996). Koch (1996) outlined Heidegger's emphasis on the historicity of understanding as one's background or situatedness in the world. Consciousness is not separate from the world, but is a formation of historically lived experience. Historicity, a person's history or background, includes what a culture gives a person from birth and is handed down, presenting ways of understanding the world (Koch, 1996; Pascoe, 1996; Fleming *et al.*, 2003). Through this understanding, one determines what is 'real'. Koch (1996) described this as an indissoluble unity between a person and the world. Meaning is found as we are constructed by the world while at the same time we are constructing this world from our own background and experiences. As such, man makes sense of his world from within his existence and not while detached from it (Annells, 1996).

Interpretation is seen as critical to this process of understanding. Claiming that to be human was to interpret, Heidegger (1962) stressed that every encounter involves an interpretation influenced by an individual's background or historicity. Hermeneutic interprets human experiences not only from the viewpoints of individuals under study, but also from social and historical effects (Dempsy & Dempsy, 2000). The idea of attaining the daily experience of people is compatible with Heidegger's philosophy, which emphasises that the understanding and interpretation of people's experiences are possible through their language, history, and cultural factors (Maggs-Rapport, 2001).

²² While Husserl focused on understanding beings or phenomena, Heidegger focused on '*Dasein*', that is translated as 'the mode of being human' or 'the situated meaning of a human in the world' (Koch, 1996).

Gadamer is a crucial figure in philosophical hermeneutics and, as a student of Heidegger his philosophy extends Heidegger's work into practical application (Pascoe, 1996; Fleming *et al.*, 2003). Gadamer saw the work of hermeneutics not as developing a procedure of understanding, but to clarify further the conditions in which understanding itself takes place (Fleming *et al.*, 2003). In agreement with Heidegger's view that language and understanding are inseparable structural aspects of human 'being-in-the world,' Gadamer stated,

“Language is the universal medium in which understanding occurs. Understanding occurs in interpreting” (1998, page 389).

Gadamer believed that understanding and interpretation are bound together and interpretation is always an evolving process, thus a definitive interpretation is likely never possible (Annells, 1996). While Gadamer (1998) was not opposed to use of methods to increase our level of understanding and to overcome limited perspectives, he was emphatic in his stand that methods are not totally objective, separate or value free from the user. He viewed bracketing²³ not only as impossible, but attempts to do so manifestly absurd (Annells, 1996; Fleming *et al.*, 2003).

Gadamer (1998) emphasised the notion of historical awareness and valued it as a positive condition for knowledge and understanding. Koch (1996) described Gadamer's position as one of supporting *prejudice*²⁴ as the condition of knowledge that determines what we find intelligible in any situation. These understandings are based on our historicity of being and all understanding will involve some prejudice. Gadamer saw consciousness has been determined by the fusion of individual's horizon with the prejudices of history, including those provided by people and/ or texts (Pascoe, 1996; Fleming *et al.*, 2003). Gadamer also believed that researchers bring their expectations and meanings from their own frame of reference and past experiences to merge into a hermeneutic interpretation (Koch, 1996;

²³ A number of different writers have described the process of phenomenological reduction or bracketing, which was developed by Husserl (Annells, 1996; Koch, 1996; Fleming *et al.*, 2003). This is a process of suspending one's judgement or bracketing particular beliefs about the phenomena in order to see it clearly. Husserl proposed that one needed to bracket out the outer world as well as individual biases in order to successfully achieve contact with essences.

²⁴ Gadamer introduced the term *prejudice* to describe the values, experiences, or forestructures that unavoidably colour how an individual interprets experiences (Gadamer, 1975).

Flemming *et al.*, 2003). Therefore consciousness is not independent of history. These prejudices or pre-understanding are the meanings or organization of a culture that are present before we understand and become part of our historicity of background. They are the historical reality of his being (Pascoe, 1996). Pre-understanding is not something a person can dispose with, as it is understood as already being with us in the world.

Following Gadamer (1976) there are three key philosophical assumptions or constructs that inform hermeneutics as a strategy for knowledge creation: The hermeneutic circle, dialogue and fusion of horizons. These constructs produced the research strategy created for this research.

- **Hermeneutic circle-** Gadamer used Heidegger’s metaphor of the hermeneutic circle “to describe the experience of moving dialectically between the parts and the whole” (Koch, 1996, p. 176). This interpretive process is achieved through a hermeneutic circle which moves from the parts of experience, to the whole of experience and back and forth again and again to increase the depth of engagement with and the understanding of texts (Annells, 1996). The researcher becomes part of this circle moving repeatedly between interpretations of parts of the text and interpretations of the whole text, representing an emerging understanding of the phenomenon (Paterson & Higgs, 2005). As von Zweck and collaborators pointed out (2008, p. 119), “by circuitously viewing a phenomenon as a whole and as a sum of individual parts, the researcher gains knowledge to build increasing understanding of the experience.
- **Dialogue-** To Gadamer, knowledge is constructed through dialogue. Meaning emerges through a continuous dialogue or hermeneutic conversation between the text and the inquirer (Koch, 1996). Understanding could emerge only through deep immersion in the text, achieved through repeated readings and a recurring process of asking and answering questions of the information that explore new directions and possible answers (Annells, 1996; Koch, 1996; Fleming *et al.*, 2003). Koch (1996, p. 176) uses the expression “surrender to the movement of question and answer” in order to achieve that understanding. A shared understanding of the current approaches to reasoning and practice was ultimately constructed in this study by analyzing and combining data from a broad range of perspectives. Understanding emerged from reading and re-reading text,

videos and other sources of information and analyzing what was said in relation to the research questions that explored the current understanding of clinical reasoning among musculoskeletal physiotherapists.

- **Fusion of Horizons-** The metaphor “*fusion of horizons*” was used by Gadamer “to illustrate how prejudice merges with information from other perspectives to create new knowledge and understanding” (von Zweck *et al.*, 2008, p. 120). Gadamer viewed interpretation as a fusion of horizons, a dialectical interaction between the expectation of the interpreter and the meaning of the text (Koch, 1996; Fleming *et al.*, 2003). A ‘horizon’ is a range of vision that includes everything seen from a particular vantage point (Gadamer, 1975, p. 269). Gadamer suggested that the interpretation of a phenomenon reflects the intersection of the vision of the researcher (past horizon) with the view of the text (present horizon) (Gadamer, 1975). Understanding is always more than merely re-creating someone else’s meaning. Understanding involves *appropriation*, “making one’s own what was previously foreign” (Ricoeur, 1976, p. 91) to “bridge the gap between the familiar and the unfamiliar” (Paterson & Higgs, 2005, p. 346).

The researcher’s experience as a clinician and a teacher provided important knowledge of some clinical reasoning in musculoskeletal physiotherapy that he wished to use to inform the study. This knowledge and understanding represented the past horizon at the start of the study. The hermeneutical situation represented the prejudices the researcher brought into the study and “constituted the horizon beyond which it was impossible to see” (Gadamer, 1981, p. 272). A fusion of horizons occurred as new knowledge was gained through the interpretation of data collected throughout the study, ultimately resulting in a deep understanding of the current understanding of clinical reasoning among musculoskeletal physiotherapists.

5.4. Positioning the researcher in the investigation

Much of the role of the researcher in this investigation has already been stated in the initial part of this chapter. Reflexivity on the part of the researcher was essential to the whole process succeeding, for it was necessary to be aware of one’s own frames of reference and prejudices, in order to go back and forth, in the hermeneutic circle. This relates to the notion

of historicity. Historicity refers to the ability to be aware of our own past and incorporate that awareness into our own present (Maggs-Rapport, 2001). Awareness of pre-understandings helps in accessing the participants' world and at the same time allows such understandings to be challenged by the participants' stories. Therefore, participants and researcher are inexorably linked.

The role of the researcher was dominated by the ontological and epistemological assumption driven from the interpretative position stated above. Accordingly, the researcher had a stance, a voice, and a perspective that framed the way in which the research question was posed and the investigation conducted. In this investigation neither the participants nor the researcher can assume a privileged position in interpretation. The researcher adopted a participant position, based on his prejudices about the questions in study, and the context in which it took place. It is argued that expectations of what participants will think and do, together with the researcher's own feelings and values about physiotherapy practice and its reasoning process shape both the content and the process of inquiry.

In this investigation, the researcher was also a physiotherapist and colleague of the participants. This fact was both a constraint and a facilitating factor in achieving the research outcomes. Knowing the participants allowed researcher and participants to establish a truthful atmosphere, and therefore to feel comfortable about exposing their practice to scrutiny. The fact that participants knew the researcher made the presence of the researcher less obtrusive. Throughout the data collection process, particularly during the observation of the sessions and of the interview, the researcher knew what the participants were talking about. In many situations this led to the need to go further onto the subject matters, once the information that had been provided by the patients could have multifarious meanings and therefore might be interpreted in various ways. As a consequence, participants were then asked to clarify certain aspects of the clinical interaction. At the same time this was also a constraint to the research process. The researcher assumed that he knew what participants were talking about and did not question further, losing opportunities for gathering valuable insights from the participants. However, in different moments of data collection, knowing participants allowed the researcher and participants to build up together the meaning of the phenomenon under study. In data analysis data generated by the participants was fused with the experience of the researcher and placed in context (Koch, 1996). The interpretation of the data becomes

a construction, a merger of data sources. In doing that, knowledge was developed using the researcher as reflexive tool to acquire new knowledge and insights into Portuguese musculoskeletal physiotherapy reasoning.

5.5. Summary

Clinical reasoning is a complex and context dependent phenomenon. It is embedded in the actions that clinicians carry out in their clinical care as well the educative actions planned to promote and develop clinical competences in undergraduate students. These actions are influenced by a diversity of factors such as, the complexity of health care environment, the personal and professional framework of the clinician or the characteristics of the clinical problem. Particular aspects of a given context, such as the dominant professional culture, and the related model of practice and expertise could have a particular impact on the way clinicians' reason and practice or in the way they promote clinical reasoning throughout professional education. These particular realities such as the clinical reasoning processes are viewed in terms of multiple, mental constructions held by individuals and groups. These constructions are socially and experientially based and although local and specific in nature may often be shared across communities and cultures. The choice of the interpretive paradigm for this research allowed a focus on uncovering contextualized, professional education and clinical practice, and understandings about the phenomenon of clinical reasoning from those who are most likely to know and understand this phenomenon, the clinicians and professional educators.

Having flagged the appropriateness of prioritizing a qualitative line of inquiry and the role of the researcher for this investigation, the following section of this chapter presents the research strategy and the research methods used.

5.6. Research Strategy

In this investigation qualitative and quantitative data was collected within multiple studies performed in four sequential studies (Figure 5.1.). Table 5.1. summarises the desired level of knowledge, information source, and data collection method for each phase of the study.

Table 5.1. Knowledge sought by each study phase.

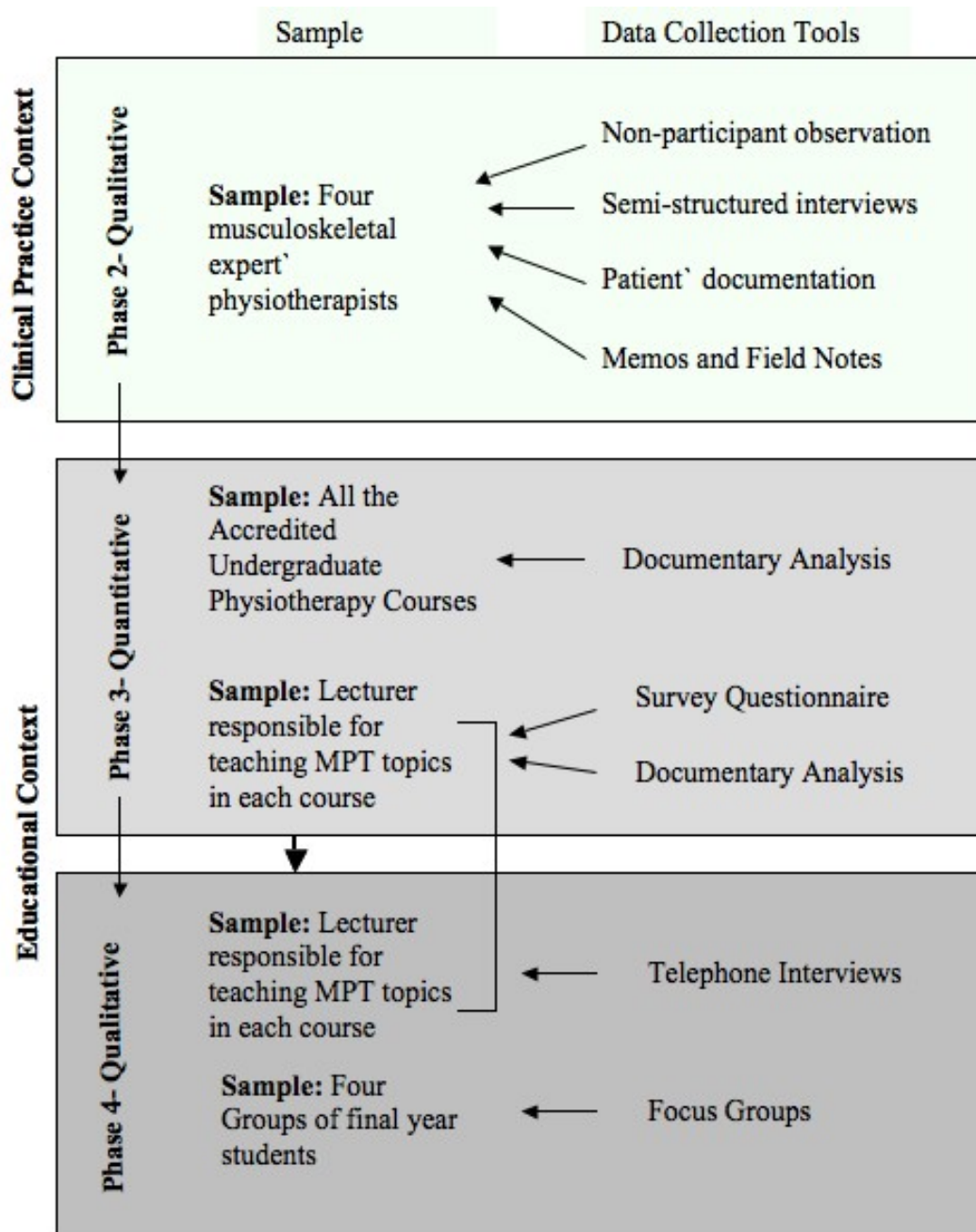
Phase	Desired Knowledge	Information Source	Data Collection Method
Study 1	Identification of current understanding of clinical reasoning held by musculoskeletal clinicians	Sample of Portuguese Expert musculoskeletal physiotherapists	Non-participant observation; Semi-structured Interviews; field notes
Study 2	Recognition of the broad issues influencing clinical reasoning approach through educational ethos and philosophy of undergraduate physiotherapy courses. Identification of how clinical reasoning is realised in the undergraduate curriculum.	School/ courses documentation; School/ courses websites; Subject review reports available. Musculoskeletal programmes educational practice of each undergraduate course	Documentary Analysis Survey
Study 3	Understanding of clinical reasoning approaches promoted in musculoskeletal curriculum of undergraduate physiotherapy courses	Musculoskeletal lecturers	Telephone Interview;
Study 4	Understanding of clinical reasoning approaches promoted in musculoskeletal curriculum of undergraduate physiotherapy courses	Students near graduation	focus group interview;

- **Study 1:** A qualitative study was carried out with a sample of four expert musculoskeletal physiotherapists. This study phase involved non-participant observation, semi-structured interviews, memos and field notes. Each participant was videotaped, evaluating and treating a previously unseen patient during an episode of care. Immediately after each session the clinicians were interviewed about what had occurred during the session (recorded in video).
- **Study 2:** In Study 2 (quantitative study) the generic aspects of the “curriculum on paper” of all undergraduate courses in physiotherapy in Portugal were analysed. Data was collected using documentary analysis from different sources, including: a review of the literature; review of school/ courses websites; review of school documentation; and review of the subject review reports available, elaborated on by external evaluation committees. Musculoskeletal programmes in each course were then explored in greater

depth by a survey questionnaire and documentary analysis. Quantitative methods in the form of questionnaire surveys enabled the ease and economy of gathering multiple information about the curriculum content, organisation and educational practices of musculoskeletal undergraduate physiotherapy courses. To capture the practice and actions of that practice the researcher drew on reports of behaviour as collected in a self-completion survey questionnaire.

- **Studies 3 and 4:** A qualitative study was carried out with a purposive sample of musculoskeletal physiotherapy lecturers (study 3) and also with final year students (study 4). This study phase utilised telephone interviews (study 3) and focus groups (study 4). Interviews of lecturers and students' focus groups were conducted to explore current understanding of clinical reasoning, and how it is promoted in musculoskeletal undergraduate programmes. Interviews and focus groups were able to shed light on numerous areas not possible with questionnaires alone, and they provided a clearer understanding of which types of clinical reasoning are most emphasised relative to musculoskeletal physiotherapy.

Figure 5.1. Flowchart of data collection methods across study phases.



5.7. An Overview of Data Analysis

Analysis of the data collected in this investigation followed the hermeneutic spiral method first described by Paterson and Higgs (2005). This method integrates the constructs of dialogue, the hermeneutic circle, and the fusion of horizons to define a process for data analysis. Understanding is viewed as a movement between part (data) and whole (phenomenon), each giving meaning to the other such that understanding is continually

enhanced in a circular fashion (Ajjawi & Higgs, 2008).

The reasoning process for analysis of the data evolved through the study phases. In phase 1 there was the need for additional knowledge about the clinical reasoning process and factors impacting on clinical reasoning. This in conjunction with the researcher's pre-understandings and assumptions about the phenomena resulted in the recognition of the influence of the dominant professional paradigm in the approaches to reason and practice.

Data collected was then sought to continually challenge the researchers assumptions about the phenomena by comparing and contrasting these assumptions with the findings in the research texts produced. Therefore, the researcher remained open to questions that emerged from studying the phenomenon being investigated and allowed the text to speak; the answer was then to be found in the text. In this context, the text was a creation by the researcher from data collected from participants. Understanding emerged in the process of dialogue between the researcher and the text of the research (Ajjawi & Higgs, 2008).

By turning through the hermeneutic circle, analysis alternated between seeking the meaning of individual parts of data with contextualizing this information within the overall interpretation of clinical reasoning approaches used and promoted in clinical and educational environments. A layering of new knowledge was created that developed progressively deeper insight into factors influencing the dominant approach to reason and practice (Paterson & Higgs, 2005).

New knowledge was created in each phase as a result of a fusion of horizons. Pre-existing understanding of clinical reasoning aspects was "fused" or integrated with new information that had been gathered during the study phases. In turn, the understanding of the clinical reasoning process gained in a previous phase served as the past horizon for the next phase of the study (Table 5.2) (Paterson & Higgs, 2005). The successive process of "fusing" the horizons of the past and present within each study phase resulted in a growing understanding of the clinical reasoning strategies used and promoted in musculoskeletal physiotherapy in Portugal.

Table 5.2. Horizons and Fusion Outcome for each Study Phase (Adapted from von Zweck *et al.*, 2008).

Phase	Past Horizon	Present Horizon	Fusion Outcome
1	Past researcher knowledge and experience.	Description and analysis of the clinical reasoning process and factors impacting clinical reasoning.	Recognition of the influence of professional paradigm in the approaches to reason and practice
2 (Study 1)	Recognition of the influence of professional paradigm in the approaches to reason and practice	Analysis of clinical reasoning strategies in a sample of Portuguese Musculoskeletal physiotherapists	Identification of the dominant clinical reasoning approach to reason and practice and Identification of potential influences from education.
3 (Study 2)	Identification of the dominant clinical reasoning approach to reason and practice and Identification of potential influences from education.	Generic aspects of the “curricular on paper”. Course philosophy, aims and objectives of undergraduate course, curricular structure and educational practice. Detailed information concerning educational practices in undergraduate musculoskeletal physiotherapy courses	Recognition of the broad issues influencing the clinical reasoning’ experiences of undergraduate physiotherapy students and identification of clinical reasoning’ experiences of undergraduate physiotherapy students.
4 (Study 3 and 4)	Recognition of the broad issues influencing the clinical reasoning’ experiences of undergraduate physiotherapy students and identification of clinical reasoning’ experiences of undergraduate physiotherapy students.	Detailed information regarding how clinical reasoning is promoted in undergraduate physiotherapy musculoskeletal courses.	A shared understanding of currently perspective adopted among lecturers and students concerning approaches to reason and practice.

Qualitative and quantitative results are treated as different entities. Each type of data analysis enhances the other. Together the data analyses from the two methods are juxtaposed and generate complementary insights that together create a bigger picture of how clinical reasoning is understood in this particular context.

With the exception of phase 1, which has already been described, details of procedure and specific methods related to each study are presented and discussed separately in the following chapters.

5.8. Methods to assure trustworthiness, rigour and credibility

Ensuring quality in any research requires the accurate use of systematic methods of data collection and analysis, clarity in documenting these methods and consistency in operating within the philosophical assumptions and traditions of the research paradigm and approach (Lincoln & Guba, 2000). Several strategies have been identified in the literature to enhancing rigour in interpretive research, including congruence between the adopted paradigm and chosen methods, multiple methods of data collection, and auditable records. The application of these strategies in this research was considered.

Applicability or transferability is the criterion used to determine whether the findings can be applied in other contexts or settings or with other groups (Morse & Field, 1995). While generalisation is not the goal of a qualitative study (Morse & Field, 1995), it was anticipated that the results from this study may have applicability to other contexts.

Multiple methods and sources of data collection provide multiple constructions of phenomena, thereby enhancing the depth and richness of the data (Denzin & Lincoln, 2000). The use of multiple data sources and strategies reduces systematic bias in the data, thereby adding rigour to interpretive research (Denzin & Lincoln, 2000). In this research, Physiotherapists and physiotherapy students from a range of clinical and educational environments were recruited, offering different perspectives on the phenomenon of clinical reasoning and how it is taught and learned in undergraduate courses in Portugal.

“Triangulation” refers to an approach to data collection in which evidence is deliberately sought from a wide range of different, independent sources and often by different means (Mays & Pope, 1995, p. 111). Triangulation is a strategy that uses multiple and different techniques namely different sources, methods, investigators and theories in ensuring an accurate representation of reality (Lincoln & Guba, 1985, p. 305). In this investigation the researcher employed documentary analysis, survey questionnaire, telephone interviews and focus groups to collect data from a range of participants in the professional education of physiotherapists in Portugal. Data from the documentary analysis and interviews was used to complement the information contained in the questionnaires describing the current practice of Musculoskeletal physiotherapy in the undergraduate courses in Portugal.

This investigation also used a systematic analysis during the research process. This process would reflect "negative case analysis", which means by looking for data that did not fit the direction of the ongoing analysis. The results therefore reflect the preponderance of data rather than isolated instances. This process searches for "negative" or "deviant" cases, which means, those in which the researcher's explanatory schema appears weak or is contradicted by the evidence (Mays & Pope, 1995, p. 112). This means that during the all process there was a search for variations on data in order to strip away alternative explanations.

Ensuring that the voices of both the participants and the researcher are evident in the text also enhances authenticity (Lincoln & Guba, 2000). This was achieved by the use of rich description and, where possible, the use of participants' words to allow them to speak for themselves. Use of quotations is known as "low inference data", which means that no inferences will be made without supporting data taken directly from the respondents (Jensen *et al.*, 1999). Presenting these "thick" data allows the reader to determine the credibility of the researchers' interpretations.

Qualitative researchers try to increase trustworthiness by prolonged contact with informants. Prolonged engagement is the investment of sufficient time to become familiar with participants. In this investigation (study 1) the researcher was present in all the sessions during the episode of care of each patient.

Quotes were then translated to English using a back translation approach (Beaton *et al.*, 2000). The first stage of this back translation was the forward translation in which one Portuguese physiotherapist with certificate in advanced English translated the quotes. The English version of each quote was then translated to Portuguese by another Portuguese physiotherapist who translated it back into Portuguese. The researcher checked on both versions for language accuracy.

This chapter has described the research approach undertaken in this investigation. The following chapters present the methods including the sampling method, participants, data collection methods, and data analysis steps for each study and the findings of that analysis.

Chapter 6

Study 1: Clinical reasoning of expert physiotherapists in the management of musculoskeletal conditions

6.1. Introduction

This chapter presents the research methods and findings of Study 1 of this research. Study 1 relates to the first research question: “*What clinical reasoning strategies are apparent in clinical management of musculoskeletal problems by Portuguese physiotherapists?* “. The main goal of this study was to explore the clinical reasoning of Portuguese expert physiotherapists in the management of musculoskeletal conditions. It focused on four Portuguese expert clinicians. A total of 19 interactions were observed within the context of an interactive clinical situation. An illustration of the experts’ practice and reasoning was built considering the patterns of responses found within participant’s reports and from observation of their practice.

The chapter is organized into two sections. In the first section the research methods for the study are presented. A detailed description of the procedures used in the different phases of the study is given, including the rationale for choosing each procedure, where and how they were conducted, the degree of participation involved, and how the data were collected and analysed.

The second section presents findings from observation of the practice and reasoning of the four physiotherapists. It includes a brief introduction to each participant followed by presentation and discussion of the clinical decision making processes of this sample of Portuguese ‘expert’ physiotherapists. Considering the whole episode of care, five themes representing the focus of thinking and decision making of the clinicians emerged from the texts produced. Each of these themes is presented and contextualized with the participants’ own words.

6.2 Research Methods

6.2.1. Participants

The aim of participant selection in hermeneutic research is to select participants who have a rich experience of the focus of the study, who are willing to talk about their experience, and who are diverse enough from one another to enhance the possibilities of rich and unique stories of the particular experience (van Manen, 1997).

Consequently, a purposive sample of Portuguese Expert' Musculoskeletal Physiotherapists was selected for this study. This selection method was chosen, as recommended by several authors for this type of research, in order to select participants that are or have been involved in the experience of interest (Morse & Field, 1995; Denzin & Lincoln, 2000; Patton, 2002), and from which the most can be learned (Merriam, 1998). Accordingly, expert physiotherapists (as defined below) were chosen to be the participants in this research because it was anticipated that they would have greater breadth of experience and ability to reflect on their experiences in order to gain a full understanding of their personal approaches to clinical reasoning.

6.2.2. Sample Size

As far as qualitative studies are concerned, there is no consensus or frame of reference about sample size. Morse (2000) stated that the sample size estimated in qualitative research depends on the following factors: the scope of the study, the nature of the topic, the number of interviews per subject, the qualitative method and the study design, the quality of the data, and the amount of useful information collected from each participant.

Sandelowski (1995) noted that sample sizes in qualitative research should not be too small or it is difficult to achieve data saturation, theoretical saturation, or informational redundancy. At the same time, the sample should not be too large so that it is difficult to undertake a deep analysis.

In this study it was decided to adopt the previously reported approaches in similar research studies where the aim was mainly to obtain data saturation. According to this principle, the

sampling should be developed until there is no further information or new categories (Jensen *et al.*, 1999). Jensen and collaborators (1999, p. 47) indicated that,

“we discovered that three in-depth cases per clinical speciality area provided enough consistent data to saturate our conceptual categories and understand the commonalties and differences in expert clinical practice within each area.”

In a similar study, Edwards and collaborators (2004a) selected 6 primary informants (2 clinicians from each field- orthopaedic, neurological and domiciliary physiotherapy) following Kluzel’s argument that the validity, meaningfulness and insights generated from qualitative inquiry have more to do with the information richness of the cases selected and the observations/ analytical capabilities of the research than sample size (Kluzel, 1994).

In undertaking a hermeneutic research inquiry, the need to explore a particular aspect of clinical practice (clinical reasoning) in an in-depth manner was positively linked to a smaller sample size. For the purposes of this study, it was felt at the outset of the research design, that a sample size of four participants would be sufficient to be applicable to the existing musculoskeletal expert physiotherapists in Portugal and would provide the possibility for saturation to be achieved.

6.2.3. Sample recruitment

The sample in this study included physiotherapists working with musculoskeletal conditions. These were selected for two reasons: first to facilitate the understanding of the clinical reasoning process itself and second to enhance a better understanding of this reasoning in a specific clinical field (musculoskeletal physiotherapy).

In Portugal there are many clinical units where clinicians are obliged to implement a treatment prescribed by a medical doctor (a physiatrist). Considering the study’s research goals, it was important to guarantee that participants felt autonomous and responsible for the health care provided to their patients. The researcher also looked for clinical units where the decision about the number of treatment sessions, as well as the discharge process was the physiotherapist’ responsibility. This was a major criterion for sample recruitment.

According to Merriam (1998), to select a purposive sample, in the first place, the researcher must define the selection criteria to be used, including certain characteristics or standards of the sample that are central units in the investigation (Jensen *et al.*, 1992). In this study, the characteristics or attributes of expertise were also identified as criteria for the selection of the sample.

6.2.4. What is an expert?

The definition of an expert is neither straightforward nor consensual. The criteria established in its definition are balanced between the concepts of performance and individual skills. Dellito (1998) defined an "expert" as a person who is very skilled or highly trained and informed in his/her field. Jones (1994) stated that experts in the physiotherapy profession are such, not simply on the basis of years of experience or superior handling skills, but because they have highly developed knowledge bases acquired through advanced clinical reasoning where critical thinking has allowed them to formulate a larger repertoire of clinical patterns which they can recognise.

Current literature reports a set of features that can be used to differentiate between "experts" and "novices". These features are shown on table 6.1. Generally speaking, "experts" perform better; they solve problems faster and, they spend less time on the qualitative analysis of the problems before they reach a diagnosis. (Glaser & Chi, 1988). Considering these attributes, "an expert" is essentially the product of what is perceived as important or relevant by a community of practitioners.

Table 6.1. Experts' attributes. Adapted from "Overview" by R. Glaser & M. T. H. Chi, 1988, p. xvii-xx.**The nature of Expertise (Glaser & Chi 1988)**

1. Experts excel mainly in their own domains.
2. Experts perceive large meaningful patterns in their domain.
3. Experts are fast; They are faster than novices at performing the skills of their domain and they quickly solve problems with little error,
4. Experts have superior Short-Term and Long- Term memory.
5. Experts represent a problem in their domain at a deeper (more principled) level than novices; Novices tend to represent a problem at a superficial level.
6. Experts spend a great deal of time analysing a problem qualitatively.
7. Experts have strong self-monitoring skills.

Independently of the above considerations, researchers in the field have been using three main criteria for selection purposes, namely, number of years of experience in the field, recognition by peers, or by professional bodies and the professional qualification they hold. Although the numbers of years of experience may not necessarily mean "expertise" (Shon, 1987) clinical experience has been used as a prerequisite in studies in physiotherapy and other health care professions (see table 6.2.). Simon (1980) for example, suggested that it takes at least 10 years experience to produce expertise in any profession. Groen and Patel (1985), based on their research findings stated that the denomination of an expert should consider the differences between generic knowledge and specific knowledge. These authors defined novices as the individuals with the initial preparation to understand patient's problems, "sub- expert", characterises individuals with generic knowledge but without specific knowledge. Finally they proposed the term "expert" for individuals, with subject-specific knowledge in a certain domain²⁵.

²⁵ See Chapter 3, p. 70/ 71 the explanation.

Table 6.2. Criteria used to select Expert Clinicians

Research Studies	Criteria used to select Expert Clinician's
Payton (1985)	Purposive sample; Recognized by one physical therapy academic faculty as clinical experts in some aspect of physiotherapy
Tomas- Edding (1987)	More than 3 years of practice
Jensen, Shepard & Hack (1990) ²⁶	Purposive sample; Years of Experience
Jensen, Shepard & Hack (1992) ²⁷	Purposive sample; Panel nomination on the basis of reputation; Years of experience
Embrey, Guthrie, White & Dietz (1996)	Purposive sample (3 experts and 3 novices); Therapists were recruited by contacting the directors of outpatient neuromuscular centres in the Pacific Northwest. Each director nominated therapists who were considered to be skilled, commensurate with their experience level, in the evaluation and treatment of children with cerebral palsy.
Rivett & Higgs (1997)	Convenience sample: Postgraduate Qualification in Manipulative Therapy; a minimum of 5 years of clinical experience since acquiring the postgraduate classification; current practice in a relevant clinical situation.
King & Bithell (1998)	Purposive sample; the criterions were use to define specialists and generalists practitioners
Jensen, Gwyer, Shepard & Hack (2000)	Purposive sample; Recognition by peers as experts; years of experience (> 7); involved in direct patient care at least 50% of the time; have completed formal or informal advance work in a specialty area.
Noll, Key & Jensen (2001)	Years of practice; Postgraduate Education in the McKenzie Method
Doody & McAter (2002)	Purposive sample; Minimum of 10 years of experience; Involved in postgraduate and/ or undergraduate training in the area of manual therapy.
Edwards <i>et al.</i> (2004a)	Purposive sample: A professional panel identified physiotherapists who have recognised status in their field and were perceived as fulfilling at least five of seven features of expertise ²⁸ .

²⁶ Jensen, Shepard & Hack (1990) used the term “experienced clinician” instead of expert clinician. The authors stated that they did not attempt to fully define a master clinician in this first study.

²⁷ Jensen, Shepard & Hack (1992) used the term “Master clinician” instead of expert clinician.

²⁸ Physiotherapists who have recognised status in their field and were perceived as fulfilling at least five of seven features of expertise: 1) a good deal of area specific knowledge is demonstrated in their clinical work; 2) able to recognise and/or identify a large variety of patient presentations in their work; 3) they perform work skills and solve problems related to patient management in a generally fast and efficient manner; 4) they develop a deep understanding of the complexities and ambiguities which may exist in a patient’s case; 5) They spend time, especially at the outset, analysing and considering the wider dimensions and implications of a patient’s presenting problem(s); 6) They combine good self monitoring skills with an ability to accurately prioritize treatment(s) to identified problems and adjust these as necessary (adapted from Glaser & Chi 1988); and 7) They have a depth of understanding of a clinical problem, which includes the patient’s view (Higgs & Jones 1995).

Considering the “expertise” of the “experts”, and having analysed the definition in terms of adequacy, as far as the Portuguese context is concerned, a purposive sample of four Physiotherapists (experts) in the assessment and treatment of patients with musculoskeletal dysfunction was defined. These physiotherapists were selected according to the following criteria:

- At least 10 years of experience in treating musculoskeletal dysfunctions;
- Post-graduate education in areas related with management of low back pain problems;
- Involved in postgraduate and/or undergraduate training in the area of musculoskeletal therapy as a lecturer or clinical supervisor.
- Autonomy in the management process was considered as a basic element of reasoning and knowledge. In terms of Portuguese physiotherapy practice the researcher needed to guarantee that during the episode of care that the physiotherapist had the possibility to change their intervention according to their interpretation of the patient’s findings.
- Researcher’s geographical advantage was also taken into consideration due to the amount of time to be spent in data collection, therefore the physiotherapists that were selected for the study worked in the Lisbon area.

Eligible participants were identified using the list of physiotherapists that belonged to the Special Interest Group in Manual Therapy of the Portuguese Association of Physiotherapists. Two leaders of the Special Interest Group were asked to name four physiotherapists to whom they would refer a relative for treatment. After being identified, physiotherapists were contacted by telephone and by post in order to invite them to participate in the study. All four physiotherapists invited accepted the invitation to participate in the study.

6.2.5. Ethical Issues

Selected clinicians were formally recruited by means of a written agreement by which clinicians agreed to participate in the study. Appointments were made in order to explain to each participant the purpose, the nature and the procedures of the study and a consent form was signed. Clinicians were told that there was a need to videotape every session and they were also informed that after each session a semi-structured interview would occur based upon the content of the videotapes recorded. It was also explained that each clinician would

be asked to review the video and would then answer questions about their reasons for taking specific actions, for example, for using specific questions or specific tests and/or examination procedures. They would also be asked questions about their thoughts concerning the patient's situation and their ideas for management of the patient's problem (see Appendix 1 for ethics protocol- Study 1).

Confidentiality and anonymity of the participants were guaranteed. Each clinician chose a fictional name, and all the other data that could lead to a possible identification was kept confidential (e.g. address of the work setting or other demographic characteristics). All data was either stored on a computer disk or was stored in a locked cabinet only accessible to the researcher, for example videotapes or transcriptions (Appendix 2 to 6).

A first meeting with participants was carried out with the purpose of planning data collection. Usually patient appointments are made by phone call, or medical referral. If the appointment was requested directly by the patient (phone call), the participant (clinician) asked the patient about his/her chief complaint/ problem. After this procedure, each clinician contacted the researcher to communicate the date and time of the first session. The date and time for subsequent sessions were arranged between the patient, clinician and researcher. In case of any change, phone numbers were shared. At the beginning of the first session, the procedures of the study were explained to the patient and if participation in the study was agreed, written consent was obtained.

6.2.6. Rationale for choosing methods for data collection

The data collection methods in this study were planned according to the structure of real life events in physiotherapy practice. Although preliminary data analysis was undertaken concurrently with ongoing data collection, data collection methods and analysis procedures are described separately for clarity.

In line with the study designed by Jensen and collaborators (1999) and Edwards and collaborators (2004a), this study examined the clinical decisions of the therapists as it was expressed in action and interaction in the tasks of practice, but at the same time it explored the insights into the clinicians thinking processes. This allowed the researcher to examine the phenomenon of clinical reasoning as a cognitive but also as an interactive phenomenon.

6.2.6.1. Observational methods

Observational methods are appropriate when the focus of the study is to describe a setting, situations, people, or human experiences that require long-term observations and interactions with study participants (Merriam, 1998). In this research, non-participant observation (or participant as observer) was selected to access the phenomenon of clinical decision-making in a real clinical practice environment. Consequently, observation was used to gain an understanding of the participants' actions and interactions with their patients and to observe the decisions clinicians made during the whole episode of care.

Non-participant observation has much value in capturing social action and interaction as it occurs (Morse & Field, 1995). Non-participant observation allowed more freedom for clinicians to present their usual practice. It also allowed for greater access to the subjective experience (introspection), and was less intrusive than participant observation (Morse & Field, 1995). Instead of direct observation by the researcher it was decided to use a video camera to record the actions and behaviours of the participants. The intent of using this device was to interfere as little as possible with the informants' usual decision-making during the course of patient care. Musculoskeletal physiotherapists usually work in confined clinical spaces and the use of a video camera was a less obtrusive method of recording clinician-patient interactions (Jensen *et al.*, 1999). Another reason to record the sessions was related to the detail required to capture the clinician's actions, interactions and thinking in a way that was consistent with the moment-to-moment decision-making that occurs in clinical practice (Jensen *et al.*, 1999). Using the video recording allowed capture of non-verbal and verbal interactions simultaneously, but also provided an opportunity during the retrospective interview to add data, which might have been overlooked in a direct observation. Finally, the tapes were played back repeatedly, allowing verbal and non-verbal interactions to be observed and analysed in detail (Caldwell & Atwal, 2005).

In this study, a framework of analysis was developed by structuring observation rigorously to minimize subjectivity. Data gathering activities on video record included audio recording of clinicians interacting with their patients, observation and recording of clinicians' behaviour for interacting with their patients, such as opening and closing moments, transition moments (e.g. between examination and treatment), the therapist's response to patient questions, ideas

or cues; recording of notes in patient charts (recorded in researcher' field notes); and observation and recording the natural environment (e.g. furniture, presence of other staff members).

Observation was also considered important to act as a reference point for subsequent interviews in that much of the clinical decision making involved in clinical practice normally occurs at a rapid and subconscious level, particularly in experienced practitioners. Feedback or prompting on observed behaviours can serve to prompt recall and awareness of thinking, and enable practitioners to verbalize their reasoning, reflect upon it, and explain the rationale for it (Ajjawi & Higgs, 2007). Therefore, each session recorded in the video was followed by a semi-structured interview in which participants were invited to focus directly on the actual experience and describe it in detail (remembering that hermeneutics assumes that all experiences are always already interpreted simply through choice of language). According to Ricoeur (1976) people reveal themselves when talking about their experience, in a certain context. Van Manen (1990, p. 67) suggested,

“as we interview others about their experience of a certain phenomenon, it is imperative to stay close to experience as lived. As we ask what an experience is like, it may be helpful to be very concrete. Ask the person to think of a specific instance, situation, person, or event. Then explore the whole experience to the fullest”.

When using observational methods the possibility that the observational action triggers modifications in behaviours or actions is known as Hawthorne effect, and this has been frequently reported on the literature (Morse & Field, 1995; Mays & Pope, 1995). In this study several different strategies were adopted to minimize the participants' potential feeling of being observed or assessed. First, participants were informed of the purpose of the study and the researcher maintained a non-threatening posture at all times. They were reassured that their clinical decisions were sought and that the researcher was not attempting to make judgments about their practice and reasoning. Prolonged engagement, which means the investment of time within the research environment as a means of the researcher creating trust, learning about the culture, and testing for misinformation and distortions that may be introduced either by the participant or researcher (Lincoln & Guba, 1985) also provided a means of overcoming this problem. Literature suggested that over a period of time, participants would become used to the camera (Latvaia *et al.*, 2000). In this investigation the

participants were observed during several treatment sessions, which minimized the impact of the presence of a camera in the room.

Another important concern with observation is the possibility of participants changing their usual behavior as a result of researcher presence or because of power relationships between the researcher and the participants. Despite the fact that the researcher was also a physiotherapist and colleague of the participants there were no previous or existing power relations between the participants and the researcher. Finally, observation lasted over several treatment sessions, which limited the possibility for participants to maintain false or unusual practice for the whole episode of care.

6.2.6.2. Interview

The interview is, in general, the major mode of data collection in qualitative studies. This method of data collection was included in this investigation for two major reasons: In the first place because it could provide information which could not be obtained directly; and also, because it offered potentially more in-depth insights into specific issues of practice and reasoning of this group of musculoskeletal physiotherapists.

In hermeneutic research it is central that the interaction in the interview takes place within the context of a relationship. Priority was given to establish a good rapport and create a feeling of safety and comfort for the participants. Before the interviews with the clinicians the researcher worked to establish an environment of safety and trust and this was maintained throughout the data collection period. It was within this embodied relationship that the text and/or data was generated and interpreted. This entailed exhibiting warmth, empathy and unconditional positive regard, so as to encourage the participants to speak freely and congruently about their experiences.

The interviews were conducted in such a manner that they resembled a conversation rather than a formal questioning session. Questions were open-ended and focused on 'what' and 'how', rather than on 'why' (Stiles, 1993), thus, eliciting personal information and enriching the participants' stories. Participants were generally asked to describe in detail their experience of the topic being investigated. The specific question asked was generally very open in nature followed by a discussion being led not so much by the researcher, but by the

participant. Openness was considered critical and the exchange was entirely open, with few direct questions asked (Koch, 1996). The reason for this was to encourage the interview process to stay as close to the clinical experience as possible. Geertz (1973) described this process as getting at what participants really experienced, from the inside out, not simulations of what they thought they experienced.

Participants' narratives were recognised as valuable descriptions of the participants making sense of their experience within their contexts (Coale, 1994). As the interviews progressed, the researcher used reflections and clarification in order to verify his understanding of the participants' narratives and also to help the participants to elaborate on their descriptions. The aim was to elicit as much detail as possible about the participants' experiences regarding their clinical reasoning and to co-construct meanings and experiences through conversation.

6.2.6.3. Development and content of the interview topic guide

A group of open-ended questions was developed to seek information related to the actions, interactions and focus of thinking (Table 6.3., next page). The interviews in this study were therefore essentially concerned with trying to understand what Portuguese expert physiotherapists do and think during their practice. More specific information was elicited by using questions of particular sorts for example, a specific question (*What are your thoughts about your patient?*) was used systematically during each interview. The purpose of this question was to facilitate the clinicians' thoughts about their experience with clinical reasoning at different stages of the "episode of care".

6.2.6.4. Documentation

Documentation is an important complement to qualitative data (Merriam, 1998). In this research these documents included the researcher's field notes and the patient's charts. These field notes were taken during the period of observation, with attention given to recording the words and actions of the participants as they occurred in the various encounters of the episode of care. These field notes were also used to help the data analysis process. Ideas about how to categorize the data, the potential themes and their relationships, were written during the data collection processes. Patients' charts refer to what the clinicians wrote in their own records and were used to analyse and compare data. Patients' charts included

information about the patient's condition, mostly related to the relevant aspects of the evaluation, treatment and re-evaluation processes.

Table 6.3. Interview Guide Questions- Study 1.

Interview Guide Questions
<ol style="list-style-type: none"> 1. Why did you provide this type of action? <ul style="list-style-type: none"> • <i>A specific question, test or exam;</i> • <i>A treatment modality;</i> • <i>A specific instruction, advice or explanation;</i> • <i>A specific interaction;</i> 2. At this moment, what are your thoughts about your patient? 3. At this time what kind of ideas do you have in mind?

6.2.7. Pilot study

Using the interview as a data collection tool requires specific skills that must be practised and checked. In the present investigation, interviewer and researcher were one and the same, allowing a reflective attitude towards the researcher's competences as an interviewer and also towards the adequacy and the understanding of the questions proposed in the interview guide, and consequently a pilot study was carried out.

This pilot study also aimed to test all the procedures concerning data collection, those that included the handling of the video camera, the sound-recording procedures, the interview and its duration, and the conceptual framework used to collect and analyse data. As far as the competencies of the interviewer are concerned, a template of analysis was also designed. It included aspects related to the competencies of the interviewer and the criteria that should be accomplished. The interviews were recorded and an external moderator assessed these competencies according to the referred template. Feedback was given according to the type of questions (neutral and open-ended), their adequacy to the subject topic, the accuracy of the interviewer and the non-verbal aspects of communication that were also analysed.

The pilot study included a physiotherapist that had the same profile as the clinicians that participate in the study, namely, more than 10 years of experience in the treatment of patients with musculoskeletal conditions (15 years of clinical experience).

6.2.8. Data Collection

The study was carried out in the Lisbon District in three different clinics and one state hospital. Data collection took place in the natural setting of each participant's work place over an eight month-period. Data was collected through non-participant observation, field notes, semi-structured interviews, and patient' charts of each session during the "episode of care". A total of 19 encounters were observed within the context of an interactive clinical situation. The data sets consisted of 19 video films, 19 interviews, 4 patients' charts and several pages of field notes.

Observational data were obtained by video recording the musculoskeletal physiotherapists as they conducted their usual daily practice within musculoskeletal patients. Each participant was videotaped, evaluating and treating a previously unseen patient referred by a medical doctor for a musculoskeletal problem. The number of observations of each participant varied according to the number of sessions of each episode of care (Table 6.4.). During the observation session the researcher did not participate in any activities undertaken by the participants. The researcher stayed outside the room leaving a camera in a suitable position to record the session.

Table 6.4. Information related to the data collected in study 1.

Clinicians Pseudonyms	N° of Sessions	Hours Observed
Monica	6	3 hours, 45 minutes
José Maria	3	2 hours, 21 minutes
Maria	6	2 hours, 41 minutes
Mariana	4	2 hours, 53 minutes
Total	19	11 hours and 3 minutes

Before starting to collect data it was necessary to discuss with the clinicians where to place the camera in order to select an angle that enabled the researcher to capture all the activities

and interactions that might potentially occur during a patient- clinician encounter. In each case the camera was left stationary in the setting to ensure that the participants were distracted as little as possible by the recording equipment, and a wide angle was chosen to accommodate basic shifts in orientation and movement by the participants.

Following each interaction participants were immediately interviewed about the decisions they made during their interaction with their patients. Semi-structured interviews were performed immediately after each session and the questions were focussed on the actions performed by the clinician, recorded on the video. The reason for this was to encourage the interview process to stay as close to the clinical experience as possible and to provide prompts for interview questions.

Each of the interviews was conducted at the participant’s place of work in a meeting room and followed the sequence of events observed on the video. This was achieved by replaying the videotapes to each clinician and asking them to describe and explain what they were doing and thinking about during their work with their patient. Interviews began by asking participants to share their thoughts about their clinical experience with their patients. After reviewing the video clinicians were asked for their reflection about the patient’s condition and the clinical decision making process they undertook.

The guided format used for the interview permitted flexibility in sequencing and wording of interview questions and allowed for additional probing to clarify specific participant responses. This occurred mostly because of the specific interactions developed during the clinician/ patient encounter recorded on the video. The duration of each interview ranged from 10 to 46 minutes (Table 6.5.).

Table 6.5. Information related to the data collected through interviews.

Clinicians Pseudonyms	N° of Interview Sessions	Hours of Interview
Monica	6	2 hours, 15 minutes
José Maria	3	1 hours, 19 minutes
Maria	6	1 hours, 44 minutes
Mariana	4	1 hours, 45 minutes
Total	19	7 hours and 30 minutes

After each session, the researcher carefully observed the session, recorded on the video, and notes were taken with a focus on clinicians' interactions and actions linked to clinical decision-making. When observing the participants, detailed field-notes were recorded documenting the words and actions of the participants as they engaged in patient care. These activities were complemented with a continuous reflection and recording of the researcher thoughts and ideas about the decisions clinicians made. These field-notes formed part of the texts that were then used as the basis for interpretation and analysis.

Finally, the researcher asked the participants for a copy of their clinical notes recorded in the patients' charts. At the end of the "episode of care" the researcher expressed thanks to the participants for their time spent in collaboration with this study and informed them that a copy of the transcriptions and the analysis would be made available to them.

6.2.9. Data Analysis

All data (i.e. interview and observational field notes and data from patient' charts for all 4 participants) were transcribed. Interview transcriptions were reviewed against the tapes to ensure accuracy of interview recordings, and videos were replayed several times to expand field notes. Then all the transcribed material²⁹ for each participant was read several times. This allowed the researcher to get a 'feel' for the overall story that reflected the fundamental meaning of the text as a whole. Gaining understanding of the whole text was the starting point of analysis, since the meaning of the whole influences the understanding of every other part of the text (Gadamer, 1998).

In this study the researcher conducted interpretation of the texts produced by the participants. For Gadamer (1998), a conversation between the researcher and participants' texts is a suitable method of achieving understanding of a phenomenon of interest. Using the researcher as research instrument helps the researcher in finding ways of developing deeper understanding of the phenomenon under investigation (Fleming *et al.*, 2003). The interpretation process aimed to develop a deep understanding of the texts produced by the participants through a cyclic process of reading, questioning and interpreting each participant's texts and the whole text set. This enabled the researcher to get inside the

²⁹ In this research we followed the Gadamer' tradition, of using the word "texts" to refer all the transcribed material.

viewpoint presented as a whole, and then develop an increased understanding and a more complete interpretation of how clinicians approach clinical reasoning in musculoskeletal physiotherapy. Understanding occurs through a fusion of horizons, which is a dialectic process between the pre-understandings of the researcher, the interpretive framework and the sources of information (Koch, 1996).

The data analysis process moved from the “parts” to “whole”. The process started by the individual analysis of the texts produced by each participant, considering the “parts” and then the four stories were gathered together and considered the “whole” and moved backwards and forwards in the hermeneutic circle to attempt to make sense of the phenomenon.

6.2.9.1. The process of data analysis

This section explains the steps and processes used to make sense of the data. It then demonstrates how the analysis was undertaken and how it was informed throughout by the work of Gadamer (1975), with his ideas of moving the parts to the whole and also the fusion of horizons and hermeneutic circle, and van Manen (1990; 1997)³⁰, with his ideas of isolating thematic statements.

van Manen (1997) offers three approaches that could be used to uncover thematic statements in the participants’ descriptions. These approaches are line by line, highlighting, and detailed reading of analysis. van Manen (1990, p. 92; 1997) proposed that the researcher could choose to use one of three approaches or all three to conduct the analysis. In this study all the three approaches were used, since they could each provide new ideas emerging from the data.

van Manen (1990, p. 93) stated that in the detailed reading approach, the researcher looks at every single sentence or cluster of sentences and asks, “*What does this sentence, or sentence cluster, reveal about the phenomenon or experience being described?*”. In this study the researcher started the data analysis through this approach by reading the participants’ texts several times in order to isolate key words and thematic statements. To do this, all transcribed interview and field notes were compiled into a computer file and the relevant words and

³⁰ It is important to note that, although the work of van Manen is considerably consistent with Gadamer, there are some inconsistencies associated with the role of pre-understandings. According to the van Manen method, the analysis does not include the movement back to the whole, which is absolutely necessary to experience the hermeneutic circle based on philosophical/ interpretative hermeneutics (Flemming *et al.*, 2003).

statements that described the clinical experiences, thoughts, or feelings about the phenomenon under study were identified. These key words and sentences were cut and pasted into a series of tables in a Microsoft Excel document, and a set of preliminary category labels were affixed to the data (see table 6.6.). These initial codes refer to participants’ ideas expressed in their own words, phrases, actions and interactions which capture the precise detail of what the person was saying or how he/she was performing in the clinical encounter situation (Titchen & McIntyre, 1993). Examples of such key words/ actions and statements are:

Table 6.6. Representing the preliminary analysis- Significant idea/ action or statement (From transcript)

Words/ Actions/ interactions of participants	Key words/ actions/ interactions	Categories
He always points to his hip ...he puts is finger over there... the great trochanter. He puts his finger, his hand there; this is there where he feels his pain . And after a while the pain goes up and down. So I thought about a bursitis” (Monica, Session 1: 1134-136, p. 3)	<u>Pain Area</u> Points to his hip Where he feels the pain	Cue acquisition

In the preliminary analysis this quote was highlighted, cut and pasted, and became linked to the key word **Pain Area** which led to the category, **Cue Acquisition**. In the final analysis, this highlighted phrase became part of the sub-theme, **Formulating Working Hypothesis**, and the theme, **“Finding the source of patients’ complaints”**.

The following quote, from Maria’s first session, was highlighted, cut and pasted, and linked to the key words/actions **“Interrupting patient’s speech”** and then, in the preliminary analysis, to the category, **“Redirect the patient story”** It later became part of **“Controlling the flow of patient speech”**, and the theme, **“Taking control of patient’s clinical history”**.

Table 6.7. Representing the preliminary analysis- Significant idea/ action or statement (From transcript)

Words/ Actions/ interactions of participants	Key words/ actions/ interactions	Categories
Maria asks several different questions about the patient’s profession, his hobbies, daily routine, sports habits, etc. The patient starts to give other details about his problem such as his past history and episodes of pain worsening. Maria stepped in and redirected the process by saying. “Okay. You start saying so many things that we’ll get lost” . Maria took control of the interview and guided the interview in another direction, saying. “ I want to know where do you feel pain. Then I’ll ask you about when you have pain. So, the pain is on your back?” (Maria, session 1: Video Start Time: 02: 34- Video End Time: 03:14).	Interrupting patient’s speech	Redirect the patient story

This part of the analysis involved selecting phrases, which appeared particularly relevant in discerning the meaning of a text (van Manen, 1990, p 94). Other quotations were taken from the text, grouped together based on similarity of ideas, and analysed together in the same way.

Thereafter, these initial categories were organized so that all the statements that followed a category were under the same heading. These initial categories were identified first for one participant, and were then used to code for the remaining participants, with a constant process of checking for appropriateness and completeness of these categories.

After this first approach to data analysis, specific sentences or phrases that could reveal the experience of reasoning and practice of this group of Portuguese musculoskeletal physiotherapists were identified and highlighted (selective reading approach). These sentences were then examined to expose its meaning in relation to clinical reasoning. Every sentence was then related to the meaning of the whole text and with it the sense of the text as a whole was expanded.

Finally, the texts were read as a whole and the researcher searched for one powerful phrase, which captured the fundamental meaning or the main significance of the text, for example, in searching for the implicit (or hidden) themes in the data.

This preliminary analysis facilitated the identification of the initial categories, which in turn led to a rich and detailed understanding of the phenomenon under investigation (van Manen, 1997). These initial categories were informed by the clinical reasoning literature and challenged by, and in turn, challenged the researcher's pre-understandings.

Following the preliminary categorization process, a narrative of the description of what happened was written for each participant (van Manen, 1997). This helped to reveal the 'essence' of clinical reasoning in the participants' stories (Koch, 1996). The intention was to make a conscious effort to extract the researcher from the textual data and focus also on the setting in which participants worked as physiotherapists. This helped to place participants' own words, actions and interactions in context. This process was then repeated for each clinician, thus allowing emergent themes and sub-themes to be drawn out.

Following individual analysis common patterns and themes amongst the participants' experiences of clinical decision-making were identified and analysed. The categories from preliminary analysis were then grouped together in an additional column of the table, pooled with similar categories after much thought on which ideas belonged together, to form the sub-themes, and finally the sub-themes were gathered together similarly to inform the development of major themes. Table 6.8 (next page) provides an example of how the theme "Requesting patient' compliance" developed from a sub-theme "Excluding the Patient from the decision making process".

Emergent major theme clusters were detailed in a separate sheet, with theme headings together with any connections, clusters or sub-themes. The process continued until a full list of themes was produced. Finally, a summary of the narratives from the folders of a priori categories was then written to illustrate the themes. Drafting summaries allowed for identification of themes and enabled the researcher to connect themes at a deeper level than simply continuing to reread original passages. These steps are crucial to hermeneutics, according to van Manen (1990). The inferred themes were then discussed and excerpts from the original texts were used to support these proposed themes. The narratives of each participant were thus constructed around the identified themes.

The interpretation resulted in an understanding by the researcher of the characteristic approaches these practitioners were using in their decision-making. The aim throughout the texts' interpretation phase was to shift the researcher's pre-understanding of decision making to a new understanding of decision making as revealed by the texts. The final step involved the identification of passages that seemed to be representative of the shared understandings between the researcher and participants. Such passages appear in the following section to give the reader insight into that aspect of the clinical reasoning, which is being discussed.

Table 6.8. Development of the theme – “Excluding the Patient from the decision making process”.

Words/ Actions/ interactions of participants	Key words/ actions/ interactions	Categories	Sub-theme	Theme
<p>“She reported some discomfort and muscle tension on her low back so I decided to apply a muscle stretching technique to elongate his back muscles and hamstrings and to take some pressure from that area. She has hiperlordosis so the iliac bones are anteriorized. In consequence of that her hamstrings has more tension than normal...when she bends the hamstrings limits the iliac ROM, so she needs more flexion in her lumbar spine and she increases the L5/S1 conflict. (José Maria, session 2: 1 399-405, p. 9)</p>	<p>I decided; She needs;</p>	<p>The clinician dictates the target for the patient’s problem</p>	<p>No incorporation of the patients’ own ideas and perspectives</p>	<p>Excluding the Patient from the decision making process</p>
<p>... José requested Ms AJ to lie down on the table and started carrying out several tests...While performing palpation and the other tests José consistently asked about Ms. AJ’ s pain. “Does this improve your pain?” What about this?” and now?” No other dialogue behind those questions concerned with pain behaviour occurred.</p> <p>After finishing the physical examination José decided to apply a global stretching technique. He positioned Ms AJ on the treatment table, corrected her body position and started with the exercise. There was no discussion about José’s ideas or an explanation of what he intended to do. (José Maria, session 1: Video Start Time: 05:34- End Time: 28:42).</p>	<p>No discussion or explanation of the treatment procedure applied</p>	<p>No shared thinking</p>		
<p>After the subjective inquiry Maria spent most of the session time testing Mr. TC’s pain reaction to lumbar spine movements. She asked for back extension and flexion in standing to be carried out and then she requested ten repetitions of each movement several times. Then she did the same with the patient lying down prone. After these tests Maria reached a decision about what kind of exercise (direction of movement) would be more appropriate for Mr. TC’s present condition. She chose the position where Mr. TC had less pain and said, “Let’s make a deal”. Then she explained to Mr. TC that she was looking for the movements that were better and the ones that were worse for him and now (she knows) what kind of exercises Mr. TC should do at home. Maria emphasized that it was really important that Mr. TC did the exercise. (Maria session 1, Video Start Time: 44:00- Video End Time: 53:20)</p>	<p>Decision are exclusively based on clinical data</p>	<p>The decision is stated unequivocally</p>		
<p>... I think he has SI problem. He has arthrosis there and also in L5/ S1. His pain on the back of his lower leg (sartorius region) is related to these nervous roots, so its natural that his problem is related with his arthrosis. He gets worse when he walks, ... so with movement. When he is seated he felt okay. So what I know now, is that I have to relieve that SI pain... (Monica, Session 2: 1 461-469, pg 10)</p>	<p>I think I know, I have to</p>	<p>The clinician frames the reflection in terms of therapeutic options</p>		

6.3. Findings

The participants are firstly introduced to situate them as individuals. The environment where they operate as well their practices are presented as short vignettes which outline the circumstances that led to their clinical decisions. In order to preserve anonymity, a pseudonym was given to each participant and patients are identified by their initials.

6.3.1. Introducing the participants

Four expert musculoskeletal physiotherapists participated in the study. Three female and one male, with an age- range between 39 and 56 years old were the participants in the study. Their professional profiles are briefly presented in this section.

Monica was a well-recognised musculoskeletal physiotherapist in Portugal. She achieved her Bachelor's degree in physiotherapy in 1970. Several years later (1991), she undertook a Diploma in Education and Administration. At the time of this study she had 36 years of experience and worked in a public hospital in Lisbon with both in-patients and outpatients. She also worked in private practice on a part-time basis with musculoskeletal patients.

Monica has been a manual therapist for over 20 years and was regarded widely as having particular expertise in the area of the Maitland approach. She is a recognized tutor of Maitland courses in Portugal. Recently she had been increasingly interested in motor control and attended several postgraduate courses on 'dynamic stability and muscle balance of the neuromuscular system'. Monica had extensive experience of lecturing on postgraduate courses and tutoring students. She was also a very active member of the manual therapy interest group of the Portuguese Physiotherapy Association.

José Maria

José was in his thirties. José graduated as a physiotherapist in 1987. Following graduation, José worked casual shifts in a range of clinical settings including two private clinics, and with the national judo team, where he was recruited to go along with the Portuguese National team to several different international events. At the time of the study he was working in a general hospital and in a private clinic. He worked with musculoskeletal patients in both settings. Also at the time of this study José was enrolled on a Masters degree in Physiotherapy in a Faculty in Lisbon.

Maria

Maria was nearly 40 years old and at the time of this study was working in a public hospital in Lisbon. Since she completed her undergraduate training as a physiotherapist at 'Escola Superior de Saúde do Alcoitão' in 1974, Maria had been a very active life-long learner. She went on several postgraduate courses, such as for example, the Maitland Approach, McKenzie Approach, Adverse Neural Dynamics, etc. After some years she developed a special interest in the McKenzie Approach and became a tutor of the same approach in Portugal. Maria had been a longstanding member of the manual therapy interest group of the Portuguese Physiotherapy Association.

In the hospital Maria worked in the outpatient unit where she attended to a wide variety of patients with musculoskeletal conditions. Maria's workplace was a small room with one mechanical plinth and space for her and her patient to move around. Besides this, the room had a chair, usually used to help patients to dress and to undress and to conduct the initial clinical interview. For patients with back or neck problems, Maria used the McKenzie Approach as the framework for patient assessment and treatment. This framework allowed Maria to be focused on specific aspects of the patient's clinical history, in the tests she used on the physical examination and in the way she define the treatment approach to her patient. The Mckenzie approach also orientated Maria to value the specific complaints of her patient. According to this protocol Maria looked for changes in pain behaviour through the modification of patient's posture (lumbar or cervical) and repeated movements. Flexion and extension were repeated several times in different positions (sitting, standing and lying supine/ test by having the patient sit, lie down and stand up).

Mariana

Mariana graduated with a bachelor of physiotherapy from 'Escola Superior de Saúde do Alcoitão' in 1984. She spent her first years following graduation working in a general private hospital in Lisbon, where like most new graduates, she was introduced to the various fields of practice within physiotherapy. At the time of the study, she worked as a private practitioner in a well-recognized clinic in Lisbon. She was also currently a guest lecturer for an undergraduate course at the 'Escola Superior de Saúde de Setúbal'. Mariana was a tutor at undergraduate level. At postgraduate level, she was involved in the short- postgraduate

courses based on Maitland’s approach. In her world of private practice, Mariana considered herself to be an autonomous practitioner, able to spend time with their patients. This was in contrast to her experience of working in hospitals, which she described as leaving her feeling frustrated with the treatments delivered to some of her patients.

Summarising the participants’ profiles, three of them had more than 15 years of experience with musculoskeletal patients and all of them were involved with supervising/tutoring undergraduate students. In general, they were all very active life-long learners. During their careers they were engaged in several different post-graduate courses mainly focused on maintaining an up-date approach to the treatment of musculoskeletal problems. With regard to postgraduate training relevant to musculoskeletal management, the most common courses completed were short courses in the Maitland approach, McKenzie approach, and therapeutic exercises for musculoskeletal problems, and spinal manipulation. Table 6.6. shows the professional profiles of these Portuguese expert physiotherapists.

Table 6.9. Clinicians’ characteristics.

	Monica	José	Maria	Mariana
Years of clinical experience	30	13	26	22
Years of clinical experience with low back pain	16	10	16	16
Education	Bachelor in physiotherapy Dip. In Education and Administration	Bachelor in physiotherapy Dip. In Rehabilitation	Bachelor in physiotherapy Dip. In Physiotherapy	Bachelor in physiotherapy Dip. In Physiotherapy
Advanced Postgraduate Education	Maitland’s Approach; Cyriax; Adverse Nervous System; Dynamic Stability and Muscle Balance	Cyriax; McKenzie; Dynamic Stability and Muscle Balance	Maitland’s Approach McKenzie; Adverse Nervous System; Dynamic Stability and Muscle Balance	Maitland’s Approach McKenzie; Adverse Nervous System; Dynamic Stability and Muscle Balance
Teaching experience	Lecturer in undergraduate and Postgraduate courses in physiotherapy. Clinical Supervisor of undergraduate students	Clinical Supervisor for undergraduate students	Lecturer in undergraduate and Postgraduate courses in physiotherapy. Clinical Supervisor of undergraduate students	Lecturer in undergraduate and Postgraduate courses in physiotherapy. Clinical Supervisor of undergraduate students
Member of Professional organisations	APF GITM	APF GITM	APF GITM	APF GITM

Legend: APF- Portuguese Physiotherapists Association; GITM- Portuguese Manual Therapy Group.

6.3.2. Clinical Reasoning of Portuguese experts physiotherapists in Musculoskeletal Physiotherapy

This section presents and discusses the findings of this study of clinical reasoning by this sample of Portuguese 'expert' physiotherapists. The initial analysis was completed from the process of nineteen interviews and observations with four experts in musculoskeletal physiotherapy in Portugal. From the data it became clear that participants made purposeful decisions in order to identify and diagnosis clinical problems, about how to interact with a particular patient, or what treatment modalities are most appropriate for a given condition. These actions and decisions were frequently intermingled through the sessions considering the focus of thinking of the clinician in a given moment. The interrelatedness founded across actions and decisions illustrates the nature and complexity of the clinical reasoning processes but also the variability of clinical tasks those clinicians had to face in their clinical practice.

In exploring participants' responses to interview questions and the observation of their clinical practice five themes representing the participants' experience about their reasoning and practice emerged from the texts produced by the participants. Each of these themes is presented and contextualized with participants' own actions, interactions and words and then discussed.

In keeping with the hermeneutic approach of providing a rich text description of the phenomena being investigated, vignettes are presented to provide a description of how this sample of Portuguese musculoskeletal physiotherapists structures meaning, goals, and health management strategies, while interacting with their patients. These vignettes illustrate the environment where participants operate, as well their practices, and outline the circumstances that led to their clinical decisions.

Theme 1: Finding the source of patients' complaints

The earliest theme to emerge from the data analysis was the importance participants gave to the discovery of the source of the patient's complaints and to the determination of a comfortable explanation for how these complaints have developed. When they reflected about the interaction with their patients, participants talked about the information they got from their patients and how this information helped them to reach an idea about why the

patient was in pain. This constitutes one important element of the clinicians' experience, especially in their first interaction with their patients. In this sense and for this group of musculoskeletal physiotherapists the experience of dealing with the subjectivity of a patient's complaints meant that they felt the need to think of different possibilities or recognize clinical features that would help them to reach a diagnosis.

In all the cases, participants started the first encounter by assessing the patient. Patient assessment included activities concerning data collection through subjective inquiry and physical examination. In general participants used the same type of approach when examining their patients starting the interaction with their patients by asking pre-determined questions about the patient's signs and symptoms. The following vignettes are presented here as an illustration of the initial moments of the first interaction made by Monica and Mariana.

Vignette 1: The first encounter of Monica and Mr. VM

VM is a male patient of 54 years old. He was referred to physiotherapy with the medical diagnosis of L5/S1 radiculopathy. He presented to physiotherapy care with a chief complaint of pain on left hip, which spreads to his left buttock and low back region. As Ms VM enters in the room Monica invites him to sit down and after a brief introduction she starts the interaction by asking several questions about the patient's pain. The following conversation illustrates the dialogue in the initial moments of the first encounter.

Monica: Could you please tell me your name?

VM: (Give the Name)

Monica: and your address

VM: (Give the Address).

Monica: do you have a phone number?

VM: Yes

Monica: And your age?

VM: 72 years old

Monica: So, I would like to know what your complaint is. Can you tell me what your problem is?

VM: My complaint is about this area here (JG is pointing his left SI and hip regions). When I go for a walk, 100 or 200 meters after I have to stop because of my pain. I stop for a while, 5 minutes or so, I stroke my leg a bit, and then I can walk a little bit more.

Monica: So your pain starts in your back...

VM: the pain starts here (points the hip region)

Monica: And then goes up...till your back
VM: Yes, but here (hip region) the pain is constant. Even during the night
Monica: During the night.....Do you think it is only one pain or three different pains.
VM: I think it is only one pain
Monica: And your pain is a deep pain?
VM: It is deep, yes
Monica: and it is like a `pin prick`.
VM: it is a strong pain....acute...
Monica: The pain is getting better or worse?
VM: I think it is getting worse...
Monica: So, for how long have you had this pain?
VM: For about six months. The first time I came here to see the doctor....
Monica: (Interrupting the patient' speech)So, your pain started six months ago and now is getting worse?
VM: Yes, everyday I feel it more stronger...
Monica: And right now, do you feel it? For example yesterday...
VM: Yesterday? Well, you know, if the weather is not good the pain gets worse. I feel it immediately. Because I live nearby I walked from my home to come here and I had to stop for several times before I get here.
Monica: So you live close by. How far is your home from here?
VM: I live in `Boa Hora` (referring the name of the neighbourhood)
Monica: So it's about 1 kilometre?
VM: Yes, maybe...
Monica: And how many times do you stop?
VM: Today I stopped four times...
Monica: Okay. And what about stepping down or climb up stairs?
VM: Yes...I feel it
Monica: So its more difficult if you have to climb up
VM: Yes...and I live in a second floor, so I have to climb up my stairs. I climb up some stairs and I stop. Then I do it again. I have to stop at least two or three times...
(Mónica, session 1: video start time- 00:00- video end-time-04:37)

Vignette 2: The first encounter of Mariana and Ms. MC

In a second vignette Mariana follows a similar pattern of inquiry. MC is a young female of 22 years old. She called Mariana asking for an urgent consultation. She complained of a strong low back pain, that began suddenly three days ago and without apparent reason. Mariana was seated at her desk expecting MC. The desk is full of objects, such as a telephone, different boxes with pencils and pens and a computer monitor. As MC enters the consulting room and walks towards the chair alongside the desk, Mariana briefly introduces herself and asks about the patient's age and sports habits. Then she utters, "So tell me what's up?" The utterance invites the patient to deliver her reason for seeking professional help. It projects a sequentially relevant action for the patient, and the patient does indeed deliver the

appropriate response, "I've got a strong pain in there (pointing to her back)". The following conversation illustrates the initial moments of the first encounter.

Mariana- could you please tell me your age?

MC- 22 years old

Mariana- do you practise any sports?

MC- no...only the usual gymnastic when I was in the secondary school...and then one or two years of aerobic...but nothing more than that ...

Mariana- Okay, so could you please tell me what's up?

MC- well... I've got a strong pain here (pointing for her back)". Last Tuesday I woke up with pain in my back ...

Mariana- (interrupting) Okay, so please tell me exactly where do you feel pain

MC- It's here (pointing for her back. The patient stands up to show the precise site where she feels pain)

Mariana- So, tell me, your pain spreads for both sides of your back?

MC- Yes, it spreads for both sides

Mariana- But it spreads or stays in the middle?

MC- It spreads and catches my legs...

Mariana- Both legs?

MC- Yes

Mariana- (Mariana took notes). Where to in your legs?

MC- close to my knees...

Mariana- and you feel it in both legs at the same time? Or you feel it sometimes in one leg and other times in the other?

MC- I feel it in both legs at the same time...but in the last days...

Mariana- (interrupting) and you feel it all around the leg or is only in one specific area?...in the back of your leg or in the front?

MC- It catches all my legs....You know, right now I have some difficulties to walk...and in the last few days I feel it stronger in my right leg...

Mariana- So it's worse on your right leg (Mariana took notes). Below your knees, do you feel any pain?

MC- No, I don't feel anything special...

Mariana- No?

MC- well comparing with the upper part of my legs, no...

Mariana- and what about the other areas of your back?

MC- No

Mariana- Okay, lets do a number to your pain. I'll call pain 1 to the pain on your back, which is your main complaint. Pain 2 to the pain in your right leg and pain 3 to your pain in the left leg- That's okay?

MC- Yes...

Mariana- Okay, so pain 1 do you feel it on the surface of your back or deep inside?

MC- Deep inside, it's a horrible pain...I'm taking some medication..."

Mariana- (interrupting), "yes, you're going to tell me all that story later." "If you had to grade your pain between `0`, which means no pain, and `10`, which means a horrible pain, which number would you choose. Please consider the present moment.

MC- "4 or 5 I guess"...

Mariana- "(writing on the patient's chart). And when you felt worse?"

MC- "I would give it a 9. I couldn't walk straight..."

Mariana- “If you had to describe it to someone how would you do it, a dull pain, an electric shock?”

MC- “I feel it like a spasm...”

(**Mariana, session 1:** video start time-00:00-end time-06:20)

The patient’s interview continued with the same type of questions. After characterizing pain 1, Mariana did the same for pain 2 and 3. Then she looked for a relationship between pains. Following this initial inquiry Mariana addressed other areas of the subjective examination such as: the behaviour of the patient’s pain (aggravating and easing factors; severity and irritability; the twenty four hour behaviour of symptoms; stage of the condition); the history of the present condition; past medical condition; and professional, social and family history. MC answers all these questions and from time to time Mariana takes notes in the patient’s chart. There is no explanation to the patient about what Mariana is writing.

In the above vignettes participants used direct questions to collect relevant information (cues) that allowed them to start building an initial idea about the possible origins of the patient’s complaints. Examples of these cues are pain area³¹; pain behavior; pain intensity and severity; pain quality; and the relationship between symptomatic areas. In this process, patient data prompted the therapist consideration of competing interpretations (working hypothesis), which were, in turn clarified and tested through further data collection and reassessment of management interventions (Elstein *et al.*, 1978; Jones & Rivett, 2004). In spite of the different initial sources of cues, and in all the cases therapists had relied on data collected during the subjective examination. Pain area was the major source of information that provided cues to initial hypothesis formulation. The pain area contributed to in focusing the physiotherapist’s attention on particular regions or structures (e.g. lumbar, sacroiliac or hip areas; intervertebral disc; zygapophyseal joints) as areas responsible for the patients’ pain.

On the basis of this preliminary working hypothesis, clinicians evaluated their competing working hypothesis through subjective and physical examination and reassessment of management interventions (Hypothesis Evaluation). Questions, examinations and tests and treatment strategies, were used to refine their working ideas through the finding of positive/

³¹ Pain area is used in this document instead of area of current symptoms. In all the cases pain was the chief complaint and no other sensations/ symptoms were reported by the patients (eg. numbness; pins and needles).

negative evidence towards specific structures and pain mechanisms involved in the production of patient's pain. Examples of how these clinicians choose specific activities/movements to test their hypothesis are provided across the interviews and observational data. After the subjective examination Mariana balanced the clinical evidence collected through pain behaviour in different positions or activities by integrating the patient's information with her own clinical knowledge. She provided the following commentary while she watched the video of her first encounter.

When she walks she makes more extension and therefore more compression on the facets therefore diminishing the size of the canal, if it will be the case of being the canal, walking would have to worsen the pain as it was, and therefore the pain would have to improve in the seating position or in flexion of the trunk. ...and when she is lying, it gives a clue that does not fit into my expectations which are an aggravation of the pain when lying on her back, therefore it would make more flexion, therefore it would have to alleviate this situation and therefore this does not happen

(**Mariana**, Session 1; L 36-42, p. 2)

Monica did the same by confronting her initial hypothesis with the clinical evidence collected through the subjective examination in session 1. By that time, and considering the source of the patient's pain, Monica had three competing hypotheses for the symptom production area: hip region; low back; and sacro-iliac joint. She evaluated each of those hypotheses by analysing the positive and negative findings, which could confirm one of these regions. For example, she comments,

He always points to his hip...he puts his finger over there... the great trochanter. He puts his finger, his hand there; this is there where he feels his pain. And after a while the pain goes up and down. So I thought about a bursitis"

(**Monica**, Session 1: l 134-136, p. 3)

Hypotheses regarding possible sources, pathobiological mechanisms and contributing factors were then specifically tested through the physical examination. The physiotherapists carried out several different tests in an attempt to find evidence to prove or disprove their ideas about what was causing the patient's pain. In doing so, they asked the patient about pain reproduction or changes in pain area or intensity. Positive evidence was retrieved when the test reproduced the patient's chief symptom or when there was a change in the pain intensity. Mariana said:

Here I want to know if the increase in loading increased the pain, to confirm my hypothesis of being a load situation on top of the structures that increased the pain and to perceive what was the movement that relieved her more, and which was the movement that aggravated the pain in order to provide me with an indication about the treatment to be followed, in terms of movement. I was expecting what I found, an aggravation of pain on extension

(**Mariana:** Session 1; L 158-169, p. 5).

Monica tested Mr VM's hip joint using passive, active and resisted ranges of motion looking for pain reproduction and movement restrictions. Then she palpated the area of the greater trochanter. The clinical findings made Monica begin to evolve from a generic hypothesis of a hip problem to a more specific problem such as, a bursitis or a tendonitis.

I think the hip joint is free of pain. He complained of a bit of pain when I applied overpressure at the end of flexion and on hip quadrant testing, but this could also relate to the SI joint, and he can't tell me if the pain was from his hip or his back. All hip movements are free of pain and the ROM is normal. His pain is not reproduced when resistance is applied. He only felt pain on palpation. When I palpated the greater trochanter area he complained of pain, a strong pain. So my idea become more related to the hip, probably a bursitis or a tendonitis. But probably not a tendonitis because he doesn't have any pain when resistance is applied

(**Monica:** Session 1; L 70-78, p. 2).

Following the first encounter, therapists provided their own explanations about the patient's problem. These explanations usually involved the following hypothesis categories: source of the patient's symptoms; mechanisms of signs and symptoms; contributing factors and the management considered appropriate. A common element across participants was the uncertainty reported about the source of the patient's symptoms (anatomical structure) or about pathobiological mechanisms involved in pain production. They all seemed to need the results of their treatment to confirm their own hypotheses.

For example, Mariana discussed her reasoning trying to find an explanation for the sudden low back pain. She was in doubt about other possible origins out of the scope of physiotherapy. On the basis of the preliminary diagnosis she made - postural load- she had a clear idea of what to do in terms of patient management.

I would say that I did not understand what happened, because I find that it was an acute situation very exacerbated, with much irritation, even neuromeningeal. Therefore or it is something that escaped me and I do not understanding the problem well, or a postural situation with a nociceptive ischemic pain. Therefore my two hypotheses are these, or there is something more serious that is running away from me, and that I could get, eventually a viral situation, or it is a solely a question of postural load and what she will need to do is to do some stretching, motor control, strengthening, regular physical activity, re-education of the mentality in relation to the movement and if this is the case the thing passes and that's it, it will bring no more problems. If it is something else it will reveal later in another way.

(Mariana, Session 1: 1 234-243 p. 7)

Monica was also in doubt about the patient's complaints. She was more tempted to consider sacro-iliac joint as the source of the patient's pain but her clinical findings were not strong enough to reject the other hypothesis formulated.

At this moment I really don't understand, because he has pain in charge, so it is a joint or muscle problem. However, all hip movements are free of pain. The muscle tests on hip muscles are free of pain, so I would reject the hip and change my thoughts to the SI region. But in this patient it's very difficult to test the SI joint, and he has pain on the great trochanter during palpation, so I can't reach a conclusion

(Monica, Session 1: 1 95-102, p. 2)

Regarding the decisions made in order to find a diagnosis for the patients' complaints, the clinical reasoning process used by the expert physiotherapists was hypothesis oriented. This reasoning strategy included gathering data, generating hypotheses, interpreting data and evaluating hypotheses (Elstein *et al.*, 1978; Edwards, 2001; Jones & Rivett, 2004). Mariana and Monica collected cues and formulated hypotheses early in the encounter. Further information (data collection) was then sought throughout the subjective and physical examination with these hypotheses in mind (Jones, 1995). This process of hypothesis generation resembles forward reasoning. In using forward reasoning, therapists generated hypotheses based on the their organization of knowledge and subjective information from patients, they have seen in the past (Noll *et al.*, 2001).

Summarizing the data presented, in all the cases, participants examined patients and chose treatment on the bases of their own assessment, whatever was written on the referral from

medical doctors. The main basis for identifying the source of patient's problems was symptoms and signs in the traditional sense of being cues of musculoskeletal dysfunctions. In general, participants were very attentive with respect to the patients' descriptions of their symptoms and complaints. They took elements of the patient's clinical history, test the clinical hypothesis they formulated and arrive at a mechanical diagnosis in order to assert the kind of dysfunction that was involved (postural dysfunction, nerve compression, disc degeneration, etc). In this sense the diagnostic approach used was in accordance with the traditional conception of medical diagnosis.

Theme 2: Taking control of patient' clinical history

Closely related with the first theme was the difficulty participants experienced in dealing with the way patients described their symptoms and clinical history. Reducing the subjectivity of the patients' histories to more comprehensible aspects or biomedical entities seemed to be a major task for this sample of Portuguese expert physiotherapists. In the interaction with their patients, participants showed a strong concern in controlling the flow of patient speech by following a strict pattern of inquiry, by using closed questions and by avoiding patients' ideas about their problems. This pattern of interaction conveyed a strong message about what was important and relevant from their point of view. Focusing the attention essentially on the patient's body symptoms and restrictions entails the message that concentration on the area causing the symptoms was sufficient in order to understand, and consequently treat the patient' problem.

The vignettes previously presented (vignettes 1 and 2) exhibited a number of features common to all the participants. The sequence opened with the main focus of the clinicians' attention directed towards the patient's complaints. In both cases, the exchange involved the transition of the consultation from the 'preliminaries' to the 'business at hand', and the patient's responses provided resources for subsequent questions, diagnosis and treatment. This exchange was typical among clinicians during the subjective examination in the first encounter. In all the situations the clinicians presented themselves briefly and started their initial encounter by promptly inviting their patients to explain their reasons for seeking professional help.

In all the cases participants followed a strict sequence of questions and they do not hesitate in

redirect the patient story to issues they want to know. For example Mariana assumed the control of the interview and asked several different questions. *Where precisely is your pain? Is it more central or does it spread? It goes to your legs? Where to? It goes to both legs at the same time? How would you describe your pain?*. When MC tried to give other details about her clinical story, such as when she said, *“oh it’s a horrible pain...I’m taking some medication...”*, Mariana interrupted and said, *“yes, you’re going to tell me all that story later, and Mariana continues “If you had to grade your pain....”*.

Another common characteristic founded in participants’ interaction with their patients was the interruption of the patients when they started telling their story in their own words. Participants seemed to give priority to their thoughts about what was going wrong with their patients and appeared to ignore or devalue patients’ cues, ideas or beliefs. The following excerpt of the first encounter between Maria and Mr TC is an illustration of this.

Vignette 3: The first encounter of Mr. TC and Maria

Mr. TC enters the room and says good morning to Maria. He immediately starts to take off his clothes. It seems that Mr TC is familiar with physiotherapy. Maria asks the patient to wait a while and says- “I don’t want you to undress yet”, ..., “Could you please sit down? Okay, tell me what is your current profession?”. From the first moments of the encounter Maria takes the lead in the interview. They remain seated in front of each other during the whole interview (approximately 21:30 min). Maria asks several different questions about the patient’s profession, his hobbies, daily routine, sports habits, etc.

The patient starts to give other details about his problem such as his past history and episodes of pain worsening. Maria stepped in and redirected the process by saying. “Okay. You start saying so many things that we’ll get lost”. Maria took control of the interview and guided the interview in another direction, saying. “I want to know where do you feel pain. Then I’ll ask you about when you have pain. So, the pain is on your back? ?” (Maria, session 1: Video Start Time: 02: 34- Video End Time: 03:14).

During the course of the interview more interruptions from Maria occurred. A few minutes later the patient started to explain when he felt pain and Maria again interrupted. “Okay, but now, please sit down for a while. We need to know what is the effect of that position on your back”. Maria is fully concentrated on her questions. She wanted to have concrete

information that would help her to understand what was going on with Mr TC. Every time the patient started talking about other issues that Maria did not find relevant or appropriate considering the sequence of her assessment framework, she interrupted and re-directed the questioning.

A few minutes later in the subjective interview, Maria asked about the daily activities that made Mr. TC's pain worse. Maria asked, "Is there anything you know that will make your pain worse?". Mr. TC provides some examples of activities that made his pain worse and then he stated, "you know my problem is that I feel fear, I am afraid of doing anything. Because you know, I'm alone at home, and...!" Maria interrupts and changes the direction of the conversation by saying, "Look, when you sneeze or cough? Do you feel pain?"

(Maria, session 1: Video Start Time: 14: 04- Video End Time: 14:53)

Later on, in the session the patient returned to the theme of his fear. Mr. TC was doing back extension movements lying down on the plinth and after asking about the behaviour of Mr TC' pain while doing the exercise, Maria asks, "When does the pain get worse?". Mr. TC answers- "Well, you know, it's not easy to say if I feel pain because I'm doing this and I can stand the pain. But when I get my strong pain or when my back makes that click (blocked), its impossible to do anything. I'm doing this exercise and I'm happy because I'm doing something that I don't feel is bad for my back".

(Maria, session 1: Video Start Time: 41:14- Video End Time: 41:44)

In the above conversation the patient tried to share with Maria his fear that some kind of movement or activity will bring on "his strong pain". He his trying to say that he is worried not about the pain during the exercise but about the fear he has that suddenly "his strong pain" will arise and cause him to be paralysed. Maria answers by saying- " if that happens it is because you have not taken the care with your back that you should". These words were said without any change in Maria's tone of voice. Maria makes clear that she knows what she's is doing and what she intends from Mr. TC. At the same time, she accentuates Mr TC responsibility on the success of the treatment asking for his compliance without questioning. In this situations Maria's decision-making process, appeared to take no account of her conversation with the patient.

The pattern of interaction depicted in the vignettes was consistent throughout the sessions and amongst clinicians. In all cases, interaction with patients was exclusively focused on patient's clinical problems, and despite the fact that the patients showed a strong willingness to share their stories with the clinicians, the type of questions clinicians asked did not invite more than a yes/ no response from the patient. To illustrate this, another vignette is provided illustrating the initial moments of session 3 between Mariana and her patient.

Vignette 4: Mariana and MC in the beginning of session 3.

Mariana- Hi, so how do you feel today? Give me some news. How did you feel after our last session?

MC- Better

Mariana- what do you mean by "better"? No more pain in your leg?

MC- No

Mariana- what about your back pain?

MC- Well, I feel it once in a while, ...but that was related to my bad posture in the classroom...

Mariana- so, no more pain while walking?

MC- Yes, not anymore

Mariana- Okay...So tell me about the situations where you still have pain (Mariana writes in the clinician' chart). The pain number 1, when do you get it?

MC- Well, when I'm not correctly seated.

Mariana- So why don't you sit well? (Mariana laughs)

MC- (also laughs) I sit but then I forget

Mariana- But then you remember...

MC- Yes, and then the pain goes away...

Mariana- and for how long are you sitting until you feel that discomfort in your back?

MC- for how long?

M- Yes...It starts in the end of a class or in the beginning?

MC- No, I think is more in the middle...

Mariana- and how much time does a class take?

MC- 50 minutes... well that depends, I've got classes that take 3 hours, but after 50 min, I think.

Mariana- So you feel much better. Are you still taking your medication or have you already stopped?

MC- I stopped today. The doctor told me to take it until today...

Mariana- He told you to take it even if you weren't in pain?

MC- Yes, yes, and he said that if I felt some pain after those days I would have to maintain the treatment. If not I should stop.

Mariana- Ok, let's see then...

MC- I'm much better. There were movements that I couldn't do, such as, to bend my self...

Mariana- Ok, let's take off your clothes and see. Let's look to everything and see what you have to do from here to avoid other situations like this, okay?

MC- Okay

(Mariana: session 3- Video Start Time: 00:00- End Time: 03: 32)

In the above dialogue Mariana seems to be exclusively interested in the patient's clinical condition evolution. Mariana uses specific closed questions based on the previous clinical findings to reassess MC's pain condition. No other type of interaction concerning other aspects of MC's life is brought to the interaction. In any situation or circumstances neither Mariana, nor the other participants invited their patients to express their views in relation to their condition, their concerns and feelings or how they are dealing with the management strategies proposed.

From repeated analysis of the data, a trajectory of decision-making was observed, extending from the transition into a decision-making phase initiated by the clinician, through to the arrival at a decision (or some conclusion about the decision to be made). In this phase the clinicians' foci of thinking were basically centred on diagnostic clinical decision making. The interaction made with the patients had the specific purpose of collecting relevant data, which would help them, to identify the source of patients' complaints and decide on what treatment to apply.

Regarding the interaction between clinicians and patients, it was only possible to identify quite unilateral approaches by all the clinicians. Throughout the examination, participants mostly asked specific questions based on their professional knowledge. Through the control of topics and the form of questioning – asking mainly closed questions and presupposing the type of answer – the dialogue with the patients developed along the lines laid down by the clinical hypothesis belonging to the therapist. In all the cases and by the end of this opening phase, the patient's perception of his/ her problem remained unvoiced and unexplored.

Edwards (2001) stated that this kind of interaction was instrumental in so much as it was carried out to produce a particular effect. In all cases, the interaction was controlled by the clinician and characterized by closed questions in order to collect patient data. However, Edwards (2001) also noted that even in the first moments of the encounter, interaction could be quite communicatively (or narratively) focused. At such times, interaction was characterized by open-ended questions with the purpose of simply understanding or finding

out more about a person's values, beliefs, or assumptions regarding his or her (or his or her partner's) illness or treatment. As the vignettes show, this did not occur in the interactions between the expert physiotherapists and patients in this study.

Theme 3: Excluding the Patient from the decision making process

One important characteristic of the practice and reasoning of this group of Musculoskeletal Physiotherapists concerned the way they made decisions about what to do with their patients. Participants feel the responsibility to define appropriate treatment plans, apply precise treatment modalities and supply accurate information to their patients, giving them the responsibility to self manage with all the advice and recommendations they provide. The decisions about what treatment modalities should be selected and carried out were closely linked with the main hypothesis elaborated by each participant during their initial examination. Participants started from their chief hypothesis to define management strategies and treatment procedures to apply to their patients, the rules that guide the application of different modalities (e.g. patient's position and locale of treatment application) and the expected outcomes (e.g. pain relief). In this sense relieving patients' symptoms was the main goal found across participants' management.

To reduce patient' pain, therapists used passive joint mobilization, exercise, neural mobilization or stretching. At the same time they gave specific instructions and advice in order to minimise any potential contributing factors to the patient present condition and to reduce patient's pain. In every session there was a combination of treatments provided. Mariana and Monica's treatment modalities relay more in passive modalities, including passive joint or neural mobilization, to relieve the patients' pain. José uses muscle stretching to change the patient's conditions responsible for the pain situation (postural condition). Reasons to choose specific techniques were exclusively related with therapists' diagnostic hypotheses. For example, José justified the use of a stretching technique saying:

She reported some discomfort and muscle tension on her low back so I decided to apply a muscle stretching technique to elongate his back muscles and hamstrings and to take some pressure from that area.

She has hiperlordosis so the iliac bones are anteriorized. In consequence of that her hamstrings has more tension than normal...when she bends the hamstrings limits the iliac ROM, so she needs more flexion in her lumbar spine and she increases the L5/S1 conflict.

(José Maria, Session 2: 1 399-405, p. 9)

After the application of a specific modality and between sessions, clinicians reassessed the patient's condition searching for changes in the pain characteristics, in particular, changes in the pain area, intensity and behaviour and in the pain related activities signalled (painful) in the previous encounters. Positive changes in these characteristics helped clinicians to choose between their competing hypotheses and provided confirmation of the clinician's interpretation of the patient's problem. In this sense clinical decisions concerned diagnosis and the determination of which treatment modalities to apply, were inexorable linked. One example of how the evolution of the patient's condition influenced clinicians' judgement is provided by José Maria at the end of second encounter with his patient.

Now I'm not thinking about the SI joint anymore. Her pain has centralized in the L5/S1 region, and the complaints in the SI area with lateral irradiation have disappeared. Now she has pain in the end of the day...so I'm thinking about a postural problem ...not a mechanical problem. If it was a SI' problem, she would felt more pain when mobilized, so I think it is a L5/S1 conflict, due to her hyperlordosis and short hamstrings.

(José Maria, Session 2: 1 411-418, p. 9).

Mariana finished her first interaction without a clear idea about the origin of her patient's pain. However, and on the basis of the reassessment findings, she finished her second encounter rejecting her initial hypothesis of a more serious problem.

Well, I reject the more serious hypotheses, because in the beginning I thought, and still thinking that she had too much pain for a postural problem. I never saw a situation like this, so much pain, so acute, without any particular reason. I mean she is 22 years old, her scoliosis has been there for 22 years and this was her first low back pain episode. It was so acute, so irritable, that's why I thought it to be a more serious situation. One person could have a pain there but does not go to the hospital and does not stay four hours there to have lots of tests without any conclusion.

Rejecting this idea and considering the medical referral that says that she has a problem in her vertebral column and needs physiotherapy, I still stay with my second hypothesis, a postural condition. But it was too much pain for such a postural problem, I think...

(Mariana, Session 2: 1 495-509, p. 16)

Inherent to the way participants approach treatment (as well as examination) was a message of inequality. Participants did not offer any plans to their patients, and they do not ask for

patient input considering the plan they define. With the exception of Mariana (Vignette 6) participants did not even share information about what they are doing. Three vignettes illustrate the decision clinicians made concerning the treatment modalities or strategies they found useful to implement in their patients. All vignettes relate to the transition between the physical examination and treatment.

Vignette 5: The first session of José Maria and Ms. AJ.

José Maria finished his subjective examination and started with the physical examination by asking Ms. AJ to take off her clothes. He corrects AJ's standing position to observe her posture. José stayed behind AJ and asked for the pain to be localized and then took notes recorded in the patient's chart. Then he assessed AJ's physiological movements (flexion, extension, lateral flexion and rotation). During each movement he requested information about the patient's pain- Do you feel pain? Is this movement painful? What about this one? Ms. AJ showed the movement during which she got pain (lumbar flexion) and pointed to the area on her back. José wrote on the patient's chart and Ms AJ waited in silence.

Then José requested Ms AJ to lie down on the table and started carrying out several tests. He looked for pain reproduction while he palpated the lumbar vertebrae and the sacro-iliac joints looking for pain reproduction. He then carried out tests on the sacro-iliac joints (gapping tests) and then he performed the "straight leg raising test". While performing palpation and the other tests José consistently asked about Ms. AJ's pain. "Does this improve your pain?" "What about this?" "and now?". Sometimes Ms. AJ reported some pain or discomfort. No other dialogue behind those questions concerned with pain behaviour occurred.

After finishing the physical examination José decided to apply a global stretching technique. He positioned Ms AJ on the treatment table, corrected her body position and started with the exercise. There was no discussion about José's ideas or an explanation of what he intended to do.

(José Maria, session 1: Video Start Time: 05:34- End Time: 28:42).

Vignette 6: The first session between Mariana and MC

After the subjective inquiry Mariana moved to MC's physical examination. She abandoned her position behind her desk and asked MC to turn around so that she could examine her back. While Mariana is looking carefully to MC's posture, the patient says, "I think I walk straight. I don't have a tendency to have a bad posture". Mariana answers, "well, your problem is not related with that, you look compensated (referring to her scoliosis).

Mariana left the room for a few seconds. When she returned she asked, "Do you feel pain in that position?" MC said yes and pointed with her finger to the area where she felt the pain. Mariana moved to carry out a different test. She requested MC to perform all the physiological movements of her back. MC started by doing extension. Mariana orientated the movement with her hands and asked, "Any pain?" MC answered, "a little". Then she went to her desk and wrote on the patient's chart. She did the same for lateral flexion, flexion, and then rotation. During every movement Mariana asked about MC's pain and then recorded the findings. When MC carried out flexion, Mariana said, "you don't need to stay there (in the end of the movement). I only need to know about your pain behaviour.

Then Mariana asked MC to go to the plinth and to lie down. Mariana explained to MC what she would do and why. Then she carried out "passive neck flexion" and asked, "Does this make your pain worse? Where (range of movement)? Mariana then moved to other tests. She looked for changes in MC's sensation in both legs and then she performed the straight leg raised test and tested MC's muscle power. During all these tests Mariana looked for differences between legs (range of motion, muscle power, etc) and asked, "Do you feel any difference in your legs?"

Mariana gave precise information about what she was doing and what she intended to find out. She was always reformulating and clarifying her questions to be sure that MC clearly understood well what she wanted to know.

(Mariana, session 1: Video Start Time: 22:45- End Time: 33:43)

Mariana then asked the patient to turn around and to lie down on her tummy. Mariana told her to do it slowly and carefully and to turn to her left side "because that's where you have less pain". She demonstrated concern about MC's comfort. Mariana took the advantage of this situation and advised MC how to stand up from her bed in the morning. Mariana then explained what she would do, and said, "I'll do some movements on your vertebrae to find

the level responsible for your pain (eg. L4/L5). Mariana mobilized the vertebrae while asking about the patient's pain. "Do you feel any pain? Is it your pain? Is it pain 1?" MC said "yes".

After a few minutes of mobilization, Mariana said, "I will try to relieve your pain. I've already understood that you've got a very acute and irritable situation here and we have to relieve your pain before we start doing other things". Mariana left the room and then returned with a hot pack to put on the patient's back. She confirmed that MC was in a comfortable position and said, "If it's too hot please tell me". Then she left the room.

(Mariana, session 1: Video Start Time: 33:44- End Time: 40:54)

Vignette 7: The first session of Maria and Mr. TC.

After the subjective inquiry Maria spent most of the session time testing Mr. TC's pain reaction to lumbar spine movements. She asked for back extension and flexion in standing to be carried out and then she requested ten repetitions of each movement several times. Then she did the same with the patient lying down prone. After these tests Maria reached a decision about what kind of exercise (direction of movement) would be more appropriate for Mr. TC's present condition. She chose the position where Mr. TC had less pain and said, "Let's make a deal". Then she explained to Mr. TC that she was looking for the movements that were better and the ones that were worse for him and now (she knows) what kind of exercises Mr. TC should do at home. Maria emphasized that it was really important that Mr. TC did the exercise. She then taught the patient how to do the back extension exercise when he was lying prone. She said that Mr. TC should do the exercise in the morning. Maria emphasized the importance of doing the exercises and she asked for a series of ten repetitions, five or six times a day. Maria gave detailed instructions to Mr. TC about how he should get up from his bed or from the floor and what he could do with his back. Then Maria asked, "so do we have a deal? Do you have any questions?" Mr. TC answers, "No, I don't have any question". Maria said, "Well you have several days (between sessions) to show me what you are able to do. In our next session I want to know about everything you have done and how your pain behaved".

Maria watched the way Mr. TC stood up from the plinth and made some corrections. Then she showed him how he should stand up using his body. She then emphasised again the importance of Mr. TC doing the exercises at home.

Maria gave the patient the responsibility of achieving positive outcomes with physiotherapy. It is really important that the patient does the exercises and does them well. If he “fails” Maria can’t do anything for him. So the success of the treatment is dependent on the patient’s compliance with the exercises.

(Maria session 1, Video Start Time: 44:00- Video End Time: 53:20)

The vignettes presented show a common pattern of interaction amongst participants. They all make decisions about what kind of treatment should be applied to their patients without consider the patients’ own ideas and perspectives. Although only three vignettes are presented the pattern of interaction observed was common among participants and was consistent throughout the sessions.

However, and despite the similarities found between the clinicians there were some differences in their practice. For example, José and Maria never explained to their patients what they were doing and why. They performed all the tests and examinations, they made notes of what they found relevant but at no time did they present or discuss their clinical findings with their patients. They simply finished their physical examination and asked their patients to move on to a plinth and start doing some kind of a technique. In contrast, Mariana carefully explained to MC what she intended to do and why it was necessary during the physical examination.

In general it seemed that for this group of clinicians, patients’ needs were equated with a need to reduce abnormal medical symptoms to as close to normal as possible. Although clinicians asked patients how they felt (although their questions were always related to the patient’s pain), they used technical and clinical findings to determine which treatment approach was most appropriate. In doing so there appeared to be little or no incorporation of patient perspectives and their needs into assessment and treatment plans.

Vignettes and transcriptions from participants’ interviews provided evidence that clinicians’ foci of thinking were basically centred on procedural hypothetico- deductive reasoning (Edwards, 2001). On the basis of their clinical hypothesis, clinicians determined what modalities to apply and how to apply them. On some occasions they defined instructional

strategies that would help the patient to minimize or at least, not aggravate their condition. Clinicians' actions and interactions related to clinical decisions where the main purpose was to correct the identified dysfunctions. In doing so physiotherapists applied specific modalities that they believed would improve the patient's symptoms and confirm their main clinical hypothesis. Clinicians controlled their actions and measured their effects. In this sense clinical decisions concerning diagnosis and the determination of what treatment modalities to apply, are inexorably linked and rely on a hypothetico- deductive process of reasoning.

Decisions about how to interact with the patient were subsumed by procedural actions and decisions. In the vignettes it seemed clinicians used interaction with the specific purpose of obtaining accurate information that helped to evaluate the effects of the modalities applied and provided strict instructions concerning the way patients performed exercises or other activities. In all cases the focus of interaction was on pain behaviour and almost no time was spent explaining to the patient what was going on and why.

The different vignettes presented emphasize the instrumental nature of the procedures applied and interactions that occurred. In instrumental thinking and action there is recognition of a preferred or correct way of doing things. Hypothetico-deductive reasoning or instrumental action leads to a predicted 'best' conclusion. This instrumental action and reasoning resembles technical rationality as described by Schon (1983; 1987) and contrasts with the recent findings of Edwards' study (Edwards, 2001). On the basis of his findings with Australian expert physiotherapists, the author acknowledges that instrumental action has an integral place in physiotherapy practice, but emphasizes that clinicians engage in both instrumental and communicative practice, instead of using the former on an exclusive basis (Edwards, 2001).

The kind of practice and reasoning the study participants exhibited was quite different from communicative decision making where there is a recognition of the plurality of choices and the necessity of 'means to ends' approaches to problem solving which relate to clinicians and patients' values and beliefs. This also contrasts with the current descriptions of interaction among allied health professions where patient' collaboration is seen as essential for establishing fruitful relationships and for obtaining successful outcomes (Beeston &

Simmons, 1996; Jensen *et al.*, 1999; Edwards, 2001; Ajjawi & Higgs, 2007; Smith *et al.*, 2008).

In summary, findings of this study provide little evidence that participants incorporated patients' perspectives in their practice. Rather, they saw patient's dysfunctions or body restrictions as detached from the patient as a person.

Theme 4: A biomechanical understanding of the patient' problem

One important part of the clinician's approach to reasoning and practice involves the experience of treating the patient's body as a physical entity. When treating their patients, participants tend to separate patients from their bodies. Participants were essentially concerned with the patient's body from a biomechanical perspective. They paid most attention to the symptom- giving and the abnormalities they found in the patient' body. Joint mobility restrictions, postural mal alignments and abnormal patterns of movement, were their main interest. Participants are extremely cautious observing the way a patient's body is performing an exercise, in correcting the body position or in giving accurate information about how to perform the task they request. This contrast with the relevance they give to the patient as a person. The following extracts from the observation field notes illustrate how clinicians attended to the patients' bodies in a strictly mechanistic way.

Vignette 8: The first session of José Maria and Ms. AJ

After subjective and physical assessment, José Maria decided to apply a global stretching exercise to his patient. José asked the patient to lie down on a plinth. He started correcting AJ's body posture by positioning her legs and arms in a proper position. Starting from this initial position and over 10 minutes, José asked the patient to breathe deeply and to move particular areas of her body in order to improve the stretch applied to the back muscles of patient' body.

José was seated on a small stool in the top of the plinth. One hand was pulling AJ's cervical spine and the other applied pressure on her chest during expiration. During the period of the stretching exercise, José stood up several times to correct or adjust AJ's body. Sometimes he corrected the lumbar area and at other times the position of the legs or the arms.

During the exercise José reinforced several times what he expected from AJ's body, by giving strict orders such as, " move your back as I told you"; "breath deeply"; "that's right"; and he also asked about her pain. Behind the orders, no other type of conversation took place. At the end of the exercise José asked AJ to stand up and observed her back without giving no explanation of what were the objectives of the exercise performed.

(José Maria, session 1: video start time 27:20: end time 44:00)

In sessions 2 and 3 José returned to the same exercise and repeated all the procedures without any information or conversation with AJ beyond talking about body position, body corrections or asking about pain behaviour.

Vignette 9: The fifth encounter of Maria with her patient

Maria started her fifth session with Mr TC by reassessing the behaviour of his pain when he did the recommended exercises. After the initial subjective reassessment Maria started to verify the exercises she recommended to Ms CA.

Maria: Bend your knees. Okay. Any pain?

CA: A little...

Maria: Okay, rest a little bit. Are you sure that it is pain? It is really important for me to understand if that is a pain, a discomfort or something else...

CA: It is more like a discomfort...

Maria: Okay. Now bring your knees to your chest, yes, that's it...Any pain?

CA: No

Maria: Let's do it again...that's it...Any pain?

CA: No

Maria: Okay. Let's do it ten times

CA: Should I breathe in when pulling the knees to my chest?

Maria: Yes

Maria: Do it further...I want to know about your pain

CA:... (doing)

Maria: If you don't say anything I assume that you are not in pain

CA: Sure, if I feel any pain I'll let you know...

Maria: Okay...pull it further and relax, that's it...Okay. Any pain?

CA: No

Maria: Are you tired?

CA: No, I'm okay

Maria: Okay let's do another ten

CA: Ok, another ten

Maria: Any pain?

CA: No

Maria: Again...any pain?

CA: No. These are controlled exercises....

Maria: So I'll teach you a new exercise to do with the others. This one is to do only in the afternoon, not in the morning. You can do the others in the morning, when you wake up. Ok? You should only do this one in the afternoon. First you have to pull your knees to you chest and make it ten times. Then you turn around and finish the exercises in that position. So turn around right now.

So. Any pain?

CA: A pain in my buttock

Maria: Ok, we'll wait a little. Tell me when the pain goes away...(waiting a bit)

Maria: Okay let's do the other one, the one that you already know (back extension exercise). This is always the last exercise to do. Up and down....Up and down. The first seven times do it fast and in the last three stay a little up and then relax. Any pain?

CA: Here, that usual discomfort...

(**Maria**, Session 5: video start time 8:50- end time 14:58)

The vignettes presented are examples of courses of actions provided by José and Maria concerning their decisions of what to do with their patients. They illustrate their focus of thinking and action. In both cases the focus of the decisions clinicians make is concerned with correcting a local restriction or “abnormality” found in their patients’ bodies. José uses muscle stretching to correct the “abnormal” AJ’ posture. Maria uses back pain exercises to improve TC’s extension range of movement to close to normal values. They carefully observed how their patients performed the movements requested. They corrected the patients’ position, the range of movement or the speed of movement.

During the treatment (as well as in the clinical examination) all the therapists were sensitive to the patients’ reactions and adapted their grips, hands and movements to them. They showed an attentive and caring attitude towards their patients in other ways as well (e.g. making sure the patients were comfortable, etc). By this behaviour, one may discern a certain kind of common patient- centeredness. However, this contrast with the way participants made decisions and share those decisions with their patients. Common to the encounters in this study is that the therapists barely inform their patients about what they were going to do with respect to examination, the purpose of their actions as well as about their findings and what they considered relevant to do therapeutically.

The way participant approached the patients' problems described in both vignettes is highly instrumental with all the attention focused on the patient's body. José Maria uses her hands to correct and to teach. Maria asks the patient to demonstrate the exercises she gave him. She observes and gives feedback. She asks about the patient's pain. In both cases this movement and teaching is carried out with minimal speech. In both cases, the actions of treating and reassessing are intermingled. José applies a stretching exercise and asks how his patient is feeling about her pain. Maria supervises Mr. TC doing his exercise while asking about his pain. On the basis of the information patients provided, clinicians decided to continue or finish the intervention.

When a positive change occurs on patient's symptoms (i.e. pain), participants also changed the focus of their decisions concerning treatment. In this situation participants' emphasised teaching their patients and give them the tools to control his condition autonomously. They spent most of the time explaining to the patients how the condition developed and what were the potential contributing factors to future recurrences. They also provided postural and work modification and talked about the advantages of keeping movement and exercise in their lives. They all shared the same concern of motivating their patients to improve their health condition, and movement capability. This was considered essential to prevent future musculoskeletal disorders.

Right now she is without pain, so I'm looking for a posture of someone without pain. I'm thinking about other things...I'm looking from another perspective, which is searching for the movement dysfunctions she has. Right now I'm not trying to understand what is her pain problem, ...I'm not looking as to how her posture is affected by her pain to give me information about what kind of treatment should I apply. That problem is solved. Now I'm looking at her posture to define what kind of advice I can give her. So I'll use some muscle tests to understand what kind of dysfunction she has and then I'll define what kind of exercises are more appropriate to her.

(Mariana, Session 4: 1 685-694, p. 22)

A variety of back care instructions concerning posture, exercise, work modification, movement re-education, explanations about the origin of the patient's pain or the patient's problems, were given to patients throughout the episodes of care. The following vignettes

illustrate how participants maintain the focus on patient's body when they teach and advise their patients to deal with their clinical problems.

Vignette 10: Mariana and MC in their third sessions

In the last session, Mariana devoted most of the session to instructing MC in lower abdominal and spinal muscle contraction and pelvis motor control. Mariana used different strategies to instruct MC. Mariana firstly described the exercise to MC. She gave detailed information about what MC should do to self manage. The exercise MC had to learn involved flexion and extension of each of her legs without losing contact between her back and the plinth. Mariana uses her hands and her voice to give feedback to MC. In some circumstances she used her own body to show what kind of muscle tension (contraction) she wanted from MC and where the contraction should occur.

From time to time she asked MC if the exercise was difficult. Mariana was always close to her patient. This proximity emphasised the relevance she gave to the exercise and the strong importance she placed on all the details being learned.

After the first exercise, Mariana introduced a new exercise (adduction / abduction of each of MC's legs). She explained carefully what MC needed to do. She used her hands to correct MC's body position and to orientate the movement she requested. When MC did it well, Mariana reinforced this through a strong and emphatic "Well done!"

(Mariana, session 4: Video Start Time: 13:11: End Time: 18: 40).

It's now time to learn how to contract the "transversus abdominis muscle". Mariana provided an explanation to MC about the aim of the exercise. "We need to improve your motor control", she said. Mariana used her hand to palpate the muscle contraction and to provide a manual stimulus to reinforce her request. When MC contracted the muscle, Mariana said, "Well done!" Then she gave other strategies or metaphors to help MC to cope with her request. She used the feeling of having a full bladder, for example. She always asked if MC felt the muscle and said, "You need to be really concentrating".

Mariana said, "So you've got three new exercises to do and you should use and maintain this type of contraction (transversus abdominis) that you've learned". Then she taught another exercise. She asked the patient to lift her head and her arms until she felt movement of her pelvis. MC said, "I can't do it". "You have to practise. Please do it ten times". After a few

repetitions, Mariana asks, “Is it hard?” and MC answers, “A little”. Then Mariana asks- “But you don’t feel any pain, right?”. MC says, “No”.

(Mariana, session 4, Video Start Time: 18:41- End Time: 30:27)

Then Mariana introduced a new exercise in the sitting position. MC had to extend one knee without losing the neutral position of her pelvis. Mariana asked for ten more repetitions. She used a mirror to help MC to see her back. Mariana said, “Please focus on your pelvis. Don’t let it move”. Occasionally Mariana provided positive reinforcement. “You did well now”. Mariana started another exercise, the contraction of multifidus muscle. She asked the patient to turn around and lie down prone. Then she asked MC to contract the multifidus by pulling Mariana’s fingers upwards (Mariana was palpating the muscle on MC’s back). MC wouldn’t do the exercise and so Mariana explained once more what she intended. She used complex metaphors such as. “Imagine that you are stretching out your vertebrae”. MC tried harder but still didn’t manage the task and said, “I’m not getting it right...” Mariana answers, “This is really important for you”.

Mariana searched for another way to explain the exercise. Mariana demonstrated on herself the multifidus contraction and asked MC to palpate the muscle. MC said she was feeling it, and said, “I’m sorry...” and Mariana answers, “That’s okay, it’s my fault because I’m not explaining it well”. They both ended up laughing about the situation. The language used and the task was extremely complex to learn. MC felt that she was unable to do it. She seemed to feel frustrated or guilty about it. Mariana increased this frustration by saying, “This exercise is really important”.

Mariana and MC persisted with the exercise. They both kept trying hard and after several attempts the patient succeeded although she used other muscle compensation. Mariana reinforced the success by saying, “Much better”.

(Mariana, session 4, Video Start Time: 32:41- End Time: 43: 53)

Close to the end of the session, Mariana reassessed all the taught exercises by asking MC to demonstrate each one of them. “Okay, let’s see if you can remember all the exercises”. MC started by demonstrating the last one. She showed the exercise to Mariana and then she lay down to show the others. Mariana corrected a few details that MC had missed and said, “There is another one, do you remember?” MC showed the last one and Mariana said,

“Okay, that’s it, you can get dressed”. Mariana asked MC to practise all four exercises and to call her in a week while MC commented, “The last will be the harder to do because I can’t feel it, you know” (multifidus).

(Mariana, session 4, Video Start Time: 43:54: End Time: 33: 09)

Vignette 11: José Maria and Ms. AJ in their third encounter

In the final part of the last session with his patient, José explained to Ms AJ what a disc herniation is. José used a lot of medical terminology. He started by explaining to her about the vertebral column. Then he talked about the characteristics of the intervertebral disc. Finally he explained what the term disc herniation means. Then he tried to use other examples that he thinks are closer to the patient’s experience.

(José Maria, Session 3, Video Start Time: 34:44- End time 44:59).

*After this first explanation, José decided to use an anatomical model to more clearly explain what a disc herniation is. He followed the same sequence for the explanation. He showed AJ what the vertebrae and intervertebral disk are. Then he explained a disc herniation can affect the lateral nerve roots. José explained to AJ how her clinical symptoms could relate to a disc herniation. AJ was scared and asked, “This means that I could need surgery? I don’t want to be operated on”. José reassured AJ by saying, “You don’t have to be operated on” **(José Maria, session 3, Video Start Time: 42:05- End Time: 44:59).***

After this explanation, José Maria advised AJ about how to deal with heavy loads. She is a member of hospital staff responsible for patient’s meals. José used a chair to demonstrate how Ms. AJ could lift and carry the different kinds of loads without causing any risk to her back. This was a very short demonstration but José did not verify if Ms. AJ had understood his advice. He asked Ms. AJ to get dressed and said, “With your age there is no reason for not having a normal life.

(José Maria, Session 3, Video Start Time: 45:00- End time: 47:22).

A common pattern emerging amongst clinicians was the use of demonstration as the main method of teaching patients to perform specific exercises. In doing so, clinicians gave

particular attention to details patients should consider in their body, and in some situations they demonstrated how a specific activity or exercise should be carried out. For example, Mariana carefully taught MC how to contract her “*multifidus*” and the “*transversus abdominis*” to maintain the low back in a neutral position and from that position how to stretch her hamstring muscles. The extreme attention and care Mariana gave contrasts with the lack of participation of MC in the clinical decision making process. In fact, and despite the effort Mariana put into explaining and demonstrating all the details of the exercises she taught to MC, at no time did she ask for MC’s ideas, perspectives or intentions.

Another common belief among this sample of clinicians was that an appropriate explanation or demonstration would help the patient to better manage their condition. In the second vignette (vignette 11), José felt the need to explain what a herniated disc was and what tasks posed the greater risk. In José’s opinion, one of the possible explanations for the patient’s condition was the relationship between the patient’s pain beliefs and the movement’ fear avoidance demonstrated. He commented,

Here I’m explaining to her...because she talked once again about her herniated disc....I tried to explain to her what a disc herniated is. I used a model; a vertebral column model to explain what a herniated disc is, and I told her that the pain she felt now was nothing to do with her herniated disc...Because she doesn’t know...she went to the doctor, who told her that she had a herniated disc. The doctor told her that if things get worse she would need surgery. So she is still very anxious and worried about that problem, and she didn’t have any idea of what it means to have a herniated disc. So I decided to explain to her what it is, and which movements could aggravate her condition. She asked me what she could and couldn’t do and what type of precautions she should take. So I decided to explain to her. She would start to think that the problem was serious and she only has 22 or 23 years old and she is thinking that she will have her life limited because of her herniated disc

(José Maria, Session 3: 1485-499, p. 10).

In the above example, and no matter José Maria efforts to accomplish a particular need he noted in AJ’ discourse in any moment José explore the patient’s ideas about what is a disc herniation. Despite looking to avoid medical jargon, this is done independently of, and is given prominence over, individual patient considerations.

In the examples provided, teaching as a reasoning strategy is highly instrumental in its nature. Clinicians delineated different types of hypotheses (definition of the exercises, definition of

the advice) on the basis of the “abnormalities they found in the patients’ bodies, which were then measured for the purposes of its efficacy. In doing that they used different didactic strategies such as the use their hands, their bodies or their voices to reinforce their teaching. In the above scenarios the reasoning involved in teaching was hypothetico- deductively oriented. José used normal posture and movement in conjunction with his propositional knowledge of the factors that could impact on a recurrence of disc herniation to teach his patient how to deal with heavy loads in their workplace. Mariana selected exercises on the basis of the deviations from the norm (hypothesis) and then instructed the patient to perform the exercises that were most appropriate to be effective. They both give knowledge and information that help their patients to better deal with the restrictions of their bodies.

The interaction clinicians established with their patients to enhance understanding is highly instrumental. Patient education is defined as “a planned learning experience using a combination of methods such as teaching, counselling, and behaviour modification techniques which influence patients’ knowledge and health behaviour ... (and) involves an interactive process which assists patients to participate actively in their health care (Bartlett 1985, p. 667). In the examples provided in vignettes 10 and 11, both clinicians followed behavioural modification principles to teach or advise their patients concerning their body’ dysfunctions but restricting their participation in the process. The interaction is basically related with giving information (provision of medical knowledge derived from empirico-analytical research), in order to seek improved compliance (Bartlett 1985).

Patient education and individual behaviour change approaches like behavioural change models have traditionally been located within biomedical contexts (Trede, 2006). Behaviourist educational approaches to health education are based on assumptions that that patients share the same values concerning health beliefs and health behaviours. It also assumes that people were ignorant about their health, make poor personal choices, and just need to be told what is good for them to change their health-related behaviour. The blame for poor health is placed on individuals (Ajzen & Fishbein 1980).

In any circumstances, the therapists exercised their professional control to empower the patients, making them active participants throughout the meeting. The topics were introduced

by the participants and a giver – receiver relationship was established.

In summary, although teaching was evident in this sample of Portuguese physiotherapists it was essentially didactic in nature and focused on skill acquisition namely learning specific motor skills without any participation by the patient discussion of alternatives more appropriate to patients' understanding of their problems.

Theme 5: Requesting patient' compliance

For this group of expert musculoskeletal physiotherapists changing the patient's attitude towards movement and exercise was an important aspect of their practice. They spent a lot of time explaining the postural and movement problems they found in patients and provided different types of advice to deal with them. Mariana (*session 3*), for example, gave strong advice to her patient about starting to do exercises on a regular basis. She believed that without a change in the patient pattern of physical activity she will experience more pain. In the following dialogue Mariana suggests MC start with Pilates classes. She explains what Pilates is and then MC comments:

MC- Well...this will be difficult

Mariana- So you won't do it... (Mariana laughs)

MC- Time..., do you know how it feels to not have any time for yourself?

Mariana- Yes, for a matter a fact I do...

MC- Exactly. That's what is happening with me...

Mariana- You should do this for that same reason. You have to find time for yourself...

MC- Yes, but I don't know how...

Mariana- Two hours a week, come on. Every person should do 20 min of physical activity every day. I'm only asking for two hours a week...

MC- Yes, yes...but I don't have time...not even two hours...

(**Mariana, session 3:** Video Start Time: 5:00- End Time: 07: 16)

Requesting patient compliance, as Mariana did indicated a strong belief that MC is at risk of future recurrences because she has "problems in her body". After two sessions Mariana felt very confident about MC's problems and knows what is important for her. Mariana seems to

believe that the health of MC's body is the most important thing to consider and MC should reorganize her time and her life to fulfil those needs. The following quotation reflects the reasons why it seems so important to Mariana,

I think she has loss of movement, some muscle shortening and she needs to improve the mobility in her vertebral column, even her neural system needs more mobility. So she needs to be stretched out to improve her movement at all levels. So my advice was that she can come to physiotherapy to prevent future problems or she must find an alternative. My advice was that she would benefit from swimming or from doing Pilates. But I'm not sure if she goes or not.

(**Mariana**, Session 3: 1 558-568, pg 17)

Clinicians made several therapeutic suggestions for improving aspects of the patient' care that they considered potentially problematic. Mariana for example explained her suggestions and invited her patient to think about aspects of her life. MC considered Mariana's suggestions but was reluctant to actually try them. Mariana reinforced her interest in the patient and improving the problem at hand. Furthermore, she pressured MC to try out her suggestions and in a subtle or unconscious way she reprimanded MC for not trying her suggestions. The way she dealt with the situation could be described as imposing a decision rather than collaboration or mutual agreement. The goal of this interaction was not to reach a consensus through mutual agreement but requesting patient adherence to Mariana ideas, "because she knows the problems MC has".

In the following session Mariana after a few initial questions about the evolution of the problem, starts questioning MC about the exercises she taught her in the last session. This conversation occurred while MC was taking off her clothes. Mariana asked,

Mariana- Did you do the exercises I told to do when you were studying (referring to back extension exercises)?

MC- Yes, I did.

Mariana- And do you remember doing them when you' re not in pain?

MC- To be sincere?

Mariana- To be honest, yes!

MC- I remember only when I get pain...

Mariana- That's okay

MC- At least I remember it when I'm sitting...

Mariana- What do you mean? Sitting correctly?

MC- Yes I remember immediately, but this kind of...

Mariana- (Interrupting) To stand up and start moving...

MC- Yes, that I only remember if I'm in pain

Mariana- Yes...And when that happens, do you feel relieved?

MC- Yes, especially in this area (pointing to her back)

(**Mariana:** session 3- Video Start Time: 03:33- End Time: 04: 59)

Close to the end of the session Mariana turned again to the theme of doing exercise. Mariana said that considering the dysfunctions she had observed in MC's body she absolutely needed to elongate some of her muscles. *"It is not about doing exercise, is about elongating specific muscles. You need to learn how to adopt appropriate postures and how to do some exercises that specifically address these specific muscles"*. Following this strong advice, MC asked,

MC- What is the name of that thing that you told me?

Mariana gave again a brief explanation about how the method started and says that she knew the people who were involved in the classes. She thinks they are competent people and that they have knowledge. She adds, "...but before going there you need to learn about your body". Mariana asked MC to do the exercise she taught her, every day and provided a brief summary of the muscles of her body MC needed to give attention to and correct. She said "for God's sake, learn how to do that".

When they said goodbye Mariana recommended once more "please do not forget to do the elongations, to sit correctly, and to stand up from your desk every half an hour. Then study harder and work harder. MC nodded her head agreeing with Mariana.

(**Mariana, Session 3-** Video Start Time: 33:10- End Time: 18: 05)

The different ways clinicians found to foster patient engagement in treatment or in preventing future recurrences are better described under the concept of compliance than collaboration. Compliance has been related with submission or yielding to another (Edwards, 2001). In the example provided under this theme the cooperation clinicians looked from their patients was basically related to patient compliance to clinicians' ideas and recommendations. This kind of cooperation is somewhat different from what Edwards and colleagues (2004a) found in

their study of Australian physiotherapists where clinicians emphasized partnership in decision-making between practitioners and patients or families and where goals and strategies for therapy are jointly planned and negotiated. Edwards and colleagues (2004, pg 322) defined collaborative reasoning as a “reasoning strategy where the main goal is the nurturing of a consensual approach toward the interpretation of examination findings, the setting of goals and priorities, and the implementation and progression of intervention. In terms of the clinician- patient cooperation collaboration is something different”.

In summary, the study participants’ approach to management was highly instrumental. At no time did they facilitate patients’ reflection about their condition or life style or consider alternative perspectives indicative of a communicative approach. They gave the impression that they knew what the patients’ needs were and what they should do.

6.3.3. Summary of the key findings

This first study was intended to examine how a sample of Portuguese expert musculoskeletal Physiotherapists approached clinical reasoning and practice. This chapter has presented the findings of the first study through the identification of major themes, which emerged from the texts. Different illustrations were provided to demonstrate participants’ practice and reasoning in their everyday professional lives.

This sample of Portuguese Musculoskeletal Physiotherapists focused their actions and interactions on identifying the origin of the patients’ clinical problems, treating the source of patient’ pain, and instructing their patients how to avoid similar problems in the future. This orientation towards specific clinical goals (diagnosis, management and prognosis) drove the actions and interactions that occurred during the clinician-patients’ encounters and restricted the patients’ opportunity to tell their stories and participate in the clinical decisions made. In this sense the clinical reasoning approach is better described as a cognitive clinician-centred process than an interactive and collaborative process.

This contrasts with the current understanding of clinical reasoning in physiotherapy which emphasises the intrinsic relationship between the cognitive and decision making processes required to optimally diagnose and manage patient presentations of physical dysfunction and

pain, and those required to understand the patient (Higgs & Jones, 2000; Edwards *et al.*, 2004a; Smith *et al.*, 2008). This discussion will be addressed in more detail in Chapter 10.

Through the course of this study the researcher shared the experience of engaging in the clinical world of the participants and the different ways in which they approached clinical practice and reasoning. The reading and re-reading of the transcripts and other artefacts produced hermeneutic texts both from the participants' perspective and from the researcher's own experience. In doing that, researcher's initial pre-understandings were challenged.

The "*Fusion of Horizons*" was particularly important in the process of analysis. The researcher's prejudices were the first horizon of "understanding". In collecting the data and undertaking data analysis, the researcher's horizon of understanding expanded to include the experience of the participants. Then the researcher's prejudices were re-examined in the light of these new findings. The later analysis moving from pure description to being analytical, involved that whole process at a deeper level.

For example, it was a surprise to find out how much control clinicians placed on the interaction with their patients and, at the same time, how detached they felt from patients' illness experience. They strictly followed their assessment frameworks and made use of very closed questions to their patients. The researcher's first horizon of understanding had been to assume that the patient was a partner in the process. In telling his/ her story patients can give precious information about their own concerns, interpretations and strategies they find useful to deal with their situation. It was a surprise to realize how much the clinicians were focused on trying to find a comfortable explanation of the patients' complaints without listening or considering the patient's own views. In general the participants almost ignored patients' understanding of their problems and devalued the context and relevance of their perspectives.

Consequently the researcher horizon of understanding needed to expand to include this new data in the analysis. *Why was it so difficult for the clinicians to listen and integrate patient perspectives into the interpretation of examination findings, the setting of goals and priorities, and the implementation of interventions?*

The preference for an instrumental approach to practice and reasoning demonstrated in this sample of Portuguese physiotherapists is more compatible with a traditional biomedical model of practice and reasoning than with a biopsychosocial collaborative approach. The findings of this study suggested that the profession in Portugal needed to explore assumptions underlying current approaches to clinical practice and reasoning. Since the traditional biomedical view of health and illness, and its underlying assumptions could have a profound impact on the future generation of physiotherapists and their practice, it becomes important to understand the current perspective held by lecturers and students concerning their approach to reasoning and practice. Therefore, the aim of the next stage of this investigation was to explore assumptions underlying current physiotherapy curricula in Portuguese entry-level physiotherapy programmes, in relation to approaches to clinical practice and reasoning, and how these assumptions are perceived by lecturers and near graduate students. The following studies addressed in particular the Musculoskeletal Physiotherapy curriculum area of entry-level education.

CHAPTER 7

Study 2- Undergraduate Physiotherapy Curricula and Current Educational practices in Musculoskeletal Physiotherapy Programmes

7.1. Introduction

Findings of the previous study indicates that the study' sample of Portuguese physiotherapists focused their practice and reasoning in the clinical aspects of the patient's problem and follows a traditional clinician centred model of practice and reasoning. This approach to reasoning and practice is more compatible with an instrumental approach to clinical practice. Instrumental reasoning and action (like hypothetico-deductive reasoning) has as its purpose the determination of cause-effect relationships, which lead to predictions about observable events that are either correct or incorrect (Edwards, 2004a). In contrast communicative reasoning and action aims to increase insight and a common understanding of a situation through a mutual learning process between therapist and patient (Edwards *et al.*, 2004a). Despite the importance of both forms of reasoning and action to clinical practice an excessive emphasis on instrumental action and reasoning could limit patients' participation in the management plan and constrain learning by both patient and clinician.

The preference for instrumental approaches to practice demonstrated in the sample of Portuguese physiotherapists investigated in our previous study has been reported elsewhere. Several authors have noted that in spite of physiotherapists acknowledging the importance of collaboration in clinical practice, many physiotherapists appear not to respond to their patients' life and treatment priority concerns or set treatment goals in a collaborative manner (Payton, Nelson & Hobbs, 1998; Kerssens *et al.*, 1999; Thornquist, 2001; Edwards, 2004b). Although the reasons for this familiarity with an instrumental approach to reasoning and practice are not clearly understood, it has been suggested that they could be related to educational and training processes within the physiotherapy profession (Shepard & Jensen, 1990; Neistadt, 1995; Hunt *et al.*, 1998).

Educational process is strongly influenced by health care context, the educational system, and by the dominant professional culture (Noronen & Wikström-Grotell, 1999). In this sense, the

curriculum physiotherapists decide to offer to their students will depend to a large extent on the view of the profession and discipline within which they work. In other words, a curriculum is underpinned by a set of values and beliefs about what students should know and how they come to know it (Fraser & Bosanquet, 2006). Therefore the curriculum is an important tool to understand the beliefs, values and professional perspectives concerning the new graduates in physiotherapy.

Until now, there have been no prospective published investigations concerning its content, intended learning outcomes, or teaching/ learning and assessment strategies used within physiotherapy entry level curricula. Neither is it known how much time or content is devoted to Musculoskeletal Physiotherapy within Portuguese entry-level physiotherapy programmes. Therefore, the aim of study 2 of this investigation was to gain insight into the aims and learning outcomes of the undergraduate physiotherapy courses provided in Portugal, its curriculum design and content, and the teaching/ learning and assessment strategies used. It focused in particular on the Musculoskeletal Physiotherapy content and educational practices within Portuguese entry-level physiotherapy programmes.

This chapter describes the methods used for data collection and analysis in two consecutive phases of Study 2, which addresses the question: *“What kind of approaches to reasoning and practice are being promoted in undergraduate musculoskeletal courses and how is this achieved?”* The objective of this study was to explore assumptions underlying current undergraduate physiotherapy curricula in Portuguese entry-level physiotherapy programmes, in relation to approaches to clinical practice and reasoning, with particular interest in the Musculoskeletal Physiotherapy area.

In phase 1 a documentary analysis of the undergraduate programme of studies in fourteen accredited physiotherapy courses in Portugal was carried out in order to identify intended learning outcomes, content, and teaching/ learning and assessment strategies used within entry level curricula.

Phase 2 addressed the MPT topics delivered in each course and involved development of a survey questionnaire administered to all MPT course leaders of those accredited undergraduate physiotherapy courses in Portugal, aiming to examine the current status of

Musculoskeletal Physiotherapy Curricula in these courses. A specific documentary review of teaching and learning material/content of MPT subjects was also performed to give supplementary information about the delivery of MPT subjects in each course.

The chapter concludes with a summary of particular issues to be explored in subsequent chapters through lecturers' one to one interviews and student focus groups.

7.2. Phase 1: Documentary Analysis of the “curriculum on paper” of undergraduate physiotherapy courses in Portugal

In chapter four it was pointed out that a curriculum could be evaluated by studying three dimensions: the curriculum on paper (intended curriculum), the curriculum in action, and the experienced curriculum (learned curriculum). The first phase of this study addresses in particular the “curriculum on paper” of the accredited physiotherapy undergraduate courses in Portugal. The “curriculum on paper” includes what is taught and publicly announced in school syllabuses, course brochures, or school websites for a specific curriculum (Coles & Grant, 1985). This information can give an indication of the extent to which the “curriculum on paper” is converted into the “curriculum in action”, as well as insight into the assumptions that underline curriculum design. For example, course objectives and syllabus are used to inform students of the expectations for cognitive, psychomotor and affective learning for the course. In general most syllabi contain learning outcomes, type and format of examinations, and methods of presentation of the material. Syllabi design can be used as a road map of sorts to allow students and lecturers but also researchers to see what objectives are to be met by the end of a course.

The analysis and comparative discussion of these different curricula provides information about the overall structure and organization of physiotherapy programmes and facilitates understanding of undergraduate physiotherapy education in Portugal. The outcome of this phase were intended to help develop the survey questionnaire to examine the current status of Musculoskeletal Physiotherapy Curricula in these programmes as well as to inform the research reported in subsequent chapters.

7.2.1. Research Methods

A documentary analysis was considered the most appropriate method in order to gain a first insight into the aims, goals and educational practices across undergraduate physiotherapy programmes. This method allows the researcher to learn about the course structure and organization as well as the research question and will therefore allow for contextualization.

Following the suggestions of Eraut (1976; 1990) a documentary analysis framework was designed in order to analyse the literature identified on musculoskeletal programmes. The author provides a five point framework encompassing: aims; objectives; content; pedagogy; and assessment. Eraut (1976; 1990) suggested that each of these domains would, when considered together, constitute a curriculum strategy.

Like every research method, documentary analysis has advantages and disadvantages. An important advantage is that the gathering of information is relatively straightforward. One of the disadvantages is that lecturers' perspectives are not necessarily expressed in these kinds of documents: they remain partly implicit. Indeed, one may assume that lecturers, as well as students, have opinions about clinical reasoning that are not revealed by this method. It is not certain, either, that what is reported is completely reliable in its description of the current state of physiotherapy undergraduate education. So, what lecturers teach and what students learn do not necessarily relate to the objectives. These limitations will be in part minimized through the use of other sources of information (Study 3 and 4).

The documentary analysis of the undergraduate physiotherapy curricula was particularly interested to look at:

- 1) The aims, goals and learning outcomes of each undergraduate course;
- 2) The design and content of the curriculum of each undergraduate course;
- 3) The teaching/ learning and assessment practices students can take in the different courses;

7.2.2. Participants

Sixteen educational institutions in Portugal offering undergraduate physiotherapy courses were identified through the Portuguese higher education department web site, six belonged to

public institutions and ten to private institutions. Of the sixteen³² identified, fourteen were provided in different institutions with different course programmes. To ensure anonymity each institution was numbered. The six public institutions were numbered 1 to 6 and the eight private institutions were numbered 7 to 14.

7.2.3. Data Collection

A list of documents addressing aspects of the physiotherapy curricula was initially defined. These included: course Handbooks; student guides; school documentation (curriculum and other material); and subject review reports prepared by external evaluation committees. A two-step search strategy was used to locate all documents concerned with the physiotherapy curricula. An initial search through schools/ courses websites, education legislation databases and representative entities³³ (please see footnote 2 and 3) created to evaluate the schools/ courses, was undertaken. Then the course directors of each course were contacted by the researcher, in order to request supplementary school documentation relating to the physiotherapy programmes.

Physiotherapy course programmes were identified through the Portuguese legislation database. The subject review reports were obtained from the ADISPOR³⁴ website (public schools) and from APESP³⁵ website (private schools). No other documents than the curriculum programme were available. In the different schools there was no documentation such as, student' handbooks or course manuals. In many courses other documentation such as programmes of a given topic did not include specific subject information. In others, the different terminology used and the plethora of course units inhibited any possibility of a more detailed comparison. Table 7.1. (next page) provides an overview of the documents collected in each school/ course.

A final list of documents to analyse was constituted only by the material available and then

³² In Portugal there are fourteen schools responsible for the sixteen physiotherapy undergraduate programmes. The "Instituto Jean Piaget" has three physiotherapy courses in three different locations: Macedo de Caveleiros; Vila Nova de Gaia; Silves.

³³ ADISPOR – Association of the Portuguese Polytechnics Institutes

³⁴ ADISPOR – Association of the Portuguese Polytechnics Institutes

³⁵ APESP – Portuguese Association of Private Higher Education Institutions.

These are the representative entities created to evaluate the schools/ courses corresponding to the different higher education sectors: 1) The Evaluation Council for Public Polytechnics, managed through ADISPOR; 2) The Evaluation Council for Private Polytechnics, managed through APESP.

compiled by the researcher for in-depth analyses. These primary sources for curriculum information in this study were: 1) the physiotherapy course programmes; 2) the subject review reports; 3) and information or documentation available on the websites of each school/ course.

Table 7.1. List of documents received for documentary analysis.

Providers of undergraduate physiotherapy courses	Webpage	Course Programme	Subject Review Report	Course Handbook/ Student Guides
Institution 1	✓	✓	✓	Not Available
Institution 2	✓	✓	✓	Not Available
Institution 3	✓	✓	✓	✓
Institution 4	✓	✓	Not Available	Not Available
Institution 5	✓	✓	Not Available	Not Available
Institution 6	✓	✓	Not Available	Not Available
Institution 7	✓	✓	✓	Not Available
Institution 8	✓	✓	✓	Not Available
Institution 9	✓	✓	✓	Not Available
Institution 10	✓	✓	Not Available	Not Available
Institution 11	✓	✓	Not Available	Not Available
Institution 12	✓	✓	Not Available	Not Available
Institution 13	✓	✓	Not Available	Not Available
Institution 14	✓	✓	Not Available	Not Available

7.2.3.1. General description of the documents

School WebPages

The websites were consulted during the week of 12 June 2006. Information publicly available concerning the aims and objective of physiotherapy undergraduate programmes was sparse and generic. In the 14 websites reviewed, only five schools/ courses indicate the aims of the course/ learning outcomes that students should achieve/ demonstrate in the final of their courses.

Instead of providing the aims and objectives of the physiotherapy programmes schools/ courses seemed to be more aware in explaining what physiotherapy is and where it can be practised. In doing that, School/ courses use the definition established in the Portuguese law (Decreto-Lei 261/93 de 24 de Julho) or the WCPT Description of Physical Therapy adopted by the 14th General Meeting (May, 1999). Furthermore, course advertisements emphasise career opportunities in different contexts of practice. According to the information provided, these opportunities are usually limited to the clinical field, whether in the public health system, private practice or non-government organisations in urban, regional or rural settings, and, in a few cases, to an academic career. One common example among school/ courses websites is,

“The physiotherapist works in hospitals, community health centres, private and public rehabilitation clinics, occupational health departments, elderly centres, schools, sport clinics and academic institutions”.

(Institution 7, 9 and 13)

The number of pages printed from each different school website ranged from 1 to 5.

Course Programmes

Physiotherapy course programmes were extracted from the Portuguese legislation database during the week of 12 June 2006. Publication includes information about the entry level (admission requirements) and the total amount of students per year. It also provides information about the overall curriculum, including the course units per year; its duration (semester or year); the total of contact hours allocated to each course unit and how they are distributed through different types of lectures (T- Theoretical classes; Theoretical/ Practical classes; Practical classes; Seminars; Clinical Education). In the fourteen programmes reviewed, information about the content of programmes was limited to course units' names (see Appendix 7).

The number of pages printed from each course programme was 3.

Subject review reports

Only 6 subject review reports were available. The remaining schools/ courses were not evaluated at the time of this study. Each subject review report was presented in sections. The

first three sections includes a preliminary commentary about the self evaluation report received by the external evaluation commission, and a brief contextualization of the institution in terms of its history and mission. The following sections includes descriptive information about the organizational structure, the competences of the head of the course and its resources (Physical, Financial resources and Human resources); The remaining sections addresses: E. Course organization; F. Course development (Teacher and students workload); Evaluation system; Achievement; G. Students (Admission rate; admission requirements); H. Scientific Production; I. Internationalization Level; J. Graduate Employability; K. Final Recommendations. For the purpose of this study the analysis was centred on the data related with points E (Course organization); F. (Course development/ Evaluation system/ Students' achievement); K. (Final Recommendations).

The number of pages from each subject review report ranged from 2 to 8.

7.2.4. Data Analysis

The analysis was performed in two phases. First, a content analysis of the documents was used to explore the aims/ learning outcomes within the curricula of fourteen providers of physiotherapy undergraduate education. The first step was to read all the documents from a given course. Information related with the aims/ goals³⁶, learning outcomes³⁷ and teaching/ learning and assessment strategies of each course programme was searched in all the documents and when presented it was extracted and transcribed to the indicated place on the extraction file by the researcher (See Appendix 8). If there is no information available a tick was placed in the appropriate box (“if none say none”).

Following the extraction of the data an Excel worksheet was created that separated the data concerning programme aims, learning outcomes and teaching/ learning strategies. The data from the different courses was then grouped under these categories and a content analysis of the extracts was performed looking for the identification of repeating ideas, topics or

³⁶ **Aims and Objectives** - An aim is an overall specification of the intention or purpose of a programme of study or institutional mission or policy. Objective: An objective is: (a) a specific statement about what students are expected to learn or to be able to do as a result of studying a programme: more specifically this is a learning objective; (b) a measurable operationalisation of a policy, strategy or mission: this is an implementation objective (Harvey, 2004).

³⁷ **Learning Outcomes**- A learning outcome is the specification of what a student should learn as the result of a period of specified and supported study (Harvey, 2004).

educational practices (teaching/ learning and assessment strategies) (McNamara, 1998). Illustrative statements of aims, goals and learning outcomes were then selected and translated to English and finally included in the study' findings.

In phase two the curricula of the fourteen courses was summarized. The list of course units was fully transcribed to the appropriate tables. The total of contact hours was allocated to each course unit and then split according to the nature of the lectures. The hours allocated to clinical education were analysed in a different table. The goal at the outset was to cross tabulate the elements from the curricula. Following this procedure, all fourteen curricula are examined more closely in order to identify both common and unique features of their curricula. In order to facilitate the description and analysis of the content of the different programmes, the course units were organized around five main categories³⁸: Biological and Physical Sciences; Social/ Behavioural/ Technological Sciences; Clinical Sciences; Clinical education. A category of “others (not classified)” was added to the categories proposed.

Findings from the documentary analysis are reported in section 7.3. They have prompted questions in these areas to be asked of the survey and through lecturers' interviews and students' focus groups.

7.3. Phase 2- Survey of MPT curricula in undergraduate physiotherapy programmes

Following the previous overview, each accredited programme each course was then explored in greater depth by a questionnaire survey and documentary analysis of a range of documents focused specifically on MPT topics to capture the educational process and actions underlying delivery of musculoskeletal physiotherapy curricula. Findings of this part of the study are reported in section 7.4.

³⁸ The categories were established on the basis of the WCPT Guidelines for Physical Therapist Professional Entry-Level Education (Approved at the 16 General Meeting of WCPT June 2007).

7.3.1. Ethical Approval³⁹

The protocol for the study was submitted to and approved by the School Ethics Panel of the School of Health Professions, University of Brighton (Appendix 9). Permission to perform the study as well the pilot study was obtained from the course directors of the schools involved (Appendix 10).

In phase 2 all standard procedures were taken to protect participants' confidentiality and privacy and to prevent any potential risks. Participants were informed about the study, and written informed consent was obtained for the survey questionnaire in all cases (Appendix 11 and 12). All participants were provided with information sheets detailing the aims of the study and procedures to be taken to protect identities and maintain confidentiality. These information sheets were provided to the participants by email, prior to their participation in the investigation. Contact details were provided to give participants the opportunity to ask questions if required. The participants understood that participation was voluntary and that they had the freedom to withdraw from the study at any time.

Course directors and participants in the study were informed that study results would be disseminated in their schools and eventually in the professional field.

7.3.2. Participants

Each course director (from the same 14 schools/ courses addressed in phase 1) was invited to identify the lecturer(s) responsible for designing the musculoskeletal physiotherapy curriculum/ content in their current programme. Ultimately a convenience sample of 14 MPT lecturers was recruited to participate in the study.

7.3.3. Survey Questionnaire

A questionnaire was developed to elicit information concerning the educational process and actions underlying current educational practice across undergraduate courses. Three specific objectives were established:

³⁹ It is important to note that all the procedures concerning ethical issues in study 2, 3 and 4 were submitted together in a single document, and approved by the School Ethics Panel of the School of Health Professions, University of Brighton.

- Determine the characteristics of musculoskeletal physiotherapy education process in terms of the type, duration and location of training and education;
- Examine the current learning outcomes and curricular content related to undergraduate Musculoskeletal Physiotherapy;
- Examine teaching/learning and assessment strategies used in the Musculoskeletal Physiotherapy modules.

7.3.3.1. Survey Questionnaire development

Items and questions were determined through a combined process of exploring the literature and discussion with experienced physiotherapists and researchers around the goals defined for the questionnaire survey.

Evaluation of curricular content in undergraduate physiotherapy programmes has been addressed in a few published studies from North America, Canada and UK. These studies have focused on pain (Scudds *et al.*, 2001), joint manipulation (Boissonnault *et al.*, 2004), anatomy (Mattingly & Barnes, 1994), and rheumatology provision in undergraduate courses (Westby, 1999; Almeida *et al.*, 2006), but have not specifically investigated musculoskeletal physiotherapy. Generally speaking these studies address staff and student demographics, percentage of programmes teaching the topics as a separate course/ subunit of another course (Ben-Sorek & Davis, 1988; Bryan *et al.*, 1997; Boissonnault *et al.*, 2004; Almeida *et al.*, 2006), estimated number of theoretical and practical hours given to a specific topic (Jette & Becker, 1980; Westby, 1999; Almeida *et al.*, 2006), descriptive information about specific content taught (Mattingly & Barnes, 1994; Scudds *et al.*, 2001; Boissonnault *et al.*, 2004; Almeida *et al.*, 2006), the average length of instruction (Mattingly & Barnes, 1994; Westby, 1999; Scudds *et al.*, 2001), instructional materials (Mattingly & Barnes, 1994), and perceptions of graduates' competence (Scudds *et al.*, 2001).

Considering the research goals established for the survey, three areas of inquiry were salient: (1) course demographics; (2) learning outcomes and course content (3) teaching, learning and assessment strategies.

Section 1 focused on staff characteristics namely, demographic information on educational background, qualifications, years in practice, research interests, and course demographics including information about contact hours allocated to MPT, how they are taught in the programme and the year they commenced.

Section 2 focused on learning outcomes and content to be taught. It included questions about the stated aims for MPT teaching in the course, learning outcomes and subjects that were taught in MPT programme, amount of instructional time devoted to teaching/ learning Musculoskeletal Physiotherapy topics, teaching strategies, and the availability of clinical placements involving musculoskeletal patients.

Section 3 addressed teaching/ learning and assessment practices. It included questions about teaching methods and assessment strategies.

The relationship between survey questionnaire objectives, key issues and generic questions is summarized in Table 7.2.

Table 7.2. Summary of survey objectives, key issues and generic questions.

Survey objectives	Key Issues	Generic Questions
To determine the characteristics of the Musculoskeletal Physiotherapy education process in undergraduate physiotherapy courses in Portugal, in terms of the type, duration and location of training and education that students receive;	Curriculum provision in MPT topics; Availability of clinical placements with musculoskeletal patients;	How MPT topics are organized in the course? What is the depth of coverage of musculoskeletal topics taught to students? What are the learning opportunities provided?
To examine the current learning outcomes and curricular content related to Musculoskeletal Physiotherapy in undergraduate physiotherapy courses in Portugal;	Descriptive information about learning outcomes and topics taught in MPT curricula; Congruence of the programme to fulfil the outcomes stated;	What are the course expectations in terms of student outcomes? What are the main topics taught in MPT programs? Is the curriculum content appropriate for these outcomes?
To examine the teaching/learning and assessment strategies used in the Musculoskeletal Physiotherapy modules in undergraduate physiotherapy courses in Portugal;	Characteristics of the teaching and learning and assessment strategies used in Musculoskeletal Physiotherapy subjects; Congruence of the strategies used with the learning outcomes of the MPT programme;	What are the teaching/ learning and assessment strategies used in MPT programs? Is the content congruent with the goals and objectives of the programme?)

7.3.3.2. Question Types

Since Section 1 addressed predominantly personal characteristics with predetermined responses, closed-ended questions were used. In some of these questions, opportunity for additional comments was available through the inclusion of the category “other” (please give details). Sections 2 and 3 comprised predominantly open-ended questions. Because little is known about the current status of MT programs in Portugal, open-ended questions were used to capture as much information as possible, minimising social desirability.

To ensure that all the participants clearly understood the research focus the term ‘Musculoskeletal Physiotherapy’ was defined as: ‘a specialized area of physiotherapy for the examination, treatment and management of people with neuromusculoskeletal problems, based on clinical reasoning, using highly specific treatment approaches including manual techniques and therapeutic exercises’ (IFOMT, 2004; MACP, 2007; MPA, 2007). The term encompasses all the assessment and treatment modalities related to neuromusculoskeletal conditions. It could include, mobilization/manipulation, manual traction, massage, therapeutic exercises, patient education/ advice, or other specific modalities or procedures. A preliminary version of the survey questionnaire with eight pages and 31 questions was developed covering the areas of inquiry stated in table 7.2., and then translated into Portuguese (Appendix 13).

7.3.3.3. Translation to Portuguese

Translating the questionnaire from “English” to “Portuguese” involved a series of translation-related decisions in order to minimize the impact on the validity of the research (Temple, 1997; Beaton *et al.*, 2000). Three potential influential factors were anticipated prior to the translation process:

- **Conceptual equivalence**, which refers to whether the concept being measured or analyzed, is the same across groups or cultures, although wording to describe it may be different (Temple, 1997; Beaton *et al.*, 2000).
- **Idiomatic equivalence**, which refers to the use of colloquialisms, or idioms difficult to translate or nonexistent in a given language (Beaton *et al.*, 2000);

- **Semantic equivalence**, which refers to the words and sentence structure in the translated text expressing the same meaning as the source language (Beaton *et al.*, 2000);

The literature suggests specific procedures for minimizing translation-related problems including back translation, consultation and collaboration with other people during the translation process and pre-testing or piloting (Guillemin, 1993; Temple, 1997; Beaton *et al.*, 2000). In order to minimize the factors identified, the questionnaire was first translated to Portuguese by the researcher and then an interpreter (English teacher) was invited to analyze the translation by comparing both versions (Portuguese and English). This process involved the analysis of the adaptation of individual items, the instructions for the questionnaire, and the response options in terms of conceptual, idiomatic and semantic equivalence. The interpreter provided a written commentary on the quality of the translation in terms of the factors stated above (conceptual, idiomatic and semantic equivalence) (Appendix 14).

On the basis of the feedback provided, a discussion between researcher and interpreter occurred regarding the use and meaning of some words identified as potentially problematic, minor amendments were made to the Portuguese version of the questionnaire.

7.3.3.4. Content and Face Validity of the Portuguese version

After the translation process, a draft version of the questionnaire was sent to a panel of experts for content and face validity. Four individuals, including one member of the Portuguese manual therapy interest group, two physiotherapy lecturers with experience in curriculum design, and one person with research interests in survey development, were recruited to review the survey questionnaire.

The questionnaire was emailed to the panel with a request for comments on layout and content. Three questions were addressed to the panel members: *1) Do you consider that the questionnaire assesses what it intends to assess (face validity)? 2) Do you consider that the questionnaire includes all the areas you feel are important and appropriate to evaluate the current status of musculoskeletal physiotherapy teaching in undergraduate physiotherapy*

courses (content validity)? 3) Are there any suggestions you would like to make? Is there anything that you would like to add? (Appendix 15).

The panel provided a recommendation concerning adoption of consistent terminology throughout the document. Specifically it referred to use of the term “neuromusculoskeletal physiotherapy” in some parts of the questionnaire and the term “musculoskeletal” in others. It was decided to adopt the term ‘musculoskeletal physiotherapy’ as it includes the neurosystem in the definition provided. In addition other minor amendments on wording and abbreviations were made.

On the basis of the reports provided by both evaluators (interpreter and expert panel) it was concluded that the Portuguese version of the questionnaire achieved semantic, idiomatic and conceptual equivalence (see Appendix 16 for pilot questionnaire- Portuguese version).

7.3.3.5. Pilot Survey

A pilot study was conducted in January 2008 (14th to 25 of January 2008). The purpose of this pilot was to test the feasibility, comprehensibility, length, and appropriateness of the questionnaire. It also aimed to identify any questionnaire design flaws and ambiguity of questions and check that all the instructions were clear (Oppenheim, 1992; Stone, 1993).

A convenience sample of 4 physiotherapists responsible for teaching neurological physiotherapy in four different schools (2 public and 2 private) was invited to participate in the pilot. Recruitment of these physiotherapists from an area other than musculoskeletal physiotherapy was carried out in order to prevent contamination between samples (pilot and main study).

All participants were responsible for neurological physiotherapy curricula in their schools and had been qualified for more than 7 years. Three had a Masters degree (one in physiotherapy and the others in education) and were currently involved in research activities. None had received any Postgraduate Education in Neurological Physiotherapy, but they all had achieved several postgraduate qualifications, for example, in the Bobath concept or in the Carr and Shepard Motor Re-learning concept.

A draft questionnaire with a covering letter and a participant report sheet were sent by email to the participants (Appendices 17 to 19). The participants were asked to comment on the items with respect to content, use of wording, instruction and ease of completion. On the basis of the comments and suggestions provided by the participants in the pilot (Appendix 20 and 21), especially concerning the length of the questionnaire and time needed to complete it, major amendments were made. As a result of this input, the final version of the survey questionnaire was refined and reduced to 18 questions, comprising three sections: the respondents' background, course structure and organization, including learning outcomes and the content of the course and finally a section on the teaching and learning and assessment strategies used in the course (Appendix 22).

7.3.4. Data Collection

Preliminary contact was established by telephone with the course director of each course. The purpose of the study was explained and a preliminary agreement to participate in the study obtained. Course directors were informed that specific school documentation relating to the subjects of MPT would be requested and a questionnaire survey would be sent in the near future.

Each course director was invited to approve the course's involvement in the study by identifying the lecturer(s) responsible for designing the musculoskeletal physiotherapy curriculum/ content in their current programme. Upon approval from the course director, a formal letter with a copy of the questionnaire was sent giving research details and seeking permission to access the documentation needed (Appendix 23). In order to promote the response rate a stamped, return-addressed envelope accompanied the cover letter and survey and an online version of the "Survey Questionnaire" was also sent to all the participants.

Two weeks after the initial survey questionnaire distribution, a follow-up e-mail was sent to the participants for the returning of the questionnaire. Four weeks after the initial mailing, attempts were made to contact non-respondents by telephone. Once the completed questionnaire surveys were received, they were immediately separated and a code number was attached to help ensure anonymity.

A range of documents relating to MPT topics in each course was also requested for documentary analysis⁴⁰. These documents include typical documentation given to students before starting a programme/ module for example, MPT programme specification, MPT module specifications or detailed syllabus, and a description of the contact hours for each module by teaching method (eg. theoretical lectures, practical lectures, other), when available.

7.3.5. Data Analysis

Nominal and ordinal data from the questionnaire were coded and entered into the Statistical Package for Social Sciences Version 14 (SPSS). Summary statistics were provided in the form of counts, percentages, means and standard deviations where appropriate. Means and standard deviations were calculated for years since graduation and as a lecturer in MPT. Response frequencies were calculated for all other items that were not part of a summative scale.

The analysis of the documents collected, as well as the responses provided to the open-ended questions of the survey followed similar procedures as described in the documentary analysis of the whole programme of studies (Phase 1 of this study). The first step was to read all the documents and the lecturer's survey answers from a given course. Information related with the aims/ goals' learning outcomes, content, and teaching/ learning and assessment strategies of each MPT course programme was searched in all the documents and when presented it was extracted and transcribed to the indicated place on the extraction file by the researcher (See Appendix 8). If there is no information available a thick was written in the appropriate box ("if none say none").

Following the extraction of the data an Excel worksheet was created that separated the data concerning programme aims, learning outcomes, content, and teaching/ learning and assessment strategies. The data from the different courses was then grouped under these broader categories and a content analysis of the extracts was performed looking for the

⁴⁰ Initial documentary analysis (Phase 1) addressed the structure and organization of the whole curriculum of physiotherapy undergraduate studies. This documentary analyses addressed in particular the topics of the curriculum related with musculoskeletal physiotherapy.

identification of repeating ideas, topics or educational practices (teaching/ learning and assessment strategies) (McNamara, 1998).

Aims and learning outcomes were mapped according these categories and then crossover through the different courses. The same procedure was applied to the content of the MPT courses and for the teaching, learning and assessment strategies reported. A content analysis of the extracts was then performed looking for the identification of repeating ideas, topics or educational practices (teaching/ learning and assessment strategies) (McNamara, 1998).

Given the scarcity and nature of the information provided in the documents (see appendix 24) a frequency analysis of the repeated ideas or topics in each category was used to provide a guide to the nature of the aims/ leaning outcomes, content and teaching/ learning and assessment strategies reported and for extensiveness of musculoskeletal content, present across MPT programmes.

7.4. Findings- Phase 1

Fourteen institutions (public and private) were identified that offered undergraduate physiotherapy programmes in Portugal in 2008. These institutions differed in size (number of students enrolled in physiotherapy course), tradition (length of time as a Physiotherapy education provider) and nature (public and private) (Table 7.3.). Each of them had a unique curriculum, differing teaching strategies, differing expectations and standards. It is important to note that for the physiotherapy profession, there are no national benchmarks, no National examinations to determine eligibility for registration to practice, and no professional accreditation of the fourteen undergraduate programmes.

Table 7.3. Characteristics of Undergraduate Institutions/ physiotherapy courses in Portugal.

Public Institutions	N° of students enrolled in 1st year	Year of establishment	Private Institutions	N° of students enrolled in 1st year	Year of establishment
Institution 1	60	1982	Institution 7	50	1966
Institution 2	30	1982	Institution 8	60	1990
Institution 3	35	1982	Institution 9	60	2002
Institution 4	40	2000	Institution 10	75	2002
Institution 5	22	2001	Institution 11	80	2002
Institution 6	25	2001	Institution 12	50	2001
			Institution 13	50	2000
			Institution 14	100	2001

7.4.1. Aims, Objectives and learning outcomes of the Physiotherapy programmes

Of the 14 websites reviewed, only five schools/ courses indicated the aims of the course/ learning outcomes that students should achieve/ demonstrate on completion of their courses.

Although the scenario is quite diverse in terms of the information provided, in general the courses reviewed aimed to produce health care professionals whose clinical competence was underpinned by theoretical knowledge and clinical expertise. This was achieved by curricular designs that combined basic and clinical science with extensive tuition in practical and clinical skills. The various curricula also succeeded in meeting the requirements of what was established in current legislation in terms of fitness for purpose and award. One course summed this up as,

“The aim of the physiotherapy course is to prepare an high level professional that will be able to programme, to execute and to assess all the physiotherapy techniques are part of prevention and health promotion.”

(Institution 2)

In terms of overall objectives/ learning outcomes, courses highlighted the acquisition of knowledge and skills and development of professional behaviours and attitudes towards clinical practice, learning and knowledge development. Propositional and procedural knowledge (non-propositional) were emphasised in course aims. Knowledge of normal/

abnormal was one of the key conditions that guided physiotherapy assessment and clinical practice. One course described this in the following terms,

“Knowledge of the inter-relationship of the various body systems in normal and abnormal function and ability to design and conduct a physical examination in order to identify the abnormal process, and to implement adequate procedures to improve the patient’s health state”

(Institution 8)

Besides propositional knowledge courses aimed to prepare new graduates to exhibit professional craft knowledge in order to make them able to assess patients’ conditions. One course said that,

“Students should be able to apply assessment and treatment procedures/ modalities to the impaired body structures and functions”

(Institution 8)

Of the fourteen courses addressed only two courses indicated the objectives/ learning outcomes in more explicit terms:

- To collaborate in the identification and resolution of the community problems related to impairments, disabilities and handicaps.
- To identify and assess dysfunction areas, taking into account the organic, the psychological situation and the socio-economic and cultural frame of the client.
- Plan and execute programmes of intervention utilising among other means: physical exercise; specific techniques of postural reeducation and movement; manipulative therapies; electrotherapy; hydrotherapy.
- Assess the effectiveness of the professional intervention and adapt it according to the results obtained.
- Assess in a critical way the role of the professional intervention within the general plan of care to the client, and, to apprehend the nature of other simultaneous interventions and the interaction between them.
- To develop actions to sensitize, advise and/or enlighten the patients/ clients, their families and other health care/ education professionals in particular and the community in general.
- To assess the physiotherapy practice and to promote its development.
- To apply the safety rules of physiotherapy practice.
- To collaborate in the management of the working place.
- To collaborate in the education of health professionals.
- To develop and participate in studies/ research programmes.

(Institution 7)

In one course (**Institution 8**), the learning outcomes are divided in three domains, cognitive, psychomotor and affective. In the final year of the programme of studies, the graduate will be able to demonstrate the following,

- **Cognitive domain**

Knowledge of the inter-relationship of the various body systems in normal and abnormal function and ability to design and conduct a physical examination in order to identify the abnormal process, and to implement the adequate procedures to improve the patient's health state.

- **Psycho-motor domain**

Apply assessment and treatment procedures/ modalities through the impaired body structures and functions.

- **Affective domain**

The student should be able to demonstrate professional behaviour appropriate to the moral, ethical and legal aspects of the profession and also a commitment to life long learning.

(Institution 8)

7.4.2. Curriculum Design and Content

Content of physiotherapy undergraduate curricula was analysed to gain better understanding of its design and organization. A content analysis of the published curricula showed that courses were broadly similar in terms of their curricular design. They all had the same course length⁴¹ and were organized around large course units and in semesters⁴² that lasted between 14 (*Institution 5*) and 18 weeks (*Institution 4*). They all also offered a Bachelor degree followed by a one-year honours degree⁴³. Despite the similarities there was also variation between them at programme design level; course units level; in the students workload; and in the time spent in clinical placements. The analysis showed that directed student learning (total contact hours) made a significant contribution to the overall student workload. The total

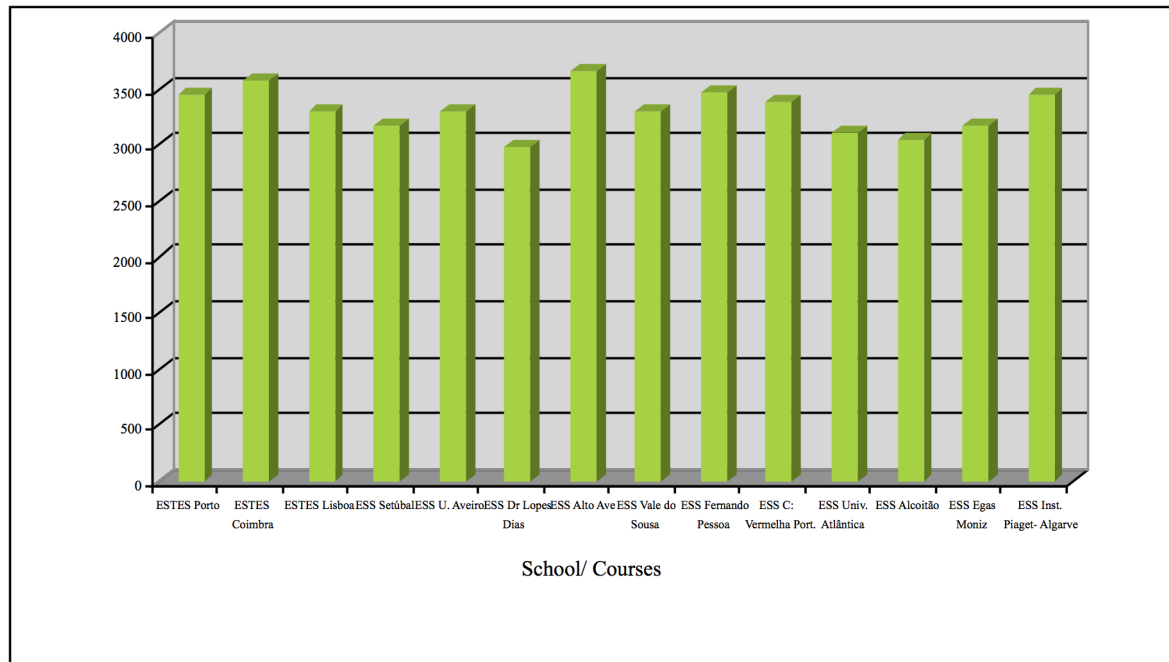
⁴¹ In 2006 the length of the undergraduate programmes was four years. After completing the first three years of study students achieve a Baccalaureate degree in Physiotherapy and are qualified to start working as physiotherapists. After this, the student can also reach the next level of Portuguese Higher Education and have 1 more year of study continuing a deeper level of studies in his basic area. It's called the "Licenciatura" and it is essential if the student wants to progress towards a Master Degree (2 more years).

⁴² Under the Bologna agreement, all programmes will have to move to the ECTS credit system by 2009/10.

⁴³ Institutions 10 and 12 had recently changed their curriculum for a three years course.

number of contact hours ranged between 2985 (*Institution 6*) and 3660 (*Institution 9*) (Figure 7.1).

Figure 7.1. Total amount of contact hours in the different physiotherapy baccalaureate courses in Portugal.



In fact, one of the main complaints reported by the students in different “subject review reports” was the heavy workload. Students spent on average 25 to 30 hours per week in classes, listening and practising. Heavy student workload usually meant that students had little opportunity for reflection on their learning processes. This has been related also with a tendency for students to adopt superficial approaches to learning, meaning that students tend to rely more on memorization strategies than on understanding (Biggs, 1995).

In the fourteen programmes reviewed, information about the content of programmes was limited to course units’ names. In order to facilitate the description and analysis of the content of the different programmes, the topics were organized around five main categories⁴⁴: Biological and Physical Sciences; Social/ Behavioural/ Technological Sciences;

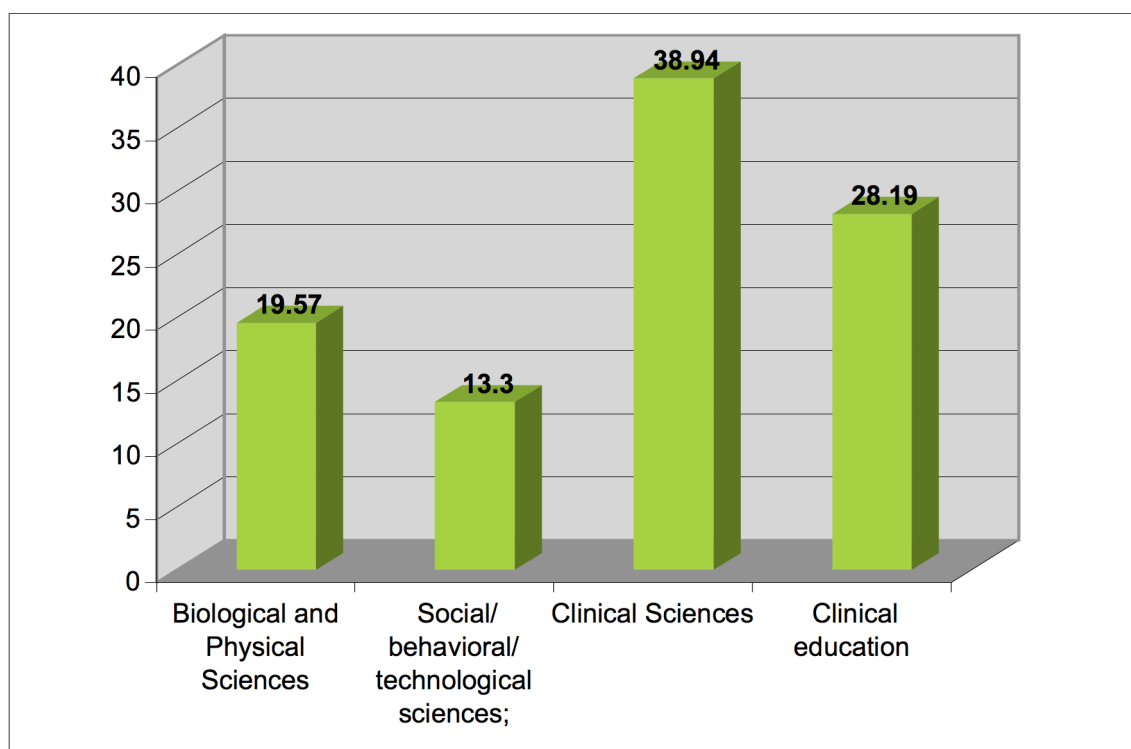
⁴⁴ The categories were established on the basis of the WCPT Guidelines for Physical Therapist Professional Entry-Level Education (Approved at the 16 General Meeting of WCPT June 2007).

Clinical Sciences; Clinical education. A category of “others (not classified)” was added to the categories proposed.

- Biological and Physical Sciences included, for example, Anatomy; Physiology; Pathology; Pathophysiology; Neurology; Orthopaedics and traumatology; Paediatrics; Respiratory conditions; Cardiovascular condition; Biomechanics, Biology; Physics; etc.
- Social/ behavioural/ technological sciences included, for example: Psychology; Socio-Anthropology; Behavioural Sciences and Human development; Ethics; Health management, information communication technology [ICT], applied statistics, etc.
- Clinical Sciences included, for example: Manual Therapy; Movement Therapy; Electrophysical Agents; Neuromuscular Physiotherapy, Musculoskeletal Physiotherapy; Methods and techniques of Intervention; Techniques of Evaluation and Intervention; Physiotherapy theory and Practice; Theoretical aspects of Physiotherapy; human movement studies; Introduction to the profession; research, etc.
- Clinical education included 1) management of patients/clients with an array of conditions (e.g., musculoskeletal, neuromuscular, cardiovascular/pulmonary) across the lifespan and the continuum of care; 2) practice in multiple settings; 3) opportunities for involvement in interdisciplinary care.
- Others, not classified, included for example, Seminars (not specified)

Figure 7.2. summarises the data from a content analysis of the published curricula from the 14 Portuguese schools. The percentages were obtained through the amount of hours per category, and represent the average of each category in the total amount of contact hours in the course.

Figure 7.2. Average percentage of contact hours per category in the total taught time within the programmes (values in percentage).

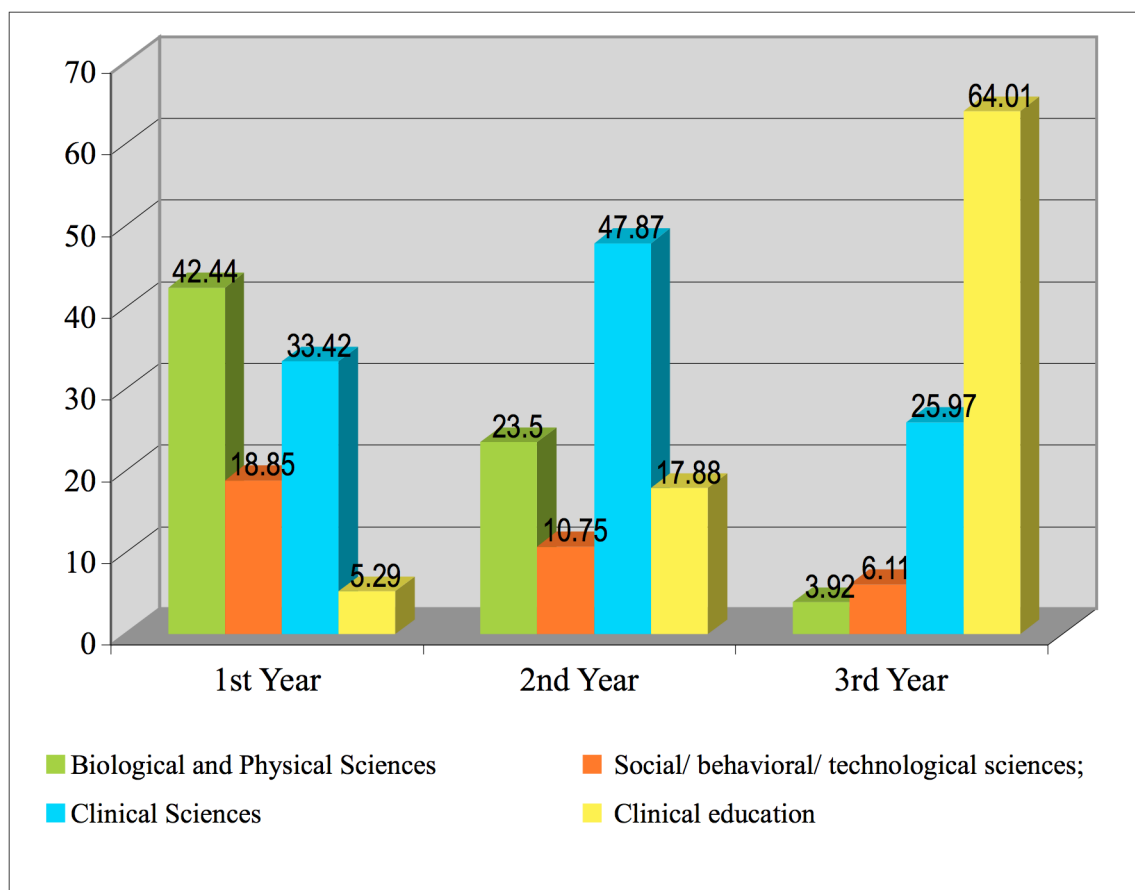


The averaged data showed differences in the content in the four main curriculum areas. Clinical sciences represented approximately 39% of the total course content, followed by clinical education (28%), Biological and Physical Sciences (20%) and finally Social/behavioural/ technological sciences (13%). When the courses were analyzed by year of programme it could be seen that in general Biological and Physical Sciences were front loaded, with practice (including clinical) building up in years three and four.

Figure 7.3. (next page) shows that “Biological and Physical Sciences” were the main component within the first year (42%), followed by “Clinical Sciences” (33%) with “Social/

Behavioural/ Technological sciences” (19%) and “Clinical Education” (5%) having a lower impact in the programmes in this first year.

Figure 7.3. Percentage of the different categories in the each year of the course.



The results also showed that, in the second year, “Clinical Sciences” became the main component of the physiotherapy curricula (48%). “Biological and Physical Sciences” (24%) and “Clinical education” (18%) had similar percentages. The category “Social/ Behavioural/ Technological sciences” with (11%), indicated perhaps the low impact of these components in the programme of studies.

In the third year it is possible to note that “Clinical Education” became the main component of the physiotherapy curricula (64%), followed by “Clinical Sciences” (26%) with “Biological and Physical Sciences” and “Social/ Behavioural/ Technological sciences” having a lower impact at this stage of the programme.

Analysis of the curricula content indicated that the curriculum design model is a traditional design, with the following sequence: basic sciences; applied sciences; clinical practice. Students were first equipped with basic science knowledge of human anatomy, psychology and pathology, together with physiotherapy studies, before taking up clinical subjects. This curriculum design is also called 'subject- based' in which the theory and practical components of curriculum are taught prior to clinical placement (Shepard & Jensen, 1990; Morris, 2003). Illustrative of the previous statement is the course units chosen for the first year: e.g. anatomy, physiology or psychology (knowledge about the normal). In the second year the emphasis changed to the clinical sciences, meaning the knowledge about diseases and other pathological conditions (knowledge about the abnormal). In the third year, the main emphasis of the programme was on clinical internship.

In the first year, more than 60% of the total time of the programme was concerned with the study of basic sciences (Biological and Physical Sciences and Social/ Behavioural/ Technological sciences); although widespread across the three years of the programmes "clinical studies" became more important in the second and third years of the course". In terms of the contact hours planned in the different programmes, Social/ Behavioural/ Technological sciences held less importance in the programme than "Biological and Physical Sciences".

The most common course units in the first year were: anatomy; physiology; general pathology; movement studies; psychology. In the second and third years, the curricula became more profession-specific in terms of skills development, fieldwork practice and professional studies, although clinical sciences, such as, orthopaedic conditions, neurological conditions, haematological conditions, or cardiovascular conditions, were studied jointly.

On average, "Clinical Education" constituted 5% of teaching in year 1, 18% in year 2, and 64% in year 3.

7.4.3. Clinical Education⁴⁵

Clinical education is a key component of physiotherapy curricula and constituted a large part of all courses. High quality, broad, clinical experience under expert guidance in an entry-level physiotherapy course seemed to be critical for the majority of the physiotherapy programmes in Portugal.

Of the 14 programmes examined, 11 (78,6%) had clinical education modules integrated throughout the three years with students attending clinics from the beginning of the course. The amount of clinical education hours differed from course to course (Table 7.4., next page). For example, in the physiotherapy programme of the Institution 2, the number of clinical education hours was 525, approximately one third of the amount provided by the Institution 10 (1050).

Despite there was no information available within the curricula about how clinical education was organized or about the clinical educational model provided, the differences founded in the hours allocated to clinical education and in the period where they occurs could have important implications for the development of the clinical reasoning of the students. In developing clinical reasoning, it is crucial for students to master the knowledge base and establish their competence in integrating their knowledge into practice. In the curriculum, the components of the clinical subjects and the clinical practice were important in this process. The clinical subjects provide the opportunity for students to apply what they had learnt in terms of theories, clinical and technical knowledge and professional practices to actual case management. Clinical education therefore is regarded as the major channel through which students integrate knowledge into practice.

⁴⁵ Clinical education refers to the training that occurs outside the schools in Hospitals, Community centres, rehabilitation clinics, etc. under the supervision of a physiotherapist (tutor).

Table 7.4. Total amount of clinical hours included in the different physiotherapy baccalaureate courses in Portugal.

Schools/ Courses		Total Contact Hours	Total Clinical Education Hours	Clinical Education from the 1 st Year of the Baccalaureate
Public Institutions	Institution 1	3450	570	No
	Institution 2	3585	525	Yes
	Institution 3	3300	930	No
	Institution 4	3170	870	Yes
	Institution 5	3309	925	Yes
	Institution 6	2985	870	Yes
Private Institutions	Institution 7	3055	720	Yes
	Institution 8	3295	1020	Yes
	Institution 9	3660	1035	Yes
	Institution 10	3480	1050	No
	Institution 11	3380	730	Yes
	Institution 12	3115	985	Yes
	Institution 13	3180	990	Yes
	Institution 14	3445	1000	Yes

7.5. Teaching and learning strategies and assessment

In the courses/ school websites information about teaching, learning and assessment strategies was non-existent. On the basis of the information provided in the course curriculum there were three different types of classroom activities: theoretical classes; and theoretical/practical classes; practical classes. It is reasonable to infer from this differentiation that different teaching and learning strategies are employed.

Anecdotally, students spend most of their time attending lectures, participating in practical classes and treating patients admitted to hospital wards in addition to outpatient work. Some courses include small-group, problem-based learning tutorials and clinical skills laboratories based on problems/ case scenarios enhanced with resource sessions.

With respect to assessment and student progression the information provided concerned the type of assessments (eg. continuous assessment and examination) and the period of

assessment, i.e. during the semester or at the end of each semester. Evaluation of outcomes in each for these programmes relied on each School specifying its own criteria, its own standards, and its own requirements in terms of sources of evidence for making judgements and decisions about which graduate students and which do not.

On the basis of this generic evaluation of the curriculum aims, design and content of Portuguese undergraduate programmes a survey was conducted in order to investigate the current status of undergraduate MPT curricula in undergraduate physiotherapy programmes in Portugal with the specific aim of capturing the educational process and actions underlying current educational practice across undergraduate courses.

7.6. Findings- Phase 2- Educational process and actions in undergraduate musculoskeletal undergraduate Physiotherapy programmes in Portugal

A total of 14 lecturers from 14 undergraduate physiotherapy programmes consented to participate in the study. Data collection occurred over a one month time period from 3rd to 31st of March 2008. Of the 14 institutions only seven provided additional data for documentary analysis purpose.

The institutions that participated and the undergraduate programmes each offered were presented in table 7.3, page 232. All data presented in this section is deliberately anonymized.

7.6.1. Lecturer Demographics

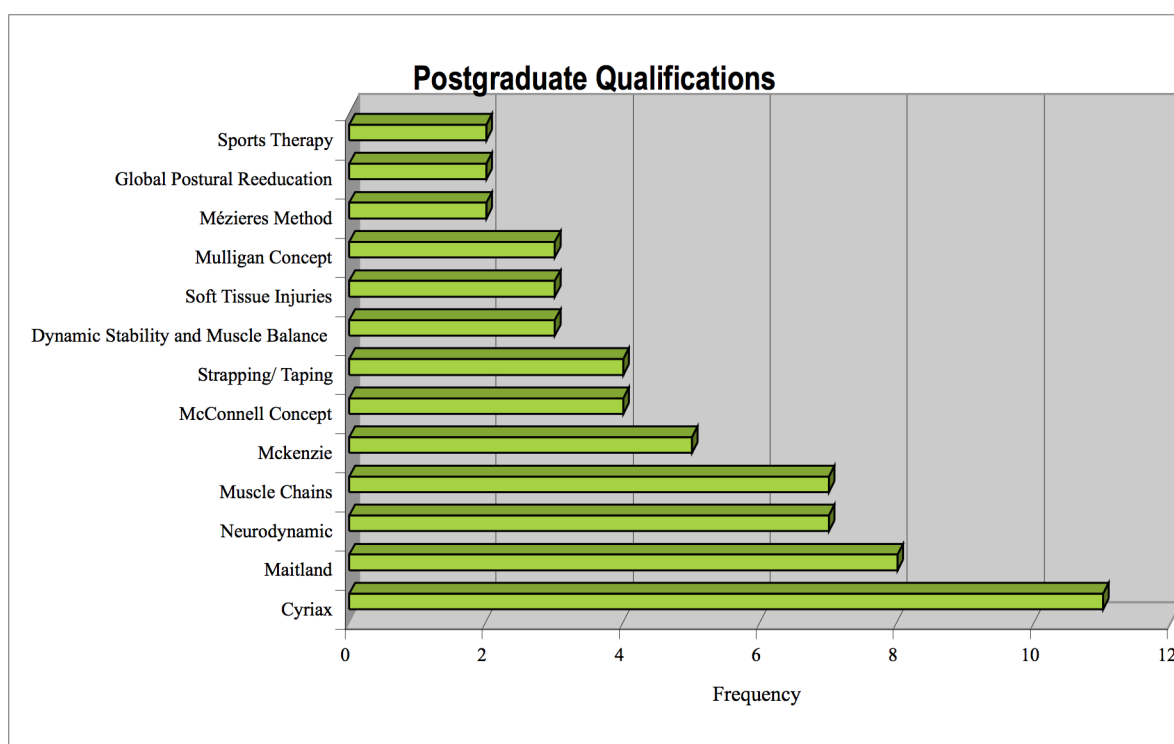
Of the 14 lecturers who were responsible for musculoskeletal physiotherapy programmes, ten were male and four were female. All 14 lecturers held an undergraduate physiotherapy degree and had postgraduate qualifications in areas related to MPT. Eleven of the 14 participants had attended a course in the Cyriax approach, and eight in the Maitland approach. Besides these two approaches qualifications were quite diverse, including for example Neurodynamic (8), McKenzie (5), McConnell (4), Dynamic Stability and Muscle Balance (3), or the Mulligan approach (3) (Figure 7.4, next page).

None of the lecturers had any formal postgraduate education in MPT. The higher degrees obtained by the lecturers teaching MPT at the time of data collection was a PhD (1), Masters

in Physiotherapy (1), and a Masters in a related field (6) (3 participants held a masters degree in Physical Activity, 1 in Sports for children and adolescents, 1 in Health' Communication and 1 not specified).

Lecturers had a range of teaching experience in MPT. This ranged from 3 to 18 years with a mean of 8.4 (SD 5.4) years at the current institution. Experience of teaching MPT in their total academic career ranged from 3 to 18 years, with a mean and 9.9 years (SD 5.5) (Table 7.5., next page).

Figure 7. 4. Postgraduate Qualifications of the lecturers responsible for MPT curriculum.



Fifty percent of the lecturers (7/14) were currently involved in research into MPT. Some participants expressed their current areas of research work or interests in generic terms, such as, proprioceptivity, arthritis, shoulder problems, others were more specific, indicating, for example, “clinical reasoning in lower quadrant dysfunction”, “effects of motor re-learning in ankle joint stability” or “artistic gymnastic injuries- relationships between the anthropometric and nutritional characteristics with injury incidence”.

Table 7. 5. Summary of Lecturer Demographics

Lecturer Demographics	
Gender	10 males and 4 females
Teaching experience in the institution (years)	Range (3-18);
Teaching experience in total academic career (years)	Range (3-18);
Years since Graduation years	Range (7-29);
Currently involved in research	7 currently involved in research

7.6.2. Structure and Organisation of Musculoskeletal Programmes

The overall response rate for the MPT questionnaire sent to the accredited programmes in Portugal was 100% (n=14). The following results summarize the main questions regarding MPT programme in undergraduate physiotherapy courses in Portugal, specific MPT content.

In six of the 14 undergraduate physiotherapy programmes (42.8%), musculoskeletal physiotherapy was embedded in other course units, in four MPT was taught as a stand-alone subject (28.6%), while the other four programmes had a mixture of both (28.6%)⁴⁶. The year of the programme in which teaching of MPT commenced and was mostly taught was the first year in ten institutions followed by the second year in four institutions.

In respect of the amount of contact hours that are allocated to MPT in each course programme, comparisons between programmes are difficult to make considering the diversity of programmes and the variety of ways they are taught (stand alone subject/ embedded/ other). However it was possible to observe some differences of emphasis of specific types of classes. For example, in the public courses, and with a few exceptions⁴⁷, the theoretical/practical classes were predominant in MPT programmes. In contrast, in the private courses the predominance was for practical classes.

7.6.3. Aims and learning outcomes of MPT teaching in individual schools/ courses

Participants were asked to report the aims and learning outcomes of MPT for their courses. Although there was some overlap in the aims and learning outcomes reported, the

⁴⁶ Respondents could choose more than one option in the questionnaire;

⁴⁷ The exceptions are: "Institution 6" where the theoretical classes are predominant in MPT programme; "Institution 5" where the practical classes are prevalent.

participants were very diverse in their description of the aims of their MPT' curriculum. With a few exceptions, aims predominantly addressed knowledge and skills (Table 7.6 summarizes the more frequent aims established across school programmes). Even though, three participants stated that the main aim of MPT programme was to promote attitudes and behaviours compatible with continual professional development, another three participants reported the ability to use their own competences (as physiotherapists) to work in multidisciplinary teams. There were also two references to the ability to manage time and space. Finally, clinical reasoning was reported in the aims of four programmes.

Table 7.6. Summary of the main aims addressed in MPT courses.

Objectives/ learning outcomes of MPT programmes	Frequency
Capacity to apply accurate skills in clinical assessment;	11
Ability to select, plan, implement, manage and evaluate physiotherapeutic interventions;	10
Knowledge and understanding of the normal anatomy and physiology of the living human body for those systems commonly encountered in physiotherapy practice	9
Ability to perform appropriate musculoskeletal procedures and modalities	8

Documentary analysis provided additional information concerning the aims/ objectives/ learning outcomes of the MPT courses (only 7/14 courses sent course documentation). The majority of the courses have generic aims/ goals/ learning outcomes. The stated aims/ goals/ learning outcomes were broadly grouped into the 6 categories laid out in Table 7.7 (next page).

The aims/ objectives/ learning outcomes provided seemed to emphasize the physical dimensions of physiotherapy practice. In general all the courses indicated that the focus of learning among musculoskeletal curricula is concerned with the application of diagnostic procedures and the selection and application of appropriate treatment. The interweaving of psychological factors or social background does not seem to be meaningful enough in this context to be regarded primarily and in detail.

Recent literature identified several factors as relevant to the development of clinical reasoning ability. For example Christensen et al (2008b) found that competences like reflective thinking, critical thinking or dialectical thinking are essential to develop clinical reasoning capability. Considering the information provided by the participants in this study,

these competences seemed to be absent or underestimated in the Portuguese musculoskeletal curricula.

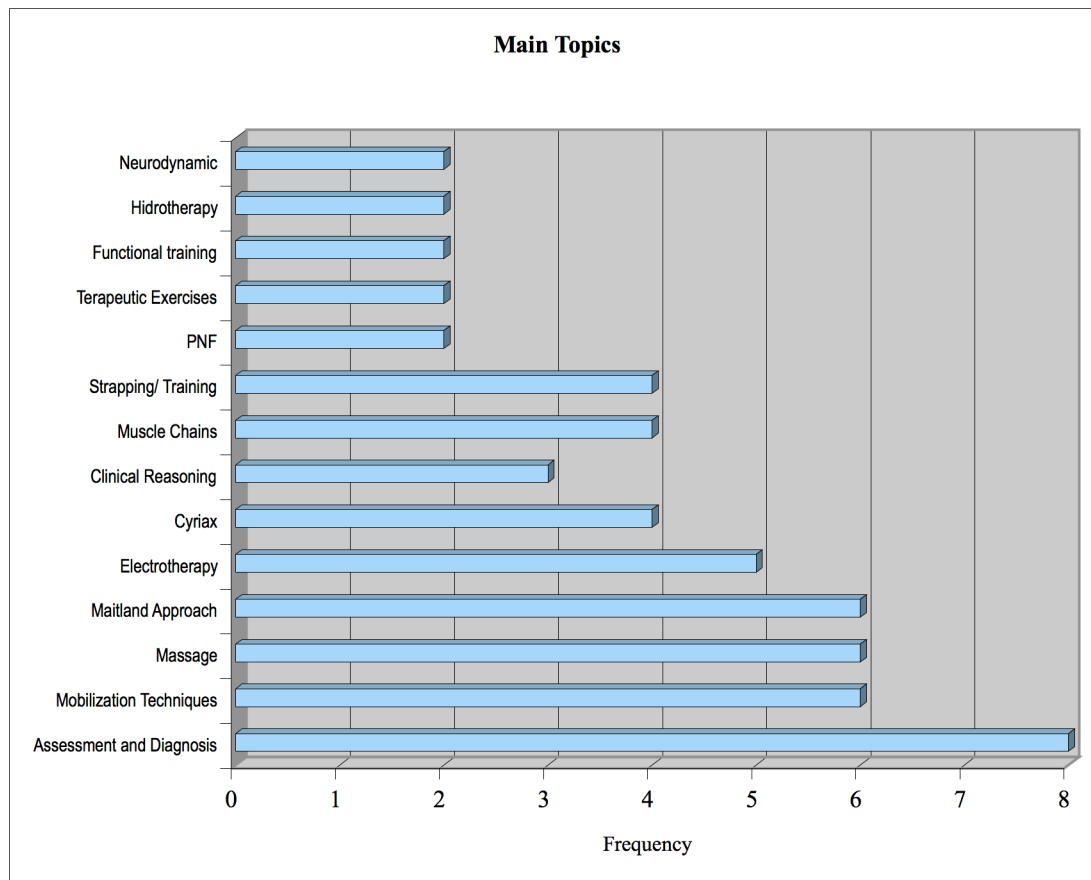
Table 7.7. Summary of the main aims addressed in MPT courses.

Aims/ Objectives/ learning outcomes of MPT programmes	Institution Number							Frequency
	11	13	3	14	6	8	4	
Demonstrate the application of a range of assessment procedures suitable for patients with musculoskeletal dysfunction	1	1	1		1		1	5
Capability to make appropriate diagnosis	1	1	1	1	1		1	6
Capability to plan objectives		1	1				1	3
Ability to select appropriate treatment techniques in response to assessment findings	1	1	1		1		1	5
Capability to provide accurate patient records	1		1				1	3
Demonstrate the application of a range of treatment procedures suitable for patients with musculoskeletal dysfunction		1	1	1	1	1	1	6

7.6.4. Curricula content

Participants were asked to indicate which main topics were taught in relation to MPT content in their curriculum. Participants responses were then crosschecked with the information contained in the course units syllabus furnished to the students. Analysing data collected through documentary analysis concerning topics taught was problematic. The different terminology used and the plethora of topics inhibited any possibility of a more detailed comparison. Some schools/ courses listed topics taught without indicating how much time was allocated to each and a few were unable to distinguish between theoretical and practical teaching.

Figure 7.5. shows the main topics taught in the different programmes. Assessment and diagnosis was reported as a main topic in eleven programmes followed by mobilization techniques, massage and the Maitland approach. To a less extent, electrotherapy, muscle chains and Cyriax were indicated in four courses.

Figure 7.5. Main Topics taught in MPT Programmes.

Analysing data collected through documentary analysis concerning topics taught was problematic. The different terminology used and the plethora of topics inhibited any possibility of a more detailed comparison. Some schools/ courses listed topics taught without indicating how much time was allocated to each, a few were unable to distinguish between theoretical and practical teaching, or those that taught on multiple sites had different programmes on each site.

7.6.5. Perception of factors impacting on choice of MPT curricula

Participants were asked an open-ended question about factors that they perceived impacted on the choice of MPT curriculum. The range of factors cited included current clinical practice, the most frequent clinical conditions, personal clinical competence and training in the staff, research or evidence base for MPT, and the need to promote clinical reasoning in MPT.

Each participant was then asked to rank each factor they had identified in terms of its impact when deciding on the content of a MPT curriculum (1 = greatest impact; 5= lower impact). Table 7.8. shows that current clinical practice and the most frequent clinical conditions were perceived the most important reasons for selecting the MPT curricular content. Nine of the fourteen participants ranked these two factors as either the highest or second highest factor.

Table 7.8. Summary of factors impacting on choice of MPT curricula (n=14)

		Order of importance				
		1 = greatest impact; 5= lowest impact;				
Main Factors impacting on choice of MPT curricula		1	2	3	4	5
Current clinical practice	Number of answers	5	3	0	0	0
Most frequent clinical conditions		1	3	3	0	0
Personal clinical competence and training in the staff		1	2	2	1	0
Research or evidence base for MPT		0	1	3	0	0
Promotion of clinical reasoning in MPT.		1	0	0	1	0

7.6.6. Inclusion/ exclusion of Musculoskeletal Physiotherapy Concepts/ approaches from the curriculum in the last 5 years

Participants were asked if they had included or excluded any MPT topic from the curriculum in the last five years, and the reasons for inclusion/ exclusion. None of the programmes indicated that they had excluded any topic.⁴⁸ The most commonly additionally included MPT topic was the International Classification of Functionality (reported in 4 courses) and dynamic stability and muscle balance (reported in 3 courses).

7.6.7. Teaching, Learning and Assessment Strategies

When asked about preferred teaching, learning and assessment strategies, 14 programmes indicated a variety of tools. Lectures were the common method of teaching MPT in the majority of the programmes (table 7.9). Seventy one percent of the programmes reported that

⁴⁸ Institution 2- Data from the interview- One participant indicated that they had significantly reduced the emphasis on some modalities, such as massage or mobilization tending to exclude the practical component while maintaining the theory teaching. The main reasons participants gave for excluding or reducing the focus on these modalities were their lack of use in clinical practice and poor research evidence.

they always used this teaching method. In contrast, the use of real patients, web-based lectures, workshops or personalized systems of instruction were never used in approximately 50% of the courses. Small group tutorials, problems based learning or simulated patients were used in some programmes, but less frequently when compared to traditional lectures.

Table 7.9. Frequency of use the following teaching methods

N=14	Never	Sometimes	Always
a) Lectures			10
b) Small group tutorials	3	6	1
c) Problem/ Case Base Learning	2	5	3
d) Simulated Patients	2	5	3
e) Real patients	7		2
f) Personalized systems of instruction	7	2	
g) Workshops	8	2	
h) Web-based lectures	7	2	
i) Other, please describe			

7.6.8. Assessment practices

All programmes assessed students with an end of semester examination. According to the nature of the course unit this formal end of semester examination could be theoretical, practical or both. All the participants reported that in their MPT programmes they used formal summative theory and practical assessments. Seven of the 14 courses reported that they also used this formative assessment in MPT programmes, but for three courses participants referred that as an uncommon practice. Besides summative assessment, 7 participants reported that students had other opportunities to monitor their knowledge, skills and attitudes, such as, self-assessment, peer-assessment, group discussion, class debates and individual feedback.

When asked about preferred assessment strategies, the majority of the programmes reported more than one strategy. Only two schools⁴⁹ reported a single method of assessment, one favouring written questions, and the other oral examinations through clinical scenarios.

The two most commonly used methods of assessing students' knowledge and skills in MPT were oral examinations and group work assessments. Seven courses also reported the use of practical based assessments in clinical placements (Table 7.10).

Table 7.10. Type of Practical Assessments

Peer assessment	Group work assessments	Oral examinations	Video assessments	OSCE's ⁵⁰	Practice based assessments (i.e. in hospital, community, rehabilitation clinics, etc)
3	10	11	1	4	7

The survey' findings seemed to contradict the information available through course unit documents. Of the 7 schools/ courses who sent course documentation, only 6 have information related with assessment strategies used. Of this 6, 5 reported the use of written examinations and oral examinations (practical). Only one school/ course has group work as part of the assessment strategies. Peer Assessment, video assessments or OSCE's are not reported.

7.6.9. Summary of the Key findings

A critical study of aims, goals and learning outcomes and teaching/ learning and assessment methods is one of the ways of gaining insight into the characteristics of a curriculum. Unfortunately the scarcity of the documentation available restrained the level of analysis. On the basis of the study' findings the following summary has been shaped:

- The curriculum model utilised in Portuguese Physiotherapy Schools is a traditional 'subject-based' model, with the following sequence: basic sciences; applied sciences; clinical practice;

⁴⁹ Institution 9 – Only written assessment; Institution 14- oral examination based on clinical scenarios;

⁵⁰ OSCE- Objective Structured Clinical Examination

- The information publicly available suggests that the competence profile of physiotherapists in Portugal is still based on the technical dimension of the profession. The majority of the programmes seemed to be concerned with preparing new graduates for the traditional model of practice. Patients' beliefs, values or expectations were absent from the explicit educational discourse. Reference to the development of professional behaviours and attitudes towards clinical practice, learning and knowledge development was sparse or non-existent. There was sparse reference to clinical reasoning or reflective practice;
- Identifying 'abnormalities' seemed to be a key role of clinical reasoning process. From the recognized abnormalities, physiotherapists formulate their goals and intentions of treatment. This relationship suggests that the physiotherapy process (clinical reasoning) is driven by the physiopathology of the pathologic conditions presented;
- Musculoskeletal programmes analysis suggested that school/ courses favour an eclectic approach with contributions from several different approaches to treatment. However there was no information about how these different approaches are integrated in the clinical decision making process;
- Findings also suggest that there were a variety of teaching, learning and assessment strategies used to develop competence in the management of musculoskeletal conditions;

The results of this preliminary documental analysis suggests that the educational process still focuses on the biomedical (instrumental) approach to practice and reasoning, but more information is needed to achieve a deeper understanding about the values and beliefs that underpin curriculum design in undergraduate programmes in Portugal.

Chapter 8

An Exploration of Clinical Reasoning in Portuguese Undergraduate Physiotherapy Programmes through lecturers' interviews

8.1. Introduction

Having developed a questionnaire survey and undertaken a documental analysis of the “curriculum on paper”, study 3 involved an in-depth analysis of the lecturers' perspectives on clinical reasoning and how it is promoted in the musculoskeletal course across the different schools. The objective of this study was to investigate whether the physiotherapy courses were promoting hypothetico-deductive and/ or narrative approaches to reasoning and practice in relation to musculoskeletal conditions.

This study relates to the second and third questions of this investigation: *“What kind of approaches to reasoning and practice are being promoted in undergraduate musculoskeletal courses and how is this achieved?, and “What do Portuguese physiotherapy educators understand by the concept of clinical reasoning in musculoskeletal physiotherapy?”*. This chapter presents the research methods and the findings of the study.

A total of 14 telephone interviews with the lecturer responsible for MPT subjects in each course were carried out to explore their perspectives about clinical reasoning, how it is used in clinical practice situations and how it is facilitated in their courses. The first section of this chapter includes information about the participants and their recruitment, ethical issues, the study setting, and the data collection techniques. Techniques used for data analysis are also discussed. A final section presents and discusses the findings from lecturers' interviews. Five themes representing the perspectives about clinical reasoning, its role on musculoskeletal practice and how it is learned through undergraduate musculoskeletal physiotherapy programmes have emerged from the texts produced by the participants. Each theme is presented and contextualized with participants' own words.

8.2. Research Methods

In this study, telephone interviews with fourteen lecturers, responsible for MPT programmes from each of the different physiotherapy courses were carried out to explore their ideas about clinical reasoning, how it is used in clinical education situations and how it is facilitated in their courses.

8.2.1. Participants

In this study the sample of MPT lecturers, which participated in the questionnaire survey (phase 2 of study 2), was recruited to take part in telephone interviews.

8.2.2. Ethical Approval

The protocol for the study was submitted to and approved by the Faculty of Health and Social Sciences Ethics and Governance Panel of the University of Brighton and all standard procedures were taken to protect participants' confidentiality and privacy and to prevent any potential risks. Permission to perform the study as well as the pilot study was obtained from the course directors of the schools involved.

All participants were informed about the study, and written informed consent was obtained. Each participant was provided with an information sheet detailing the aims of the study, the procedures designed to protect identities and maintain confidentiality and contacts to allow the opportunity to ask questions about the study. These were sent to the participants by email, prior to their participation in the investigation. Participants understood that participation was voluntary and that they were free to withdraw at any time (Appendices 25 to 32).

Course directors and participants in the study were informed that the results would be disseminated to their schools and eventually to the professional field.

8.2.3. Semi-structured telephone interviews

A semi-structured interview schedule was developed to explore lecturers' ideas concerning clinical reasoning and clinical practice relating to musculoskeletal conditions and to gain a deeper insight and a richer perspective about the educational practices relating to MPT

programme and also to clarify ambiguous questionnaire responses (table 8.1).

Table 8.1. Interview Topic Guide- Study 3.

Interview Topic Guide

1. What does the term Clinical Reasoning mean to you?
 - What is involved in Clinical Reasoning?
 - What part does Clinical Reasoning play in a treatment episode of a Musculoskeletal patient?
 - How does Clinical Reasoning inform the overall patient management?

2. How do you define good Clinical Reasoning?

3. From your personal point of view what key competences should we be aiming to develop in a physiotherapy student concerning MPT?

4. In your course what strategies do you use to develop competence in clinical reasoning in your students?

5. In relation to the development of clinical reasoning competences, do you think the balance between classroom based and practical based teaching is appropriate?

6. If you were designing a new curriculum, what changes (if any) would you introduce in the way clinical reasoning is promoted and assessed in students?

8.2.4. Data Collection

Course directors from each course were asked to identify the staff member with the overall responsibility for their MPT programme to participate in the study. Recruited participants were initially contacted by phone and a package was sent by mail to each participant prior to the interview to allow them time to collect any relevant material and to familiarise themselves with the questions (see appendices 25 and 26; appendices 29 and 30) for participant information sheet and consent form). This package included the participant information sheet, a consent form and a copy of the interview schedule.

The researcher conducted fourteen semi-structured telephone interviews with the lecturers responsible for MPT subjects in each of the courses to further explore their questionnaire responses. Participants were interviewed by telephone, and each interview was scheduled to last between 30 minutes and 1 hour. All the interviews were audiotaped.

8.2.5. Data Analysis

Telephone interviews lasted from 20 to 80 minutes. Handwritten notes were taken during and after each telephone call. Interviews were then transcribed verbatim and were returned to all participants to confirm accuracy. This process also allowed participants to provide any additional information unavailable at the time of the questionnaire or interview. Accordingly, each interview transcription was firstly analyzed as a single case, preserving the meaningful relations that a specific lecturer had with the topic under study (Flick, 2006). This deepening analysis of the first single case started with familiarization with the content of the transcription by reading it several times. Then, the elaboration of the system of categories started by first applying open coding and then selective coding, as described by Strauss and Corbin (1990). Flick (2006, p. 308) stated that selective coding aims less at developing a grounded core theory across all cases than generating thematic domains and categories for the single case first.

Strauss & Corbin, (1990, p. 61) define open coding as the “process of breaking down, examining, comparing, conceptualizing, and categorizing data”. This coding was done by reading and examining the text for “salient categories of information supported by the text” (Strauss & Corbin, p. 150). In this study, the first step in data analysis involved reviewing the first interview transcript to identified relevant segments of text relating to how the participants approached clinical reasoning in musculoskeletal conditions. Different parts of the transcript were first identified and then marked with ‘codes’ to identify them for further analysis. Initial coding was based on the participants' wordings in the transcripts, in order to reflect the meaning lecturers ascribed to their experiences followed by the fragment’s precise location in the transcript (line number). Analysis of a word or phrase allowed the researcher to focus on themes that appeared to be significant and explore alternative explanations. The use of questioning also allowed the researcher to compare and reflect on the properties and dimensions of each category within each interview and in comparison across interviews.

For example, in the third interview, the words "patient's expectations" were coded. An analytic memo was then made beside those words questioning its meaning and whether the clinician meant the incorporation of patients' expectations in the definition of the treatment plan or if there was another underlying meaning to what "patient's expectations" entailed. Through further analysis, it was found that clinicians used the words "patient's expectations" to refer to what patients would like to achieve, such as their ability to return to work, or to take on the usual role they had, in their family or in society.

Coding categories were developed and revised while data analysis continued. As the coding list grew in size, the investigator began the process of grouping some codes under more abstract codes. For example, "learning strategies" was used as an abstract code with "role play", "case scenarios", "clinical education" and "real patients" underneath it. The code list was also revised to reflect insights gained from subsequent interviews and by re-reading previous interviews. Memos were used to help the data analysis process.

This process was then repeated for each transcript, thus allowing emergent themes to be drawn out. The researcher continued the reiterative process of data analysis to saturate the categories. This was a process of "looking for instances that represent the category and to continue looking "...until the new information obtained does not further provide insight into the category" (Strauss & Corbin, p. 151). At this stage visual representations of data were developed, such as mind-maps and tables. This helped to determine relationships between codes, themes and different levels of themes (Flick, 2006).

Following individual analysis, similar or identical categories were grouped together from the different interview transcriptions. The group categories were then compared to establish similarities or the presence of disconfirming data (van Manen, 1997). For example, whether the lecturer focused on the factors that impacted on the effectiveness of the clinical reasoning process appeared to interweave with the characteristics of the context of practice as a whole, and relate to the influence of the contextual subcategories, such as, time constraints, number of patients per day, or the presence or absence of a medical prescription.

Selective coding was then used to integrate and refine the categories. Deciding on central categories was a complex process. For example, instead of conceptualising clinical diagnosis

and definition of therapeutic goals as main theme, the analysis allowed the researcher to see professional autonomy as a significant theme in the way clinicians understand clinical reasoning. By examining the data as a whole larger categories and themes requiring further development were identified. Further development of themes was achieved by re-reading transcripts and using this information to direct subsequent interviews.

Emergent major theme clusters were detailed in a separated sheet, with theme headings together with any connections, clusters or sub-themes. The process continued until a full list of themes was produced. Finally, quotes were translated into English by a bilingual person, following the guidelines provided by Beaton and collaborators (2000).

8.3. Findings

This section presents the findings from lecturers' interviews. Data analysis of participants' perspectives about clinical reasoning, its role on musculoskeletal practice and how it is taught/ learned through undergraduate physiotherapy programmes identified themes and sub-themes that encompassed the research phenomena. The findings also clarified and extended the survey results reported in the previous chapter.

Five themes emerged that illuminate how musculoskeletal lecturers approached clinical reasoning in the musculoskeletal undergraduate curriculum in Portugal (see Table 8.2, next page). Regardless of the overlap between themes, there were sufficient differences to justify keeping them separate. The first theme represents participants' conceptual understanding of clinical reasoning. In this sense it embodies the context and boundaries from where subsequent themes evolved. When appropriate literature was included to provide a discussion framework on the themes that emerged from the data analysis.

Pseudonyms were assigned to each participant to preserve anonymity. Participant quotes were indented and presented in italics to highlight the participants' voices and demonstrate grounding for the findings in the data collected. Each quote is followed in brackets by the participant pseudonym composed of the quote number followed by the page of the interview from which the quote was obtained.

Table 8.2. Themes and sub-themes emerged from data analysis.

THEMES	Sub-Themes
Theme 1: The nature of clinical reasoning	1.1. A Problem Solving Process.
	1.2. Hypothetico-deductive reasoning is at the core of clinical reasoning process in musculoskeletal physiotherapy
	1.3. Clinical reasoning is a complex task influenced by contextual factors
Theme 2: The role of the patient in the clinical reasoning process	2.1. Patient's as a source of information
	2.2. Involving the patient in the decision making process
Theme 3: The role of Clinical reasoning in clinical practice	3.1. Clinical reasoning helps clinicians to be more efficient in clinical practice
	3.2. Clinical reasoning helps clinicians to become autonomous practitioners
Theme 4: Effective clinical reasoning involves the application of knowledge, cognitive skills and experience	4.1. The role of Knowledge
	4.2. Cognitive skills
	4.3. The role of Experience
Theme 5: Learning and developing clinical reasoning in undergraduate musculoskeletal physiotherapy programs	5.1. Teaching, learning and assessment strategies that help students to develop clinical reasoning abilities
	5.2. Role of the lecturer and clinical educator in the learning process.
	5.3. Barriers in developing clinical reasoning in undergraduate musculoskeletal physiotherapy programs

Participants in this study shared a common understanding about clinical reasoning and its role in clinical practice. They were all focused on using all his/her technical knowledge, skills and expertise to 'discover' the cause of the patient's complaints, or to treat and assure recuperation. In this sense participants highlighted diagnostic and procedural reasoning as the main foci of thinking or action in the tasks of clinical practice in physiotherapy (Jones *et al.*, 2002; Edwards *et al.*, 2004a).

Theme 1: The nature of clinical reasoning

Clinical reasoning was described as a cognitive process that underpins all the decision-making processes that occur during a clinical encounter. The process was characterised as clinician-centred and based on the patient's clinical problem(s). Participants described the reasoning process mainly as a hypothetic-deductive process. Only a few participants approached pattern recognition as an alternative type of reasoning. Despite acknowledgement

that clinical reasoning occurs in the different phases of a clinical encounter, participants emphasized their role on the diagnostic task.

Sub- Theme 1.1: A Problem Solving process

Participants characterized clinical reasoning as a clinicians' ability that facilitates all decision making processes in clinical practice, namely to identify patients' clinical problem(s), to establish treatment goals and to define the appropriate treatment plan to solve or minimize these problems. Participants reported that clinical reasoning is orientated towards specific goals. The first and most important is to identify the patient's main problem, which is then followed by establishing treatment goals and defining a treatment strategy. These goals are presented in a sequential but interrelated form. Once identified the main problem and its cause(s), treatment goals are generated automatically. Almeida describes this in the following quote.

Well then, what I am saying refers to a clinical context, right? And in that perspective, as I see it, the most important, not the most important but it actually is one of the most crucial factors, it is the identification of the patient's main problem, right? This is how it all begins ... the beginning will always be the identification of the service user's main problem

(Almeida 7, p. 2)

A key finding common to all participants was that clinical reasoning was described as the clinician's ability to use thinking, clinical skills and knowledge in order to acquire, evaluate and make sense of patient's data. The result is a statement about the problem and its probable cause: a diagnosis (Carnevali & Thomas, 1993). In this sense, the major function of clinical reasoning is to enhance clinician's understanding of patient's clinical problem, in order to provide the basis for sound health management (Higgs & Jones, 2000).

...Clinical reasoning, ... considers the ability the medical practitioner or the health professional has to, analyze the data and the information he obtains, whether it is through clinical history, through the subjective examination or the physical one, to identify the patient's problems and define the therapeutic goals/ objectives. In general terms, this is basically our clinical reasoning"

(Almeida 1, p. 1)

Participants highlighted the importance of finding a solution for a given problem, a diagnostic decision. An accurate diagnosis is fundamental to establish appropriate treatment goals and plan and to achieve successful treatment outcomes. Júlio referred that as,

I would say that clinical reasoning is important... it is a key aspect of our intervention. Without a good clinical reasoning you can't achieve the right diagnosis. Without a truthful diagnosis it would be impossible to implement the right intervention and as a consequence, be effective ... and that is critical. Without well formulated clinical reasoning patient intervention would never be appropriate

(Júlio 3, p. 1)

Although acknowledging the relevance of the diagnostic phase, participants reported that clinical reasoning underpinned all the clinical decisions they made. Clinical reasoning was related to teaching and advice, procedural decisions, prognosis and changes that happen in the treatment due to reassessment findings. In terms of their therapeutic approach and its impact on reasoning, a few participants supported the use of different clinical approaches in the assessment and treatment of a given clinical problem and incorporated these in clinical decision-making process.

Sub-theme 1.2. Hypothetico-deductive reasoning is at the core of the clinical reasoning process in musculoskeletal physiotherapy

Participants described clinical reasoning as a hypothesis driven process. Initial hypothesis guided subsequent data collection through subjective and physical examination. These initial hypotheses were subsequently verified through subjective questions and specific tests. Hypothesis generation and hypothesis testing continues until sufficient information is obtained to make a diagnostic decision (identification of the source and underlying cause of patient's disabilities) and a management decision. To establish a diagnosis, participants emphasized the complexity of the process in terms of the relationships between several different factors that could be at the origin of a given phenomena (e.g. pain). The goal is to find causal relations in order to establish a clinical diagnosis for the patient's complaints. Making a diagnostic decision implies the identification of one definitive hypothesis (the source and underlying cause of the patient' dysfunction). This is illustrated in the following quotes,

I would like to show you a practical example. Okay, so the same patient has a problem; he refers to the fact that he claudicates while he walks and that he cannot run. As we listen to the patient's history, we start to establish a set of hypotheses. Let us imagine he tells us he cannot perform dorsi flexion, a talo-crural problem, he cannot perform dorsi flexion totally and while he is walking he feels that his foot fully supported, that is, there is no impulsion. We have a limitation, perhaps on his joint one, but also a strength deficit; in case the patient gives us some more information, there may also be a stability problem. Well, I will test these hypotheses. When I test them, I immediately start analysing what is wrong with the situation from the mechanical viewpoint. Here I can immediately start preparing my therapeutic goals, ... I conclude he confirms one of the hypotheses... - At this point and in terms of intervention, I immediately start setting goals. I have to get a good impulsion on that foot; I have to get good propulsion on that segment.

(Almeida 14, p. 3)

...what one intends it is that they are able to catch all these items and to relate them; in order to find relationships between these items, so that they can confirm one definitive hypothesis, which helps them to formulate a diagnosis

(João 12, p. 2)

In some circumstances and according to the clinicians' experience, a systematic process of reasoning is no longer used for many problems, because past experience has enabled them to identify problems and treatments quickly. This type of reasoning (pattern recognition) is used when the clinician is in contact with a situation similar to others he/ she has experienced in the past. Ana uses the following words when described that process:

... if one specific situation is the kind of the "déjà vu" type, a situation that I have already seen, an experience that I have already experienced... my mode of thinking automatically follows a recognition pattern

(Ana 11, p. 3)

To Ana, the use of pattern recognition could lead to errors in reasoning. When compared to the hypothetic-deductive approach participants felt that is important to do every stage of the process instead of jumping from specific questions to conclusions. She states,

Sometimes this could be risky, because the clinician who already saw too many cases tends to quickly formulate a conclusion without exploring the other phases of reasoning. Therefore, ...he could jump important steps...

(Ana 12, p. 3)

Errors in clinical reasoning were frequently related with errors in cognition. One participant exemplified this as overemphasis on findings, which supported an existing hypothesis, rejection of findings, which did not support a favoured hypothesis, and incorrect interpretation related to inappropriately applied inductive and deductive logic (Elstein *et al.*, 1978; Jones, 1992). In Ana's words,

If I failed to arrive at a diagnosis, this could happen because I was using pattern recognition reasoning instead of a hypothetical-deductive one, right? That's why I think that sometimes too much experience, takes the people to jump steps that are risky to jump, for example... reach a conclusion on the basis of the information provided by the answer to one question; and I find that the process as the clinical reasoning guides or must guide the assessment of the patient, the clinician must not forget these phases

(Ana 34, p. 7)

Participants related the use of hypothetic-deductive reasoning or pattern recognition with experience. Experienced clinicians were considered to be more able to rely on pattern recognition when compared to novices. For instance, Almeida stated,

Well if we turn to more academic models we do not expect the recent graduate to use logical deductive hypotheses, whereas a much more experienced doctor will be able to use recognition patterns more often, right? Therefore his clinical reasoning will be more based on recognition patterns...

(Almeida 24, p. 6)

Sub.theme 1.3. Clinical reasoning is a complex task influenced by contextual factors

Physiotherapists operate in multiple and varied contexts of care. In these different contexts participants identified a multitude of contextual factors that impact on the effectiveness of the clinical reasoning process, including patient's characteristics and the type of clinical condition. Participants seemed to be aware of different contextual factors that could impact on their clinical reasoning processes. In general participants highlighted the aspects that in their opinion could limit or constraint clinical reasoning process. These factors were essentially related to the variability of working conditions in the different health care settings, physiotherapists operate. One of the participants pointed out,

So it (clinical reasoning) depends on the context, given its several dimensions: socio-economic ... cultural ... the patient's and often the physiotherapist's and where he ... I mean the geographical, physical and even political contexts. So, all these, even though different in weight, will condition the whole ... or will be involved in the reasoning process.

(Rodolfo 14, p. 3)

Working practice environments may have different missions or goals, and this could change the focus of clinical reasoning. Rodolfo gave us an example of differences that happen in the philosophy of care between a hospital and a health centre where the main focus is to promote healthy behaviours.

Let us suppose, for instance, as I said previously, someone ... a physiotherapist works with musculoskeletal conditions. But he is dealing with acute musculoskeletal conditions in the hospital. The way he handles the problem, that is, the situation because it is not the problem but the situation that is the patient's problem, the patient, the family ... it's very different if he is working at a health care centre whose goal ... whose main characteristics is health promotion ...

(Rodolfo 20, p. 5)

Theme 2. The role of the patient in the clinical reasoning process

Patients bring to the situation their own perceptions, needs and experiences and these features influence the nature of the problem. After discovering the source of patient's symptoms or disabilities and potential contributing factors (a process that belongs to the clinician), clinicians reported the importance of involving patients in the decisions concerning the definition of therapeutic goals and treatment plan.

The ways in which health professionals relate to patients is likely to influence the degree of patients' involvement in their care. When the patient's clinical condition is understood, participants highlighted the importance of involving patient's expectations and goals in the therapeutic process. However, when asked to describe how they negotiate with patients, there appeared to be little incorporation of patient perspectives into their needs assessment and treatment plans. Although participants reported that they would ask patients how they felt and what they thought they needed, participants would use clinical findings to determine which treatment approach was appropriate and then communicate that to the patient.

When a patient values a given aspect of their problem, that is not important according to my perspective, it's easiest to modify his perspective of the problem, for example by providing appropriate information about the problem, if I know what he thinks about his condition

(**Jorge** 53, p. 13)

According to participants' statements patient involvement also relates to adapting the therapeutic goals and treatment plan to the individual characteristics of each patient. Patients' needs were equated with a need to bring abnormal medical symptoms back as close to normal as possible. This meant listen to the patient's needs and expectations, considering his previous degree of functional activity and social participation. Maria Sofia, for example stated that after identifying the patient's problems (meaning what is not normal in terms of structure and functions) she explores the patient's perspective about the impact of the problem on the patient level of activity and social participation. For Maria Sofia one of the goals of the clinical reasoning process is to identify the treatment strategy that better fits the patient's lifestyle and the degree to which he participates in society.

... in my opinion clinical reasoning should always be performed in a way that integrates the patient into his family, his profession, or his participation in society, Therefore, when we think about the best solution to provide, or when we think about the way we plan our intervention, or about the patient's expectations, this has to be done considering their different perspectives. So we cannot rely only on structures and functions but need to integrate them to the patient in the context ...

(**Maria Sofia** 16, p. 3)

In general, participants claimed that it was important to listen to patients and to assist them in taking more responsibility and playing an active part in their care. However, taking responsibility seemed to be more related to the accomplishment of clinicians goals than with becoming actively involved in the decision making process. For example Jorge stated that patients needed to participate but when he talked about his practice it became evident that he did not foster patient participation, but only adherence to the clinician's treatment plan.

Well, sometimes, and this is something that I use to say to my students, we need to establish a therapeutic contract, something like a therapeutic alliance with the patient where I commit myself to make specific things that will influence the improvement of its health condition, but at the same time the patient will assume the responsibility of a set of tasks that are also important and will contribute for the success of both. This is the perspective that we give in terms of clinical reasoning ...

(**Jorge** 5, p. 2)

Trede (2006) called attention to the difference between patient participation as a result of equal negotiations compared with patient participation arising from imposition based on the therapist's technical reasoning. According to the author the difference lies in the interest and motivation that guides communication between the therapist and patient. Communication can be influenced by how the therapist's interests dominate. In this situation, patients may cooperate because they are conditioned into complying unconditionally with professional advice.

Theme 3. The role of Clinical reasoning in clinical practice

Participants described clinical reasoning as a key competence in musculoskeletal physiotherapy programmes. According to the perspective illustrated in theme 1, clinical reasoning ability is mostly concerned with assessing and diagnosing clinical problems and then establishing appropriate treatment plans. This ability to diagnosis and establish a treatment plan is considered fundamental in achieving effective and autonomous practice and also in improving the status of the profession through moving from a traditional view of physiotherapy focused on the application of treatment techniques towards a practice underpinned by clinical reasoning.

Sub.Theme 3.1. Clinical reasoning helps clinicians to be more efficient in clinical practice.

The use of clinical reasoning promotes efficient and effective practice. Speed, efficiency, and accuracy are important characteristics for the clinicians. Through clinical reasoning clinicians are able to achieve fast and less expensive results. Maria Sofia, for example stated that clinical reasoning, *“is a capacity that physiotherapists have to solve a patient's problem in an efficient and fast manner (Maria Sofia 23, p. 4).* She added,

I have to manage all the information in such a way that I'll be able to solve the patient' problem at that moment and not in a month later. So it is something that helps me to collect data, I have to think, and then I have to find a way to solve that problem
(**Maria Sofia** 11, p. 2)

For the participants in this study finding the right diagnosis was not enough. The practice context of many physiotherapists compelled them to achieve a diagnosis in a useful period of time. In this sense speed and accuracy were intermingled criteria to judge clinical reasoning ability. João expressed this in the following words,

Good clinical reasoning will be the one that leads to an accurate diagnosis, in a useful time. Physiotherapists don't have too much time to do it, so it's important to make it fast and accurate" (João, 23, p. 4)

Good clinical reasoning was also associated with the clinician's ability to solve the patient's clinical problem in an acceptable period of time. Teresa used the following words to describe it:

How do I define a good reasoning? Well, when it is...when it is efficient... When you have a successful clinical intervention. Therefore, when good plans are made and I solve the problems of my patient and if at the same time I can do it in less time than expected, well I find that... good clinical reasoning has occurred

(Teresa 25, p. 4)

Sub.Theme 3.2. Clinical reasoning helps clinicians to become autonomous practitioners.

Participants related clinical reasoning to professional autonomy. From the participants' perspective, professional autonomy means the ability to think about clinical actions that allow the clinicians to reach conclusions, i.e. to identify patients' problems, to establish treatment goals and to define a treatment plan. In this sense, professional autonomy is achieved through clinical reasoning. Almeida for example described this in the following words,

Logically, musculoskeletal interventions are utterly important if you think of ...how shall I put it, in terms of the physiotherapist's autonomy, that is, if the physiotherapist wants to be an autonomous professional in the health field area, he will have to dominate...when one mentions dominate, one means to have the clinical reasoning skills required to reach conclusions, as I was saying, to be able to identify problems and define therapeutic goals and properly plan his intervention. This is basically what we think.

(Almeida 2, p. 1)

Clinical reasoning was seen as being important since physiotherapists are no longer technicians carrying out a set of predetermined treatments for specific conditions.

I cannot imagine the (clinical) practice of an autonomous professional unless it is based upon clinical reasoning. There is no such thing. Whether this clinical reasoning is more elaborate and complex, or simpler, I cannot imagine for it has been years since I have faced physiotherapy, that is, since physiotherapy has ceased being a mere application of techniques.

(Almeida, 19, p. 5)

The use of clinical reasoning was thought to promote autonomous practice, clinical effectiveness and worked towards improving professional status of the profession. In this sense clinical reasoning was viewed as tool, which helped the profession to achieve a higher status.

...because it (clinical reasoning) tries to convey an image, let us say, of the autonomy of the profession; autonomy of the physiotherapist. This autonomy will have to be achieved through the ability that the clinician shows to be able to find solutions within the field of physiotherapy; solutions which differ from other areas of intervention; solutions that allow them to provide a contribution for the solution of the patient's problems.

(Manuel 51, p. 9)

Strongly associated with the notion of autonomy previously stated was the differentiation between qualified and unqualified physiotherapy practice. Practicing qualified physiotherapy was related to the clinician's possibility of using clinical reasoning to make a clinical diagnosis and establish a treatment plan. In contrast clinicians that confined their practice to the application of techniques were disrespected and considered unqualified. Almeida described this idea in the following manner,

What I mean is we all know there are colleagues – I guess we all know this or have heard of – who only apply therapeutic modalities without basing themselves on this clinical reasoning process. The only modality for them is to have the patient complaining and only prescribe for them the usual therapeutic modalities. Everything is led like a standard treatment. This sort of practice is not a reflective one. It is not based upon a clinical reasoning model or if so then it is a very weak one, in my opinion. As I see it, it will be a very weak model...

(Almeida 28, p. 6)

Theme 4: Effective clinical reasoning involves the application of knowledge, cognitive skills and experience

In the previous chapter the curricula of undergraduate physiotherapy courses were described as traditional curricula composed by basic sciences, then applied sciences followed by clinical education. This tradition tended to separate knowledge from application and created problems for students in integrating their knowledge. Problems with integration led to difficulties in making decisions about patient's problems when students graduated and became therapists (Liu *et al.*, 2000).

Traditional approaches to teaching and developing clinical reasoning in students have been based on the assumption that clinical reasoning is a skill, separate from content knowledge (Boshuizen & Schmidt, 2000). Lecturers and students when sharing their perspectives about how to learn and develop clinical reasoning in undergraduate musculoskeletal programs have verbalized this assumption. In fact there was a common perspective among lecturers of a sequence of stages in enhancing clinical reasoning. A deep theoretical knowledge and appropriate cognitive skills (data collection and data analysis) were considered pre-requisites to start applying clinical reasoning. Clinical reasoning should be learned first at school under the guidance of lecturers, and then practised in real practical environments (clinical placements).

Sub-theme 4.1. The role of Knowledge

To participants, effective clinical reasoning was strongly influenced by a deep sound knowledge, appropriate data collection and data analysis skills and clinician's experience. Propositional knowledge (theoretical) and cognitive skills were referred to as prerequisites to effective clinical reasoning. Then, clinical experience, in a sense of accumulation of a repertoire of cases, jointly with a reflective attitude towards the clinical reasoning process, was considered key elements in the development of effective clinical reasoning.

Solid knowledge, especially about anatomy, physiology, and particularly pathophysiology seemed to be a key condition to achieve and develop an effective clinical reasoning. The clinician's ability to formulate several different hypotheses was seen as closely related to the

clinician' capacity of mastering his knowledge. Participants reported that this knowledge helps the clinician to identify and analyse a clinical problem.

It is a fact there is a set of requisites that are necessary to have good clinical reasoning. By requisites I mean solid knowledge in terms of musculoskeletal, solid or reasonable knowledge in anatomy, mainly in the area of functional anatomy; Pathology knowledge is also important, particularly pathophysiology; assessment skills, that is interview skills as well as the skills or the physical examination skills. To sum up it is vital to have good background knowledge in order to gather information and to articulate the information gathered with the different pathological conditions, so to speak...

(Almeida 30, p. 7)

...Good clinical reasoning will depend on the clinicians' ability to use previous knowledge in order to establish several different hypotheses, right? So, when I see a student that is able to justify the condition on the basis of several different hypotheses, I can see the range of knowledge he/ she has...

(João 28, p. 5)

In developing clinical reasoning, participants strongly emphasised the need for students to master the knowledge base and then establish their competence in translating their knowledge into practice. Participants reported that the acquisition of a deep sound knowledge of normal/ abnormal (anatomy, physiology, pathophysiology, etc) is essential for students to be able to recognize what is the normal and what is abnormal. According to participants' views knowing about "normal" in terms of body structures and functions would help clinicians to identify the underlying cause of patient's complaints and apply appropriate treatment corrections. This was demonstrated by the following quote.

First of all, students must know what is a normal structure and what is a normal function... without knowing what is the normal he/ she cannot recognize what is altered. Basically, he/ she needs a deep theoretical knowledge that allows him/ her to recognize what exists in our body as normal structures... this is basic. If he/she doesn't know anatomy or physiology, probably he/ she doesn't have any possibility to go further... without understanding that he/ she cannot identify later what is modified

(Maria Sofia 28, p. 5)

It was thought that basic and clinical subjects provide the opportunity for students to apply what they had learnt in terms of theories, clinical and technical knowledge and professional practices for actual case management. João and Júlio reinforced this idea when they said,

Students should know the normal and later the pathology. They should know the aetiology that originates the appearance of disorders. Therefore, here (at school) when developing clinical reasoning ability we try to ensure that our students are able to integrate knowledge from different course units, meaning anatomy, physiology, pathology.

(**João** 48, p. 9)

...As I stated before, the knowledge of anatomy, physiology, physiopathology, and knowledge of how to conduct a patient assessment is fundamental for good clinical reasoning. I find that they have that to be equipped with this type of knowledge, lets say theoretical knowledge. And then the practical aspects...they have to acquire that to be able to make a good clinical reasoning

(**Júlio** 23, p. 6)

Looking for participants' description of how they integrated these two forms of knowledge (propositional and non-propositional knowledge) to decide on therapeutic action it became apparent that they favoured being guided by propositional knowledge.

Sub-theme 4.2. Cognitive skills

Besides knowledge, cognitive or thinking skills such as analysis, synthesis or evaluation of data collected, were also considered fundamental to achieve and perform effective clinical reasoning. This involves the ability to make relevant questions and to synthesize data provided by patients. One lecturer summed this up as,

...We have already identified good ability to gather data, not only, let us say, the subjective ones, but also and more importantly, the objective ones, achieved by means of the physical examination. These are the requisites. I mean, it is an important background. Afterwards, and speaking of more general skills for clinical reasoning, it is necessary to generally develop, let us say, the physiotherapy process and the analysis, particularly the analysis of that information so as to create or set the hypotheses. I do not know what to call this skill but this is actually what we generally call at school clinical reasoning skills; that is, place students before a given clinical context, fictional or real, and help them develop their reasoning so as to raise a set of hypotheses, as I have just mentioned.

(**Almeida** 34, p. 8)

Sub-theme 4.3. The role of Experience

According to participants, experience plays a significant role in effective clinical reasoning. Experience is related with exposure to different clinical situations. This experience results in knowledge acquisition that can be used in future clinical situations.

But there is another important issue here: the fact that the professional undergoes the experience. A recent graduate can already have theoretically approached a set of situations. Nevertheless there is no doubt that, unless he tries them ... and we know that during his internship, let us say, during his graduation as a physiotherapist, let us put it this way, no matter how hard a teaching institution intends to, it cannot have every student passing through every condition; neither can they do it enough times until the person goes through a learning curve that allows him to be more familiar with the situations or feel more confident about them.

(Almeida 26, p. 6)

Knowledge and experience (in terms of quantity) was considered linked with the clinicians' ability to make relevant inferences.

To achieve good clinical reasoning, the knowledge base the clinician has is extremely important. More knowledge or experience means more capacity to observe and memorize, more capacity to make inferences about the signs and symptoms, or about the underlying pathology...

(Ana 16, p. 3)

Although acknowledging the value of the number of years of clinical experience in a given area of practice, participants agreed that experience without reflection did not provide any advantage in terms of performing effective clinical reasoning. Reflective experience is associated with patient exposure and clinical reasoning training (in a sense of repetition). Thinking about the clinical actions provided to a given patient (diagnostic and procedural) improves the chance of being effective.

...There is an important issue regarding the more experienced doctor. It is the fact that he had had more opportunities to find the different situations in a clinical context, right? Of course the possibility of facing clinical conditions more often only counts if it is a reflective experience. In this case maybe it is the same situation. In fact, it is best to have an accurate clinical reasoning process from a recent graduate in case he as a more reflective clinical reasoning. ...Of course experience counts but it ought to be a reflective experience. When I say experience is important I mean the doctor who has worked longer and has faced clinical situations more often. This is different from

an experienced doctor – there – that is, it is not only about recognition patterns, which are undoubtedly essential, and it is not. Mainly, not only in terms of time-consuming but also in terms of accuracy or accurate decisions. It also helps but for me experience is more important, let us call it mind training, that is, it is not the reasoning, it is the training of all clinical practice. The longer he is exposed to that context, the more practice he will have and this is a certainty in life

(Almeida 27, p. 6)

Theme 5: Learning and developing clinical reasoning in undergraduate musculoskeletal physiotherapy programs

When talking about developing clinical reasoning, participants strongly emphasised the need for students to master the knowledge base and then establishing their competence in translating knowledge into practice. Participants reported that the acquisition of a deep sound knowledge of normal/ abnormal (anatomy, physiology, physiopathology, etc) is essential for students' ability to recognize what is the normal and what is abnormal. Basic and clinical subjects provide the opportunity for students to apply what they have learned in terms of theories, clinical and technical knowledge and professional practices in actual case management. Participants recognized the use of clinical cases (paper or simulated patients) as a key strategy to improve clinical reasoning skills in students. This problem based learning strategy is used to introduce the formulation and testing of clinical hypotheses into the musculoskeletal curriculum.

Sub-theme 5.1. Teaching, learning and assessment strategies to help students develop clinical reasoning abilities

All participants emphasised the use of clinical cases as a main strategy to help students to integrate knowledge, to apply this knowledge to concrete clinical conditions and to help students improve their clinical reasoning abilities. On the question of how clinical reasoning is facilitated, several lecturers suggested that it was essential to follow up theory that had been done in class, with a clinical example (usually a paper case) that filled that subject. In this way students can immediately see how to apply theory in practice.

...another strategy that we have is for example the simulated cases, and therefore, to give cases, that all of we already had, and try to transmit all this information to the students and to perceive how they think, how do they arrive at a conclusion, and how do they develop this process of reasoning

(Maria Sofia 41, p. 7)

It was clear that clinical scenarios were used to stimulate student' reflection about their clinical actions, meaning for example, if there was another hypothesis that should have been made or if the clinical tests performed were the most appropriated to test a specific hypothesis.

I refer specifically to the development of case studies. This is an essential tool for clinical reasoning. When we mention case studies we do not mean real situations. In terms of clinical reasoning, I think it is helpful and it is a crucial tool for it compels you to reflect. In other words, it is a moment when the student actually feels he is thinking about everything he has learned over three or four years.

(Almeida 37, p. 9)

We explore hypothetical clinical cases giving the students preliminary information about a case that they will have to complete later. So he/she needs to develop his/ her reasoning, to establish relations between different aspects of the problem, in order to arrive at the identification of the patient's main problem/ diagnosis and from that to a prognosis and treatment plan.

(João 49, p. 9)

Lecturers interviewed felt that clinical reasoning should be developed by demonstrations and facilitation of learning using paper cases based on real patients that the lecturers had already treated. This is illustrated by the following quote.

One thing that I find really important is to bring real cases to my classes. I find that to create a fictitious situation doesn't work. Therefore, all the cases I use are real situations. Situations that had effectively happened and I bring them to systematize the theory that is given in that moment. Therefore, with this kind of exercises... I make open questions related for example with the hypotheses about the origin of patient' symptoms. And this happen during the course unit...

(Ana 52, p. 13)

Participants recognized the limitations of these clinical subjects in that the students learn the knowledge on paper and by case discussion. They do not have direct contact with the patients for intervention implementation and interactive evaluation of its outcome. Because of the lack of feedback mechanisms, students tended to develop a procedural reasoning style rather than the interactive or conditional reasoning styles, which demand an input from and interaction with patients (Liu *et al.*, 2000).

A third level of improving clinical reasoning skills in undergraduate students were thought to relate to practice with real patients. This was considered the best learning strategy to systematize and develop the clinical reasoning process. Participants acknowledged the importance of this reasoning and practice being supervised.

...there is another crucial aspect, which is to allow the student to train in all the skills I have previously mentioned, now in a real clinical situation - and let us say, under tutorage, that is, supervised by a clinical educator or a professor, who actually is a clinical educator. This is crucial.

Deep down it is about promoting the most practical and clinical skills in a real environment, not in a real context with service users, no. It is done under tutorage and supervised by a clinical educator...

(Almeida 35, p. 9)

Practice with real patients was considered the best strategy to integrate knowledge into practice and to assess the appropriateness of students' reasoning. Maria Sofia expressed this in the following words,

There are things that are only possible later on, when the students are doing their clinical placements, right? So it is during the clinical practice with a patient that we perceived what has been done in the classroom context, what was assimilated and used in real clinical contexts.

(Maria Sofia 46, p. 8)

In summary, participants gave different roles to learning in school and practical contexts. In a classroom environment, students should first achieve theoretical and practical knowledge, and then learn how to reason; after that, they are ready to go to practical contexts (clinical placements) with the main purpose of integrating the knowledge and cognitive skills they have learned.

...in my opinion, classroom context is helpful to develop the part of the reasoning itself, the way they make a bridge between the different knowledge contents that they acquire throughout the years in the diverse curricular units, therefore they try to establish connection between these different knowledge contents

(Maria Sofia 58, p. 10)

Asking the students to explain their clinical reasoning was one of the assessment strategies used. Some lecturers felt that appropriate questioning and discussion uncovered clinical reasoning. When asking students to justify certain actions lecturers were able to assess if students reasoning was appropriated to a given clinical condition. This was demonstrated by the following quotes,

Well, during the contact with our students, during a lesson, and when we are explaining a condition, obviously there, and soon we start to understand what it is to be absorbed, let us say, by the students in terms of clinical reasoning

(**Júlio** 34, p. 8)

The assessment of student's clinical reasoning is a real problem. The assessment strategies we use are inappropriate. We made an oral examination where the teacher expects a given type of answer. We assume that they would be successful if they arrive at the point where we arrive. But we don't have any guarantee that the reasoning was developed in the right direction, or that the reasoning process, the mental process, has been well conducted.

(**João** 54, p. 10)

Sub-theme 5.2. The role of the lecturer and clinical educator in the learning process

Lecturers and clinical educators are given greater responsibility in teaching clinical reasoning skills to their students. They are the source of knowledge, skills, values, and role models for expertise. According to participants' testimonies learning how to think in clinical situations is a complex task that needs guidance from people who has clinical experience and knows the relevant (right) questions to make.

Sometimes, the lecturer who is in charge of a specific subject, on the basis of clinical cases that he or she had in the past, simulated a patient scenario. We know what we have done to that patient, we know what was the patient's problem, so we start to ask the students about their impressions of the clinical case and then we call attention to given features, the features that we think that are really important to facilitate a clinical reasoning, and to find a treatment plan...

(**Júlio** 26, p. 6)

Some participants felt that the role of the lecturer is to "call attention" to specific aspects of a given case in order to help the student to interpret clinical features of the patient' condition and improve their clinical reasoning skills.

In the musculoskeletal area we give more attention to the assessment and to the interpretation of the findings that are available, so we try to call attention for specific aspects of a given clinical situation, aspects that the students should consider in their reasoning. So we are not concerned with deepen any specific area of knowledge but we are addressing general abilities, general skills...in order that the students can interpret and find a good clinical reasoning

(Júlio 24, p. 6)

In fact, making clinical reasoning explicit was seen as an important learning opportunity for students.

...I think clinical educators do not explicit the sufficient its clinical reasoning to the students... this could happen because they are not used to, because they feel some kind of fragility in their reasoning process or simply because they have no time to explain their reasoning to students...

(Rodolfo 79, p. 15)

Sub-theme 5.3. Barriers to developing clinical reasoning ability in undergraduate courses in Portugal

Participants reported that curricular structure was sometimes a barrier to promote clinical reasoning in undergraduate physiotherapy programmes. Reasons for this related to the curriculum structure and organization and the traditional strategies adopted to improve students' learning.

We are looking for other ways of organizing the course units that facilitate the integration of knowledge... In fact, the actual separation between course units such as, anatomy or physiology and the others course units, or other aspects that are integrated in clinical conditions, will be organized in a more generic form. They will be organized around major clinical areas such as musculoskeletal conditions. So, we are trying to organize, in a great curricular unit, all the data that is necessary for the integration of knowledge in this area, including appropriate anatomy and physiology...

(João 59, p. 11)

The traditional approach involves the use of traditional teaching/ learning methods based on expositive classes and demonstrative practices, which constrained student centred learning

practice. Manuel recognizes the dominance of these traditional teaching/ learning methods in his course and the need for changing that in the near future.

... eventually there are several other strategies ..., that are less used in our course and that they could be more used. We could eventually bet a little more on a certain type of strategies.... essentially more active strategies on the part of the student...

(Manuel 36, p. 6)

One the main difficulties reported by lecturers in developing clinical reasoning competency related to the type of reasoning and practice founded in some clinical placements.

...One of the major difficulties we still have with our clinical placements is to find places where students could apply what is transmitted here at school. And with the great disadvantage that what happens to the student in his period of training, is more easily integrated compared to what is given in the classroom...

(Manuel 42, p. 7)

I wouldn't say that clinical placement models of reasoning and practice are completely the opposite when compared with what we teach in the course. Very often, we find clinical placements where clinical reasoning almost does not exist

(Manuel 44, p. 8)

Manuel justified this lack of clinical reasoning in terms of

The traditional model of practice still exists...., we have many clinical placements where clinical educators insist that our students practise according to the local model. This means what we all know - "so you have to apply this for 20 sessions....". The students are almost obliged to comply with something that is written (medical prescription). So I think, these people are not concerned or motivated to reason by themselves

(Manuel 45. P. 9)

Fernanda considered that the most part of the problem has origin on clinical educators' themselves. To Fernanda some of the clinical educators related with the course in her school do not have appropriate forms of work and do not want any change in their practices.

... In my opinion there are many colleagues who still work in the traditional model of practice, meaning on the basis of medical prescription. This could happen for several different reasons. Could be because they are obliged to do so by the medical doctor (physiatrist), but could also happen because some of them feel comfortable with this model of practice

(**Fernanda** 45, p. 9)

Jorge for example acknowledged that different models of reasoning and practice were widespread in clinical placements.

I have to say that our clinical educators use a pure clinical reasoning, which means that they think and use a more biomedical perspective. So I think there is a gap between what we teach at school and what our students face in their clinical placements. After their clinical placements and when our students return to school they complain about that. They usually say that they are prepared for a reality that doesn't exist in practice settings, especially in hospitals. In private practice the things are different, they are more autonomous or they feel more freedom to be more autonomous.

(**Jorge** 80, p.19)

When asking about solutions for the differences felt between the schools understanding of practice and reasoning and the physiotherapy “real world”, lecturers suggested two main strategies: One was to have clinical placements in schools. Others wished to promote student competence that helped to prevent them from being entrenched with traditional models of practice. José, for example, support the implementation of clinical services at school by saying,

I think it is fundamental to have clinical practice in our schools. If we have a clinic here the students will have the possibility to see how clinical problems are solved, how clinical decisions are made, or how to define a clinical reasoning. When we use a paper simulation case it helps but it is not reality, you know.

(**José** 67, p. 13)

In a different way, Manuel supported the idea of developing of a strong critical attitude among students towards these traditional models of reasoning and practice. This was illustrated by the following quote:

A critical attitude will be more in the sense of the individual not taking for granted everything what has been said or transmitted. So, he/ she will look for himself for an interpretation for what is transmitted, and at the same time with the capacity to find new things that he can connect to what was transmitted, in order to develop himself (Manuel 38, p. 6)

8.4. Summary of Key findings

This chapter has presented the findings from fourteen lecturers' interviews. These have been organized around themes and sub-themes that describe the current perspective about clinical reasoning, its role on musculoskeletal practice and how it is learned through undergraduate physiotherapy programmes. The following summarise the key findings related to the participants' reports.

- The current perspective of clinical reasoning among the participants in this study emphasised clinical reasoning as a tool that helps clinicians to make effective and efficient diagnostic and procedural decisions. In this respect, its role was principally scientific technical oriented, and instrumental.
- Clinical reasoning is also fundamental to achieve an autonomous practice. Autonomy is closely related to the idea of moving away from a medical referral model, to become first contact practitioners. The possibility to assess, diagnosis and establish treatment plans are key aspects to differentiate the profession and improve its status.
- Clinical reasoning is a cognitive process that happens in clinicians' minds. Despite being a continuous process occurring during all phases of an encounter there is a strong emphasis in the diagnostic phase. The main role for patients in the clinical reasoning process is the provision of accurate information.
- Diagnostic and procedural reasoning are the most salient strategies reported by participants in the study. No references to clinical reasoning strategies other than diagnostic and procedural reasoning were reported. Strategies such as narrative, collaborative or ethical reasoning were absent from participants' reports.

- Clinician's attributes, contextual factors, patient's characteristics and clinical problem were the major factors reported as having impact on clinical reasoning process. The majority of contextual factors were presented as constrainers to implement effective clinical reasoning. Findings suggested that participants tend to externalise their responsibility in the process.
- The major factors reported as having influence on clinical reasoning effectiveness were knowledge, cognitive skills and experience. Propositional knowledge seemed to be favoured when compared with professional craft knowledge and personal knowledge (non-propositional knowledge). References to personal knowledge were nonexistent in participants' reports. Findings suggest that participants tended to marginalise their personal knowledge focusing on developing their propositional and procedural knowledge.

Chapter 9

An Exploration of Clinical Reasoning in Portuguese Undergraduate Physiotherapy Programmes through Student' focus Groups

9.1. Introduction

Study 4 explored the near graduate⁵¹ students' perspectives about which clinical reasoning strategies were most emphasised with relation to physiotherapy interventions in musculoskeletal conditions. This stage involved four semi-structured focus group interviews in four different schools with groups of students. Collation and analysis of qualitative data in this and the previous study was undertaken to seek progressive insights into lecturers and students' understanding of clinical reasoning, their role in clinical practice and how it is promoted in their curriculum.

In this chapter, the research methods and findings of study 4 are presented. Study 4 relates with the second and forth question of this research: *“What kind of approaches to reasoning and practice are being promoted in undergraduate musculoskeletal courses and how is this achieved?”*; and *“What do Portuguese physiotherapy students understand by the concept of clinical reasoning in musculoskeletal physiotherapy?”*. The objective was to see whether the physiotherapy courses were promoting hypothetico- deductive and/ or narrative approaches to reasoning and practice in relation to musculoskeletal conditions.

The first section of this chapter includes information related with participants and their recruitment, ethical issues, the study setting, and the data collection and analysis procedures. A final section presents and discusses the findings from students focus group' interviews. Five themes representing the perspectives about clinical reasoning, its role on musculoskeletal practice and how it is learned through undergraduate musculoskeletal physiotherapy programmes have emerged from the texts produced by the participants. Each theme is presented and contextualized with participants' own words.

⁵¹ A student that is close to the end of his/ her course.

9.2. Research Methods

9.2.1. Participants

A purposive sample of four physiotherapy courses was selected to participate in study 4. These were selected against the following criteria: the diversity of institutions that offer undergraduate physiotherapy degrees (private versus public); and its educational experience (number of years since the first edition of the degree was implemented).

9.2.2. Ethical Approval

The protocol for the study was submitted to and approved by the Faculty of Health and Social Sciences Ethics and Governance Panel of the University of Brighton and all standard procedures were taken to protect participants' confidentiality and privacy and to prevent any potential risks. Permission to perform the study as well as the pilot study was obtained from the course directors of the schools involved.

All the participants were informed about the study, and written informed consent was obtained for the focus groups in all cases (Appendices 27 and 28; Appendices 31 and 32). All participants were provided with information sheets detailing the aims of the study and procedures designed to protect identities and maintain confidentiality. These information sheets were provided to the participants by email, prior to their participation in the investigation. In the information sheets contacts were provided to all participants to give them the opportunity to ask questions about the research. The participants understood that participation was voluntary and that they had the freedom to withdraw from the study any time.

9.2.3. Development of focus group topic guide

Focus group discussion for each course were arranged to explore students' perspective about clinical reasoning and clinical practice in musculoskeletal conditions. The development of the focus group process followed the guidelines proposed by Kreuger (1997) and was arranged in four phases:

- Phase 1 was concerned with developing questions and organising logistics. An interview guide was developed to facilitate brainstorming and an in-depth exploration

of the themes and ideas related to clinical reasoning approach to MPT' practice (Topic guide-Table 9.1).

- Phase 2 was concerned with planning participants' recruitment involving the determination of the groups' size and the description of the recruitment process. Procedures for conducting the focus group were also developed.
- Phase 3 and 4 were concerned with training the moderator and research assistants. Two pilot focus group sessions were planned and are described below.

The translation of the focus group topic guide followed the same procedures described for the questionnaire (page 226, chapter 7). Following a discussion between the researcher and an interpreter, a Portuguese version of the topic guide was achieved.

Table 9.1. Focus Group topic guide

Focus Group Topic Guide/

- What does the term Clinical Reasoning mean to you?
 - What is involved in Clinical Reasoning?
 - When thinking about clinical practice with musculoskeletal patients what do you think about?
- How do you see the role of Clinical Reasoning in musculoskeletal physiotherapy practice?
- When you are with patients how do you personally approach Clinical Reasoning?
 - Could you please give examples?
- How do you recognize good Clinical Reasoning?
- What has facilitated your understanding of Clinical Reasoning?
- What part does Clinical Reasoning play in a treatment episode of a patient with Musculoskeletal problems?
- How does Clinical Reasoning inform the overall patient management
- Is there anything further that you would like to add?

9.2.4. Pilot focus group

As part of the researcher's preparation for conducting a focus group session, questions included in the topic guide were tested and the thematic analysis component of the study was prepared. Two pilot focus groups were conducted with the main purpose of assessing the topic guide and the moderator skills.

Participants were recruited to take part in the pilot focus group interview from a pool of third and fourth year students from the 'Escola Superior de Saúde do Instituto Politécnico de Setúbal'. All students had completed at least one period of clinical education in musculoskeletal conditions, and twelve volunteered to take part in this pilot giving individual permission for recording the discussions (six students in each focus group).

Focus group sessions were held in the school in a quiet, private room for approximately 90 minutes each. The researcher moderated the focus group sessions. A research assistant was recruited to help the moderator with the management of the recording equipment, setting up the room and taking notes throughout the discussion. The sessions started with an explanation about the focus group goals, rules and process. Confidentiality was assured and participants were invited to choose a pseudonym. The focus group interviews were recorded using both video and audiotape with external microphones. The video was used with the aim of providing feedback to the researcher on his role and competences as a moderator.

Finally the researcher assistant was asked to provide feedback to the researcher on his performance as moderator (facilitating, recording and checking the group interview). This was done following the rules proposed by Krueger (1994, p. 124-5) through which key competences and attributes of a focus group moderator were defined. Following the pilot focus minor amendments were introduced to the topic guide.

9.2.5. Data Collection

In each course/school, the course director invited the near graduate students to participate in the study. The invitation letter was sent by email and included the explanation of the study's goals, its nature, the procedures involved and information about the voluntary nature of

participation. Students who agreed to participate sent an email to the course director confirming their willingness to participate in the study.

After this initial recruitment procedure, each course director compiled a list of students who have accepted to participate in the focus groups and delivered this information to the researcher. This list was anonymized and only the assigned student number was known. Participants were then randomly selected from this pool of volunteer students and formally invited by email.

Once participant's agreement was obtained, information concerning the nature and procedures involved in the study and a consent form was sent by email to all participants from each of the four schools (see appendix 31 and 32), and a convenient date and time was established to run each focus group. Participants were also informed that the researcher would question the group about their perspectives on clinical reasoning and how the course promotes it, and that this would be audio and videotaped. They were also informed that a research assistant would be present and take notes to assist in data analysis. Two days before the scheduled date for each focus group, a reminder letter was sent by email to each participant, with the scheduled date and time, and the researcher's contact number.

Focus groups were conducted in the four schools selected to participate in the study. The focus group sessions were held at the school location in a quiet, private room, and refreshments were provided. Prior to the session participants signed a consent form covering information about benefits and risks, procedures to maintain anonymity and confidentiality, guarantee of freedom to withdraw, and have chosen a fictional name to protect their identities. The focus group interviews were recorded using both video and audiotape with external microphones. Two recording devices were used for audio recording to prevent equipment failure or loss data. Video records were used to have a perspective of the seating arrangements and to clarify similar voices. Prior to each focus group session the recording apparatus were prepared and the availability of batteries confirmed.

The chairs were placed in a circle. The facilitator and the researcher assistant sat in places where non-verbal communication with each other was possible, and they avoided sitting side-by-side to prevent any impression of centralization of power.

The sessions started with an explanation about the focus group goals, rules and process. Confidentiality was reassured and participants were reminded of the chosen pseudonym. In addition to the topic guide presented in table 9.1., focus group discussions included participants introductions (e.g., settings where their clinical placement on MPT took place), an introductory question related to participants experience (e.g. a clinical situation), transition questions that helped the group to oversee the topic in a broader perspective and how opinions on various aspects might be diverse, and ending questions which prompted the participants to summarize their positions, and seek any information that may have been missed (Krueger, 1994).

During the focus group sessions a range of questioning strategies were used to seek essential information and to manage the process, allowing the moderator to subtly influence the group process without taking it over. An example was the use of probe questions. Probes were used to prompt and deepen discussions between the participants, for example, “could you please give an example?”, “I’m curious about what the rest of you have to say about that”, “Could you please explain further”, or leading questions that helped the groups delve deeper into a topic (Why? Or what makes you say that?).

One research assistant with experience in qualitative methods took notes during and immediately following the sessions, covering areas such as the main ideas, topics or themes addressed by the participants. The researcher assistant’s notes assisted in clarifying comments when unclear on tape.

9.2.6. Data Analysis

Focus group sessions lasted between 75 to 90 minutes and were facilitated by the researcher. Immediately after each focus group a meeting with the researcher assistant was held in order to discuss group dynamics and notes taken concerning the main themes or topics addressed during the session.

All audiotapes were transcribed verbatim after the meetings and reviewed for accuracy and corrected when necessary by the researcher (Krueger & Casey, 2000). The written transcripts were crosschecked against hand written notes and anonymized. Specific identifying

information contained within the quotes was removed and the correspondent pseudonym allocated. The transcribed data were then returned to all participants to confirm accuracy. This process allowed participants to provide any additional information.

As stated in the previous study, although the investigation itself did not adopt a grounded theory approach, aspects of this approach were used in data analysis, namely constant comparative analysis with open and axial coding for generation of thematic categories. Accordingly, each focus group transcription was firstly analyzed as a single case preserving the meaningful relations that a specific group had with the topic under study (Flick, 2006).

The thematic analysis procedures were similar to those described for the semi-structured interviews and reported in page 255/7, chapter 8. The first step in data analysis was to go through the first focus group transcript to break down in to pieces to examine closely, compare for relations, similarities and dissimilarities. Different parts of the data are marked with appropriate labels or 'codes' to identify them for further analysis. This process (open Coding) includes labelling concepts, defining and developing categories based on their properties and dimensions. As in the previous study the definitions of the codes were also developed from words used in the groups' transcripts and by explaining the researcher's interpretation.

For example, in the first focus group interview, the word "cognitive process" was coded. An analytic memo was then made beside the word "cognitive process", questioning its usage and whether the student meant the process that occurs in the clinician's mind or if there was another underlying meaning to what a "cognitive process" entailed, such as the reasoning that occurs in the patient's mind. Through further analysis, it was found that students used the word "cognitive process" to refer to the process that occurred in the clinician's mind throughout subjective and physical examination.

In another example, the statement "*I think that clinical reasoning is a method that allows us to identify the patient real problems in order to define real goals and to choose the appropriate treatment...*" (Gr1.28, p. 13) was initially coded as "a goal oriented method". The analytic memo made questioned its usage and whether the students meant the focus of clinical reasoning are only related with clinical problems or if there was another underlying

meaning to what a “a goal oriented method” involved, such as the understanding of a the person behind the clinical problem. Through further analysis, it was found that students understand the process as a clinical problem solving process used to identify and treat clinical problems.

Axial coding was also used to relate categories to subcategories and to compare across categories. Axial coding has been defined as a “set of procedures whereby data are put back together in new ways after open coding by making connections between categories” (Strauss & Corbin, 1990, p. 96) or by “interconnecting the categories” (Creswell, 1998, p. 150). In this study, axial coding was done by sorting and resorting the codes in different ways to discover groupings among the categories or domains. Colours added to the words or phrases were used to indicate groupings of categories. For example, the way students focused on their learning experiences about clinical reasoning appeared to interweave with the role of the lecturer or clinical educator and relate to the characteristics and influence of the curriculum.

Following axial coding, selective coding was used to integrate and refine the categories. Strauss & Corbin, (1990, p. 116) define selective coding as “the process of selecting the core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development”. During this phase of the process of data analysis, connections were made between categories in axial coding, then in selective coding, a selection was made of domains. The domains were used to integrate the findings of the study. These relationships are then validated against the data and further developed and/or refined as needed. For example, and instead of conceptualising knowledge, and experience, the analysis allowed the researcher to see clinical effectiveness as a significant construct, meaning that near graduate students indicated that are differences in the effectiveness of the clinical reasoning process that are dependent on a deep sound knowledge and clinical experience.

Finally emergent major theme clusters were detailed in a separated sheet, with theme headings together with any connections, or sub-themes. The process continued until a full list of themes was produced. By examining the data as a whole larger categories and themes requiring further development were identified. Further development of themes was achieved by re-reading transcripts and using this information to direct subsequent interviews.

As mentioned at the beginning of this section, a constant comparative analysis method was used. Therefore while the coding strategies are presented in order, the analysis actually occurred by shifting between different types of coding. The researcher used subsequent focus group interviews to build and develop previous interpretations and vice versa. Even in writing the results chapters for this study, the researcher re-examined the transcripts and coding to compare words and ideas within categories.

9.3. Findings

This chapter presents the findings from students' focus groups. In a similar way as the previous chapter, data analysis of participants' perspectives about clinical reasoning, its role on musculoskeletal practice and how it is taught and learned through undergraduate physiotherapy programmes, identified themes and sub-themes that encompassed the research phenomena. Findings also clarify and extend the survey results reported in the previous chapter.

A total of four students' focus groups, purposely selected, were conducted. Focus groups lasted from 80 min to 87 min. All data was transcribed verbatim and analysed thematically. When appropriate, literature was included to provide a discussion framework for themes that emerged from data analysis.

Five themes emerged in relation to the way near graduate students conceptualize clinical reasoning in musculoskeletal conditions (see Table 9.2., next page). As in the previous chapter, groups were de-identified to preserve anonymity. Participants' quotes were indented and presented in italics to highlight the participants' voices and demonstrate grounding for the findings in the data collected. Each quote is followed in brackets by the group number composed of the quote number followed by the page of the interview from which the quote was obtained.

Table 9.2. Themes and sub-themes emerged from data analysis.

THEMES	Sub-Themes
Theme 1: The nature of clinical reasoning	1.1. A cognitive process oriented towards specific goals. 1.2. A complex task influenced by a multitude of factors
Theme 2: The role of the patient in the clinical reasoning process	2.1. Patient's is a source of information. 2.2. "Negotiating" the therapeutic goals and treatment plan.
Theme 3: The role of Clinical reasoning in clinical practice	3.1. Clinical reasoning helps clinicians to be more efficient in clinical practice. 3.2. Clinical reasoning helps clinicians to become autonomous practitioners.
Theme 4: Effective clinical reasoning involves the application of knowledge, cognitive skills and experience	4.1. The role of Knowledge, 4.2. Cognitive skills 4.3. The role of Experience
Theme 5: Learning and developing clinical reasoning in undergraduate musculoskeletal physiotherapy programs	5.1. Teaching, learning and assessment strategies that help students to develop clinical reasoning abilities. 5.2. Role of the teacher and clinical educator in the learning process. 5.3. Barriers to develop clinical reasoning in undergraduate musculoskeletal physiotherapy programs

Since near graduate students and lecturers share a similar perspective in many of the aspects under study, this chapter focuses on the most salient aspects provided by the participants in the different focus groups.

Theme 1: The nature of Clinical Reasoning

Participants in this study share a similar understanding about clinical reasoning and its role in clinical practice taking into account their lecturers' perspective. A common aspect reported by the four groups of students was that clinical reasoning is a cognitive process that helps clinician to identify patients' problems and to define treatment goals. This cognitive process is oriented towards specific goals. Problem identification, establishment of an intervention plan or treatment selection were the goals participants most emphasized. Besides that it also furnishes a strategy that helps clinicians on patients' data collection and analysis, using their knowledge and experience in order to identify the origin of the complaints. The most important of this is revealing the underlying pathophysiology, structures at fault or certain contributing factors. For example, one participant in a students' focus group described clinical reasoning as a method that helps clinicians to uncover the "real" problems of a patient. In his own words,

I think that clinical reasoning is a method that allows us to identify the patient real problems in order to define real goals and to choose the appropriate treatment. In this sense allows me to be effective...and through this improve my practice as a physiotherapist.

(Gr1.28, p. 13)

Allied and closely related to diagnostic reasoning is procedural reasoning. The identification of patient's problem(s) and the definition of appropriate treatment goals and procedures are key conditions to successfully solve or manage the patient's problem. They said, for example,

...(clinical reasoning) is a tool that we have to optimize the rehabilitation of a person or for social integration in his own environment. It depends on the type of condition, some are chronic, and other degenerative, but it is a tool that makes possible to organize our thought, and to arrive, or to have a clear vision of the problems of the person and the intervention that we can make.

(Gr3.16, p. 5)

Although acknowledging the relevance of the diagnostic phase, participants reported that clinical reasoning underpinned all clinical decisions they made. One participant of focus group three described that in the following words:

If the strategies (treatment) are not working we have to change, we have to adopt new strategies, and we have to reason again. So it isn't only to diagnosis. During our intervention we have to reason in order to see what will be the best intervention to take and what can we change.

(Gr 3.28, p. 7)

Like their lecturers they also viewed clinical reasoning as a **complex and demanding** phenomena influenced by a **multitude of factors**. Near graduate students seemed to be aware of the different contextual factors that could impact on their clinical reasoning processes. Participants identified a multitude of factors, which impact on the effectiveness of clinical reasoning process, including clinicians and patient's characteristics, contextual factors and the type of clinical condition. In general, participants highlighted the aspects that in their opinion could limit or constraint clinical reasoning process. For example, quality of reasoning and practice seemed to be associated with the time available to treat patients. An excessive number of patients to treat limits the quality of care patients deserves. One student said,

...If I have, for example ten people to treat at the same time, it's impossible to give the attention the clinical condition deserves, the person deserves, and this limits a lot our intervention."

(Gr 3.34, p. 9)

Another common idea shared among participants was that "pure" clinical reasoning happens in non-diagnosed conditions⁵². When receiving a patient on a first contact basis, clinicians feel that they have the opportunity to apply all the clinical reasoning skills they have to identify the underlying source of patient' problem (diagnosis) and to establish what they think the appropriate treatment plan will be. They said,

There are situations where the patients arrive without a medical diagnosis, so we do not have any information about the problem. So the person comes and we have to do this kind of practice, we have to look to evidence, to our knowledge, and in those situations I think we have to apply clinical reasoning from the beginning, we have to look from the first moment and try to understand the all picture. This is the kind of situation where I think we practise clinical reasoning, in a first contact situation, I think it is pure clinical reasoning.

(Gr 2.7, p. 5)

⁵² Non-diagnosed conditions mean clinical conditions where the medical diagnostic is not provided or is uncertain/ unknown.

On the contrary there are contexts of practice where applying clinical reasoning is strongly limited by strict medical prescription. According to participants, especially students, in these contexts, physiotherapists don't use any clinical reasoning. One student in focus group three said,

...when there is a medical prescription and if the clinician does not assess the patient, if he does not ask what the problem is, in that case he does not accomplish any of the clinical reasoning phases. He does not interview the patient, he does not make a subjective examination, the treatment is already established, so in this situations he only apply (procedures/ techniques)...

(Gr 3.56, p. 15)

Participants also referred the nature of the patient's clinical problem as having an important impact in the way clinical reasoning is performed. Participants reported that well-defined clinical problems, where the clinician knows both the problem and the solution, might require only simple pattern recognition for the solution to be identified and implemented. A group considered this type of problems simpler and less challenging to the participants,

...in a simple condition, and if the condition is clear, and you have no doubts, and this could happen because you know the answer and you use pattern recognition, or because you know the guidelines, or because you had talked with a more experienced colleague, it is obvious that you would not need to formulate so many questions, or to search for new things. But if it is something new, even if it is simple, but if you can not understand what it is happen there, or what kind of problem is there, in this type of situation you will need to think a lot more...

(Gr 1.61, p. 21)

Considering the strong association between clinical reasoning and diagnostic reasoning reported among participants, they disagree about the role of clinical reasoning in well-defined clinical conditions. To some of them, especially students, this type of clinical problems does not need "real clinical reasoning". Group 1 said,

One thing that someone has already said was that we use clinical reasoning in some types of clinical problems and not in others. I think that it also happens to me. The problem is that for some pathologies we have a specific pattern of intervention, so when you get there you assess what you have to assess, but then our treatment is standardized ...

(Gr1.10, p. 8)

Others consider that despite similarities between the types of problems expected in well-defined clinical conditions there are other kinds of problems specific to each individual that should be addressed through clinical reasoning.

...a joint replacement for instance is a condition where the diagnosis is already established. However, and although joint replacements could be similar, different patients will have different impairments. The problem will affect differently each patient, so I think we have a specific clinical reasoning for each individual. So I considerer that is important to use clinical reasoning in any of the conditions, even if they are standardised clinical conditions...

(Gr1.20, pg. 11)

Theme 2. The role of the patient in the reasoning process

In a similar report as their lecturers, near graduate students considered patients' main role to be the provision of accurate and useful information during subjective and objective examination. Therefore, accurate information was considered essential to make "good" clinical reasoning and achieve to a "correct" diagnosis. After discovering the source of patient's symptoms or disabilities and potential contributing factors (process owned by the clinician), clinicians reported the importance of involving the patients on decisions concerning the definition of therapeutic goals and treatment plan.

Participants also reported their concern about adapting intervention strategies to individual characteristics of patients. Patients' needs were equated with the need to bring abnormal medical symptoms back as close to normal as possible. The following quotes illustrate this,

Now, there is something that I find really important and that depends a lot on the patient. Clinical reasoning is something that belongs to us, but it is dependent on what patient tells us. So it is something that is affected by the communication and by the way a person can or can't say what he is feeling, what the problem is, or how he/ she lives.... Since the most basic example such as the ability to express in proper words what he feels...and this influences our reasoning process

(Gr 3.9, p. 3).

According to participants' statements patient involvement was also related with adapting therapeutic goals and treatment plan to the individual characteristics of each patient. This

means listening to the patient's needs and expectations considering his previous degree of functional activity and social participation.

Theme 3: The role of Clinical Reasoning in musculoskeletal Physiotherapy Practice

For participants in the focus groups, clinical reasoning was synonymous of professional autonomy. As their lecturers students also reported a strong association between professional autonomy and qualified practice. Practicing qualified physiotherapy was related with the clinician's possibility of using clinical reasoning to establish the clinical diagnosis and treatment plan. In contraire clinicians whose practice is confined to the application of techniques are disrespected and considered unqualified. A group of students described this idea in the following manner,

I think clinical reasoning is something that distinguishes us. Anyone can do a massage, an ultrasound or a hot pack, but we are thinking about the problem. We are not there only to apply procedures or to alleviate the symptoms. We are thinking about what is at the origin of that problem, and this will distinguished us.

(Gr 3.22, p. 6)

Theme 4: Effective clinical reasoning involves the application of knowledge, cognitive skills and experience

Near graduate students indicated that they though effective clinical reasoning to be dependent on a deep sound knowledge and clinical experience. Like their lecturers, propositional and non-propositional knowledge were prerequisites to effective clinical reasoning. Then, clinical experience, in a sense of accumulation of a repertoire of cases was considered essential to achieve an effective clinical reasoning.

A deep sound knowledge was seen as fundamental to achieve effective clinical reasoning by all students. Participants emphasised knowledge as a pre-requisite to accurate clinical reasoning. Propositional knowledge (knowledge in anatomy, physiology, and particularly pathophysiology) and non-propositional knowledge, especially knowledge concerned with the application and effects of treatment techniques were the most emphasized. Knowledge derived from personal experience seemed to be undervalued by the participants.

In fact there is a common perspective among lecturers and students of the sequence of stages to enhance clinical reasoning. A deep theoretical knowledge and appropriate cognitive skills (data collection and data analysis) were considered pre-requisites to clinical reasoning. Clinical reasoning should be learned first at school under the guidance of lecturers, and then practiced in real clinical environments (clinical placements).

Knowledge was used to identify and analyse a clinical problem. Looking at participants' descriptions of how they integrate these two forms of knowledge (propositional and non-propositional knowledge) to decide upon therapeutic action it became apparent that guidance by propositional knowledge was favoured. Cognitive skills help clinicians to consider all potential factors involved in a given clinical situation, to interrelate those factors and to reach the origin of the patient problem. One student described that as so,

If you think about a knee pain, probably the pain doesn't come from the knee, you know? We have to think that the patient is not only his knee, he has more things. Sometimes I feel that we made mistakes, a knee pain could come from a lumbar problem, you know? And we are used to think on separated drawers- a knee is a knee- and probably we don't think in other alternatives, in other possible origins for that pain, you know?

(Gr 2.77, p. 25)

Near graduate students ascribe experience a significant role for effective clinical reasoning. Participants related experience to the advantage of being successful in managing a patient. Experience is related to exposure to different clinical situations and to the resulting knowledge stored in the clinicians' mind. If they had experienced a similar clinical condition in the past they can expect similar results. One group described that by saying,

experience is very important, especially when we have a clinical condition similar to other that we had in the past, and we know that with a specific treatment we will achieve good results.

(Gr1.46, p. 18)

Experience allows the development of knowledge and understanding about clinical problems but also about the diversity of persons physiotherapists are likely to come across in their

clinical practice. This knowledge is of great importance to understand each patient's individual specificities. One group 4th participant used the following words,

I think that we need several different cases to know how different people behave. People are different from which other and with our limited experience we probably know one type of person, so I think we need to have a wide range of people, people that behave differently, who have different ways of interacting. This experience allows me to think about what would be important to do with a specific patient...

(Gr 4.93, p. 21)

Theme 5: Learning and developing clinical reasoning in undergraduate musculoskeletal physiotherapy programs

Similarly to their lecturers students supported a sequential model of acquiring clinical reasoning competency. A common idea among groups was the need for a sound knowledge base and skills to assess the patient before thinking about clinical reasoning. Members of the four focus groups expressed this in different forms,

If we start to have something about that (clinical reasoning) in our first year, I think it will be very difficult. In the first year we were receiving our knowledge base and only after that we will be able to establish a connection between it.

(Gr4.114, p. 25)

Participants in the focus groups emphasized the role of paper and simulated cases as a useful strategy helping them to improve their clinical reasoning abilities. In addition, participants also reported debate as an important learning strategy to help students develop clinical reasoning skills. Listening and discussing with teacher and peers enhance students' critical thought and clinical reasoning. One student referred to that as,

...when we came to school to assist to our colleagues' presentations, lecturers invite us to participate, to present our points of view. I think this improves our critical thought, our reasoning about what is written or presented, ...well I found that is very important."

(Gr2.102, pg. 29)

In what concerns restrictions to clinical reasoning acquisition, students focused two main areas; the curriculum and the quality of clinical placements. Participants referred their

curricular structure as a barrier to enhance clinical reasoning in undergraduate physiotherapy programmes. Reasons for that were related to curriculum structure and organization and to traditional strategies adopted to improve students' learning.

I think school is not doing right, mainly because, it focus on pathology. So given the amount of pathologies we have, therefore we have a thousand of curricular units that approach these pathologies, that we do not memorize, right?

On the other hand it comes too late and not in enough quantity. I think that the first time we spoke about clinical reasoning was in our third year, in a curricular unit where some paper cases had been present to us, and where we had then to conduct an assessment in order to reach the problem and to define our treatment ...

(Gr 1.110, p. 32)

Students also highlighted the differences between clinical reasoning perspectives held by physiotherapy undergraduate courses and “real practice” contexts. They said,

in some clinical placements people are there to apply techniques. They did not think about what the patient's problem is. They are there, working without any kind of reasoning.”

(Gr 3.31, p. 9)

9.4. Summary of Key findings

This chapter has presented the findings from four students' focus groups. The findings have been organized around themes and sub-themes describing the current perspective about clinical reasoning, its role on musculoskeletal practice and how it is taught/ learned through undergraduate physiotherapy programmes. The following summarise the key findings related to participants' reports.

- The current perspective of clinical reasoning among participants in this study resembles the lecturers' views on clinical reasoning, in particular the nature and role of clinical reasoning in everyday musculoskeletal practice. Students emphasized the cognitive nature of the process and their goal oriented purpose. They also highlighted diagnostic and procedural clinical reasoning strategies as the most salient areas of reasoning and practice. Finally they all related competency in clinical reasoning with possession of knowledge and cognitive skills and years of clinical experience.

- Perhaps the most important aspect to emphasise is the differentiation that near graduates has for the use of clinical reasoning. In clinical situations where a medical diagnosis is provided or where the aetiology of the condition is well established, students undervalued the role of clinical reasoning, especially when compared with clinical situations where clinicians had to discover the underlying cause of patient's complaints. This seemed related with the strong association between clinical reasoning and diagnostic and procedural reasoning students share. This restrict view of clinical reasoning could lead to serious problems on students self-motivation but more important patients' could be devaluated when they present with clinical conditions students found less interesting.

Next chapter discusses these findings and those of previous chapters in more detail with relation to the research questions and previous research findings. A final chapter will then address the limitations of the study and the general conclusions. Recommendations for musculoskeletal physiotherapy practice, education and further research are also presented.

CHAPTER 10

Overall Discussion

The purpose of this investigation was twofold. The first interest was to explore clinical reasoning processes of a sample of Portuguese expert physiotherapists and secondly, to identify current perspectives on clinical reasoning held by lecturers and students and how this is promoted within the undergraduate curriculum. This study's main focus was the description of clinical reasoning processes (hypothetico-deductive and narrative) clinicians' use in their clinical practice and how these processes are promoted in the undergraduate musculoskeletal physiotherapy programmes in Portugal. Accordingly, the study sought to answer the following questions:

1. What clinical reasoning strategies are more emphasised in the various forms of clinical management?
2. How do Portuguese physiotherapy educators and students understand the concept of clinical reasoning in musculoskeletal physiotherapy?
3. What kind of approaches to reasoning and practice are being promoted in the undergraduate courses and how?

The study consisted of three parts. First, the use of clinical reasoning by a sample of Portuguese expert physiotherapists in musculoskeletal physiotherapy was investigated. The focus of the study was on how Portuguese clinicians interacted with their patients in order to define and manage their clinical problems. Then, the generic aspects of the "curricula on paper" of physiotherapy undergraduate courses in Portugal were described in order to provide a first contextual glance on how educational programmes were organized and implemented in Portugal. The musculoskeletal topics of each course were then explored in greater depth by a questionnaire survey and documentary analysis to capture the educational process and actions underlying current educational practices across undergraduate courses in musculoskeletal physiotherapy curricula.

Finally, lecturers and students' perspectives about clinical reasoning, its role on musculoskeletal practice and how it is learned through undergraduate physiotherapy programmes were addressed through telephone interviews and focus groups and subsequently themes and sub-themes that encompassed the research phenomena were identified. The focus was on exploring the underlying assumptions of musculoskeletal physiotherapy curriculum and how lecturers and students perceived it.

This chapter discusses findings with relation to the research questions.

10.1. What clinical reasoning strategies are apparent in clinical management of musculoskeletal problems by Portuguese physiotherapists?

This investigation was set within the backdrop of clinical reasoning as a model of thinking and decision making used in physiotherapy clinical practice. Since the seminal work of Benner (1984) in the nursing field, the concept of clinical reasoning has been interpreted in two ways: clinical reasoning as a purely cognitive and diagnosis orientated process; or clinical reasoning as an interactional or meaning based process. The former perspective has been focus on knowledge and processes looking at clinical reasoning as a phenomenon occurring in the clinician's mind. The latter perspective has emphasised the collaborative nature of the reasoning process, through the understanding and interpretation of clinicians' experience of practice and reasoning (Thornquist, 2001; Jensen *et al.*, 2000; Edwards *et al.*, 2004a).

Instead of these contrasting perspectives which have been depicted in the literature, Edwards *et al.*, (2004a) proposed the term dialectical reasoning to describe clinical reasoning as a phenomenon that moves between those cognitive and decision-making processes required to optimally diagnose and manage patients' presentations of impairments and physical disabilities (hypothetico-deductive reasoning) and those required to understand and engage with patients' experience of disabilities and impairments (narrative reasoning). Within this conceptual framework of clinical reasoning, this is characterized by the use of multiple skills or strategies representing a diversity of thinking and actions, in a variety of tasks and relating to many issues that exist in clinical practice. These skills or strategies range from the act of establishing a diagnosis to management issues and to ethical decision making (Edwards *et al.*, 2004a).

Recent clinical reasoning literature suggests that reasoning strategies cover a broad range of clinical practice activities including: reasoning related to diagnosis, narrative, procedure, interaction, teaching, collaboration, prediction and ethics (Edwards *et al.*, 2006; Ajawi & Higgs, 2008; Smith *et al.*, 2008). These activities can be viewed through two fundamentally different reasoning processes: hypothetico-deductive and narrative reasoning. The terms instrumental and communicative emphasise respectively the implementation of hypothetico-deductive and narrative decision-making processes in various forms of clinical management (Edwards *et al.*, 2006).

In instrumental reasoning and action (hypothetico-deductive), clinicians' reasoned decisions and actions are structured in a way where concepts of normality or what is seemingly correct underpin generalized interpretations. That is, treatment techniques may be selected and applied having their effects measured and predicted through reassessment, which are often based on population 'norms' (Edwards *et al.*, 2006). In contrast, communicative learning and action, do not aim to establish cause-effect relationships but to increase insight and a common understanding of a situation through a mutual learning process between physiotherapist and patient (Edwards *et al.*, 2004a). Communicative reasoning and action, endeavours physiotherapists to understand the assumptions underlying patients' beliefs and decision-making and to communicate their own assumptions to the patient (Edwards *et al.*, 2006).

According to the first study' findings the group of Portuguese musculoskeletal physiotherapists demonstrated using decision making processes in a way that is consistent with hypothetico-deductive reasoning, that is, they consider competing hypothesis and test them in order to reach a clinical diagnosis for their patients. Clinical decisions about what treatment modalities to apply are then established considering the chief diagnostic hypothesis. Through treatment and reassessment clinicians reconfirm their diagnostic hypothesis and make decisions concerning their treatment plan. In some circumstances the evolution of patient condition justifies maintaining or changing treatment modalities. In this sense clinical decisions concerned with diagnosis and determination of treatment modalities, were inexorably linked and followed a hypothetico-deductive process.

The way participants described their practice and reasoning was consistent with preliminary research' findings which investigated physiotherapists' clinical reasoning processes and also indicated physiotherapists' use of the cognitive processes of hypothetico-deductive reasoning and pattern recognition to make decisions about patient diagnosis (Payton, 1985; Thomas-Eddying, 1987; Rivett & Higgs, 1997; Edwards *et al.*, 2004a). Findings of the first study were also consistent with the existing research concerning clinical reasoning in allied health professions. In this study we found that all clinicians used a range of clinical reasoning strategies representing a diversity of thinking and actions in a variety of tasks and relating to many issues that exist in clinical practice. Clinicians showed the use of strategies related with the act of establishing a diagnosis through management issues through teaching decision making.

However, and despite the similarities found with other research studies on the use of a hypothetico-deductive process, in many other aspects findings of the first study tend to be in direct contrast to those referred by Edwards *et al.*, (2004a), Jensen *et al.*, (2000) and more recently by Ajjwai & Higgs (2008) and Smith *et al.*, (2008). They contrast on processes concerning interaction between practitioners and their patients in a range of areas such as therapist-patient interaction, patient' involvement and collaboration, teaching strategies, and ethical practice.

Edwards (2004a) defined interaction as a reasoning strategy where the main intention is the purposeful establishment and ongoing management of therapist-patient rapport. In the occupational therapy field, interaction is intended to help therapist to know the patient as a person, to understand disability from the patient's own point of view and to aid therapist and patient construct a shared language (Fleming, 1994). Collaboration with patient is facilitated whenever interaction is established to gain a genuine understanding of a patient's story, or when clinician shows a genuine interest in patient's beliefs. In the same way, collaboration, as a strategy of reasoning, cannot be separated from ethical practice and the application of ethical principles such as patient autonomy or informed consent.

For example Smith *et al.*, (2008), based on the findings of their study with UK cardiorespiratory physiotherapists, reported the use of collaboration with patients as the focus of decision making itself. Despite the fact that participants in the study also made deliberate

decisions concerning the establishment of therapeutic relationships, they tend to rely on traditional models of practitioner-patient interaction, where the role assigned to patients is merely the accomplishment of clinicians' indications and advises, instead of the use of collaboration.

Of particular interest to this discussion, was the mode physiotherapists conducted the initial subjective inquiry. Study findings documented that participants tended to follow a non-patient direct style in patient's assessment, where clinician followed a predetermined course of inquiry, controlled topics introduced in the dialogue, and demonstrated insensitivity to the patient's personal frame of reference or context. This was noticed on a regularly basis through the observation of care provided by the four expert clinicians participating in the first study. Encouraging patient to 'tell his/her story' in the way he/she wanted to tell it was never observed. In this sense, the interaction made with patients had the specific purpose of collecting relevant data, which helped clinicians to identify the source of patient's complaints and decide about what treatment to apply.

Findings of this first study strongly support that the interaction pattern found across participants was not primarily used to achieve a better understanding of patients. This contrasts with the findings reported by Edwards (2001), where the author found that clinicians' interactions were not only focused on the clinical condition itself but also on the patient. He provided several different examples of how clinicians often appeared to socialize or interact with their patients out of pure enjoyment, or when they shared personal stories about their families, and this was almost always a purposeful activity. The author also provided other examples where interaction was not primarily used to better understand the patient, which included engaging the person in the treatment session. Clinicians used personal stories or humour with different purposes. Sometimes they wanted the patient to feel at ease and to relieve tension or they intended to calm them.

The same pattern of asymmetry was found when clinicians made decisions concerning the choice of treatment strategies. In general this sample of MPT made decisions on behalf of their patients, doing what they felt was right for them. They didn't involve patients in decision-making and therefore didn't promote a patient-centred care. In contrast with other studies findings (e.g. Edwards, 2001), there was no evidence in this study of clinicians asking

questions about patients' lives, using humour or sharing their personal or professional stories. Focusing interaction exclusively on understanding the clinical condition and not the person is a characteristic of a more traditional biomedical model of practice and reasoning as opposed to the biopsychosocial collaborative approach. Physiotherapists whose practice is based on the biomedical model often made decisions independently of their patients' needs and expectations. Decisions are based on their clinical and theoretical knowledge, and education used to justify them to patients. This kind of approach restricts patients' participation in the management programme and does not encourage them to take more control over their own treatment and management (Partridge, 1997; Klaber Moffett & Richardson, 1997). Considering this pattern of interaction and collaboration not having found evidence of ethical decision-making in clinicians' practice or interviews was not a surprise.

Reasoning and practice on this sample of Portuguese physiotherapists was consistent with a traditional model of interaction between clinicians and their patients. According to this model clinicians' main role is to identify the source of patient's problem and prescribe a solution for the problem. Clinicians operating within this model worked with the underlying assumption that patient's acceptance of professional's advice would improve or ensure a positive outcome, whereas patient's rejection of advice may compromise health or recovery (Barr & Threlkeld, 2000). Emanuel & Emanuel (1992) indicate that clinicians may impose their own values although appearing to understand and articulate their patient's values. In this situation patient views clinician as a knowledgeable advisor, and may accept clinician's values as his/her own without truly understanding the values he/she may possess. By following this model clinicians may unintentionally presume their personal values as equally shared by their patients when, in fact, these values, may be detrimental to their patients' physical and emotional well being (Emanuel & Emanuel, 1992).

Clinicians, adopting a biomedical approach assume a paternalistic role, implicitly keeping the patient's best interests in mind but focusing on patient as a machine with body parts that are breaking down into malfunction. Such a mechanistic perspective considers patient's body as clinician's property, reinforces the passive role of patients, reduces them to dysfunctional bodies, and discourages understanding patients as human beings who want to be in control of their own lives (Partridge, 1997; Klaber Moffett & Richardson, 1997). This paternalistic model of practice is grounded in the principle of beneficence, which simply implicates the

promotion of patient's well being. In this approach the underlying assumption is that "doctor (or physiotherapist) knows best".

Paternalistic model of care has been strongly criticised and rejected by a growing number of health-care professionals and professional organizations, nevertheless several studies find it to be common (Payton Nelson & Hobbs, 1998; Kerssens *et al.*, 1999; Thornquist, 2001; Edwards, 2004b). Several authors have noted that although physiotherapists acknowledge the importance of collaboration in clinical practice, many appear not to respond to their patients' life and treatment priority concerns or set treatment goals in a collaborative manner (Payton Nelson & Hobbs, 1998; Kerssens *et al.*, 1999; Thornquist, 2001; Edwards, 2004b).

In general, this study findings seemed to provide evidence for a differentiation between cognitively based, rational models of reasoning (eg. hypothetico-deduction) and interactive or meaning-based forms of reasoning (eg. the use of narrative) as advocated by Mattingly & Flemming, (1994), Benner *et al.*, (1996), or Jensen *et al.*, (1999) in contrast with the dialectical notion proposed by Edwards *et al.*, (2004), supporting an intrinsic relationship in clinical practice for these different processes. Despite the fact that clinical reasoning processes on this sample of Portuguese musculoskeletal physiotherapists, appear to involve a range of reasoning processes that vary according to the clinical tasks addressed at a given moment, clinicians privilege the cognitive and decision making processes concerned with diagnosis and fixing patients' problems. In this sense, interaction although occurring simultaneously with other actions, such as diagnostic or treatment procedures, often appears to be subservient to the others.

Considering the focus of actions and decisions demonstrated by this group of Portuguese musculoskeletal physiotherapists across the episode of care, their practice and reasoning was highly instrumental. In all cases, physiotherapists' reasoned decisions, actions and subsequent learning were structured in a way where concepts of normality or what is seemingly correct underpinned generalised interpretations. Physiotherapists looked for normal range of motion, pain free movements, normal posture and normal muscle behaviour. Decisions about how to define a problem were based on pain reproduction (abnormal situation since the normal is pain free movements) and abnormal posture or movement. In doing that, clinicians were engaged in determination of cause-effect relationships, which lead to predictions about

observable events that were either correct or incorrect. Considering the problems identified, clinicians made treatment decisions to fix or normalise dysfunctions identified. That is, treatment techniques may be selected and applied with their effects measured and predicted through reassessment often based on population ‘norms’ (Edwards *et al.*, 2006). In situations when the patient conditions did not evolve as expected, physiotherapists were engaged in critical reflection about the underlying assumptions (i.e., hypothesis testing) behind the content and process of their own decision-making and knowledge structures. Considering the reasoning process of this group it is better described as a cognitive clinician’ centred process rather than a collaborative process.

Closely related to this instrumental approach to interaction with patients, is the nature of the collaborative process clinicians use to involve them in clinical decisions. Trede (2006) reported that there is a difference between patient participation as a result of egalitarian negotiations with collaborative reasoning when compared with patient participation arising from imposition based on the therapist’s technical reasoning. The difference lies in the interest and motivation that guides communication between therapist and patient. This contrasts with a more contemporary viewpoint where practitioners and patients are seen as partners in designing an intervention to maximise outcomes while considering the ‘problem’ within the context of patient’s life (Barr & Threlkeld, 2000).

10.2 How do Portuguese physiotherapy educators and students understand the concept of clinical reasoning in musculoskeletal physiotherapy?

The current perspective of clinical reasoning among school participants emphasised clinical reasoning as clinical instrument. Accordingly, the primary role of clinical reasoning consisted on assisting musculoskeletal physiotherapists in diagnosis and treatment of clinical problems and in facilitating the efficient management of their practices. In this sense clinical reasoning was understood as fundamental to optimally diagnose and manage patients’ impairments and physical disabilities (hypothetico-deductive).

Clinical reasoning was reported as central to effective practice and fundamental to achieve autonomy in physiotherapy practice. Participants’ understanding of autonomous practice was closely related with the possibility to assess, diagnose and establish treatment plans and these were key aspects to differentiate profession and improve its status. Having complete control

over clinical decision making and clinical intervention was a strong aspiration especially for students who participated in this investigation. In this sense, clinical reasoning was associated with efficient and effective practice by assisting clinicians to quickly discover the origin of the problem and then apply effective interventions.

Current understanding of clinical reasoning among Portuguese lecturers and students resembled the medical model of reasoning and practice. In this model physiotherapists aspire to perform the main roles of physicians. When working on this model, physiotherapists focus their practice on understanding patient's symptoms or disease. Accordingly, assessment was usually driven by the clinical problem (e.g. pain), in the search of "abnormalities" that could justify its origin. To uncover the origins of patient's problem help clinicians to define the appropriate treatment to apply. Physiotherapists' reasoned decisions and actions were structured in a way where concepts of normality or what is seemingly correct underpinned generalised interpretations. That is, treatment techniques may be selected and applied with their effects measured and predicted through reassessment often based on population 'norms' (Edwards *et al.*, 2006).

Findings also suggested that participants' perspective of clinical reasoning process were similar to medical reasoning process towards diagnosis. There was a sequential stance in participants' reports suggesting that treatment was dependent on diagnosis. This contrasts with Doody & McAteer (2002) findings where physiotherapists used treatment as a strategy to test their diagnostic hypothesis. In this respect, its role was principally scientific technical oriented, and instrumental. Through this model, physiotherapists emphasise the clinical-technical competence supported by a more scientific knowledge base within the context of professionalism (Higgs & Bithell, 2001).

Lecturers and students shared a common understanding about the nature of the process. Both emphasised the cognitive nature of the process, where clinician' main goal was to find a diagnosis of the patient's problem. Patients' role in the clinical reasoning process was to provide accurate information. Accordingly to current understanding of clinical reasoning, diagnostic and procedural reasoning were the most salient strategies reported by participants in the study. Other strategies such as narrative, collaborative or ethical reasoning were absent of participants' reports. In consonance with this understanding, hypothetico-deductive

reasoning was at core of clinical reasoning process. Participants (lecturers and students) highlighted the importance of discovering the underlying source of the patient's complaints by formulating hypothesis and then testing them through subjective and physical inquiries. Identifying the source of patient's problem made possible to define appropriate treatment plans.

The role of the patient in the CR process

One consequence of the technological rationality associated with instrumental reasoning and practice is to refuse the deliberate use of patients as the primary source for learning. Findings of this investigation showed that participants saw patient as a source of information but not a source of knowledge. They expected patients to be able to give accurate and objective information about their symptoms and to accomplish what their therapists' planned. In line with the findings in the sample of experts, school participants also shared the same perspective. "When the patient is recognized as a source of knowledge for therapist, reflective physiotherapists will also learn from the collaborative experience" (Jensen *et al.*, 2000).

With respect to patient participation in the management process findings were contradictory. Participants acknowledged the importance of involving patients in treatment goals and also in discussing those goals with patients. However this contrasts with the general idea shared among participants where the main role of clinician was to find a diagnosis and then communicate and inform the patient about his/ her understanding of the problem and the ways to manage it. In clinical encounters physiotherapist was the authority figure using all his/her technical knowledge, skills and expertise to "discover" the cause of the patient's complaints, or to treat and assure recuperation. The practitioner identifies a problem and prescribes a solution to the patient.

Examination, diagnosis and treatment are issues that concern physiotherapists. In practice health professionals work on the assumption that patient's acceptance of the professional's advice will improve or ensure a positive outcome whereas the patient's rejection of the advice might compromise health or recovery.

The above examples illustrate the opposite of narrative reasoning and communicative approach to reasoning and action. Communicative reasoning and action endeavour physiotherapists to understand the assumptions underlying patients' beliefs and decision-making and to communicate their own assumptions to them. As the therapist progresses in the data collection process, strengthening hypotheses begin to be transformed in a way that they are understood by both therapist and patient (Jensen *et al.*, 1997). The capacity to first understand the perspectives a person currently holds, then reflect on the adequacy of these perspectives, and finally adopt newer, more constructive or reliable perspectives is called "transformatory learning" (Mezirow, 2000).

Contextual Factors

The major factors reported as influencing the clinical reasoning process were clinician's attributes, contextual factors, patient's characteristics and patient's clinical problem. Each of these factors was seen as a facilitator or as a constrainer of the clinical reasoning process. The findings suggested that participants tend to externalise their responsibility in the process. Some of the factors pointed related with the strong association between clinical reasoning and diagnostic and procedural reasoning. Clinical situations where a medical diagnosis is provided or where the aetiology of the condition is well established were considered undervalued when compared with clinical situations where clinicians had to discover the underlying cause of patient's complaints. This created the idea that the clinical problem could be more or less interesting in terms of clinical reasoning (diagnostic reasoning). Medical prescription inhibits clinical reasoning because both diagnostic phase and the selection of treatment plan were impossible to make. In that situation some of the participants reported that clinical reasoning does not even exist.

10.3 What kind of approaches to reasoning and practice are being promoted in the undergraduate courses and how?

Information publicly available suggests that the competence profile of physiotherapists in Portugal is still based on the technical dimension of the profession. The majority of the programmes seemed to be concerned with preparing new graduates for the traditional model of practice. Patients' beliefs, values or expectations were absent from the explicit educational discourse. Reference to the development of professional behaviours and attitudes towards

clinical practice, learning and knowledge development is sparse or even non-existent. There is no reference to professional issues, such as clinical reasoning or reflective practice. For example, commitment to the values of the profession (eg. life-long learning) is referred to in only one programme. However, all the participants reported the need for musculoskeletal programmes to foster the development of clinical reasoning.

The generic aspects of the curriculum on paper and the content and educational practices of the physiotherapy undergraduate curriculum were analysed to gain better understanding of the emphasis on diagnosis and narrative reasoning strategies. Findings of study 2 showed that the present curriculum model was a traditional curriculum (also called discipline-based model or “subject-based curriculum”), with the following sequence: basic sciences; applied sciences; clinical practice. In this type of curriculum design theory and practical components are taught prior to clinical placement. Analysis of the curriculum content indicated that, in the three-year undergraduate course, students were first equipped with background knowledge of human anatomy, psychology and pathology (knowledge about the normal), physiotherapy studies, before taking up the clinical subjects such as assessment and treatment strategies for musculoskeletal dysfunctions. In the second year the emphasis changed to the clinical sciences, meaning the knowledge about diseases and other pathological conditions (knowledge about the abnormal). In the third year, the main emphasis of the programme was on the clinical internship.

The principles described above are the basis of knowledge organisation of physiotherapy, influencing educational and clinical conceptions (Pratt, 1989; Richardson, 1992; Roberts, 1994; Thorquist, 1994). This relationship also suggests that the physiotherapy process (clinical reasoning) is driven by the physiopathology of the pathological conditions presented. New graduates are invited to improve their knowledge and ability to make diagnosis and manage health diseases. Students should achieve competence on diagnosis and through that define appropriate treatment plans. In developing these competences students learn knowledge about normal/ abnormal and cognitive skills that will help them to collect patient data.

The major factors reported as having influence on clinical reasoning effectiveness were knowledge, cognitive skills and experience. However, and especially among near graduate

students, knowledge was referred to as the main component to achieve an effective clinical reasoning. Students often reported that their clinical reasoning was drastically affected by their lack of a deep sound knowledge base, especially in relation to propositional knowledge. Therefore they all share the common believe that the improvement of this type of knowledge, and having practical experience, will be sufficient to develop their clinical reasoning skills and turn them in clinical experts.

Beside propositional knowledge, lecturers and students emphasised the role of technique. It is the application of her skills and knowledge in the appropriate technique, which differentiates the practitioner from a layperson. The use of technique in medical practice requires the legitimization of professional training and qualifications. Physiotherapists who identified strongly with a therapist-centred approach to identifying and analysing problems had developed a professional practice knowledge base that favoured propositional knowledge (Trede, 2006).

Other types of knowledge such as professional craft knowledge and personal knowledge (non-propositional knowledge) seemed to be devalued. It seems that these clinicians don't have the possibility to uncover other knowledge than scientific-technical knowledge (propositional). This could relate with the difficulty participants have to engage in a process of reflection to uncover other forms of knowledge. Reflection is critical if clinicians are to learn from experience. While some clinicians learn little or nothing from their own experience, relying on literature and continuing education to acquire new information, others continually revise and expand their clinical knowledge through their reflective approach to patient care (Jones *et al.*, 2005).

For example, Almeida was one of the participants that most emphasised the importance of reflection. However the reflection he referred to was directly related with the actions provided and not with the assumptions that underlies those actions. Reflection about actions occurs retrospectively as the clinician thinks back about what happens in practice (Shon, 1987). As Trede (2006) points up leaving practice approaches unreflected reinforces the *status quo* of practice. Non-reflection and unwillingness to allow for flexibility and diversity can unintentionally reinforce professional dominance. Consequently, these findings indicated

that the educational environment promotes an instrumental view of reasoning and action.

The above findings suggest that there are important differences between Portugal and other European countries, especially in relation to the graduate profile and organization and teaching/ learning methods. First of all, and given the strong emphasis on the specific competences of the profession, the physiotherapy undergraduate qualification profile in Portugal seemed to be almost exclusively concerned with preparing new graduates for the instrumental model of practice. This contrasts with the current perspective shared by different entities and authors across Europe and the world, who strongly support the idea that physiotherapy curricula need to focus on development of generic thinking and learning skills (e.g. problem solving, research, interpersonal and self-directed learning skills) in addition to technical profession- specific content (Higgs *et al.*, 1999; Solomon & Baptiste, 2005; Christensen *et al.*, 2008a). For example, Higgs (1999) and Solomon & Baptiste (2005) suggested that new graduates should be skilled clinicians who can integrate evidence into clinical decision-making, communicate effectively, educate and consult patients/ families/carers and the health care team. They will require an expanded form of competence encompassing other areas of professional competence such as, the ability to interact with and change the context of practice (i.e. to be problem solvers and change agents), the capacity to demonstrate professional responsibility in serving and enhancing society, and an orientation and ability to engage in life long learning and reflection on their professional development (Health Professions Council, 2007). These competences are considered crucial to respond to the new challenges of the health care environment of today and tomorrow, such as, the cost constraints, ageing populations, the impact of technological advances, increased consumer expectations and knowledge, the desire for improved health outcomes, and changes in the healthcare task with the focus moving from acute to chronic conditions (World Health Organisation, 2000).

The above competences are reflected, for example, in the Curriculum Framework for Qualifying Programmes in Physiotherapy, (CSP, 2002), and in the European Physiotherapy Benchmark Statement (ER-WCPT, 2003). Both documents describe the learning that physiotherapy students should achieve on qualification. Among other outcomes the curriculum framework state that the profile of a newly-qualified physiotherapist should consider the student's ability to:

- promote equality to all in physiotherapy practice (eg. support patients, clients and carers through effective communication and collaboration with others, recognising the importance of effective team working and inter-professional/-agency collaboration),
- to respond appropriately to changing demands (eg. to recognise the evolving nature of physiotherapy practice, the contexts and environments in which it is practised, how it is commissioned, and the changing and varying needs of individuals whom it can best serve), or
- to practise within the core areas of physiotherapy (eg. understand the importance of assessment clinical reasoning, problem-solving, goal-setting, evaluation and review to the safe, effective and efficient practice of physiotherapy and engage in each of these activities as an integral part of their professional practice and in partnership with patients) (CSP, 2002; ER-WCPT, 2003).

Findings of studies 2 and 4 also suggested a strong teacher-centred and examination-driven orientation, which encourages passive learning. The number of contact hours is enormous and the use of didactic lectures, book-learning and memorisation seemed to be widespread. Crowded curriculum's had been linked in the literature with the development of superficial approaches to knowledge (Albanese & Mitchell, 1993; Regan-Smith et al., 1994;). In this scenario it is not a surprise that the students experienced difficulty in developing self-directed learning skills, such as critical thinking and problem-solving. This contrast, for example, with the recommendations stated for the UK undergraduate programmes where active and student-centred teaching strategies, and reflection on learning and development of high-level cognitive skills, such as clinical reasoning and the exercise of professional judgement", are strongly encouraged (Bithell, 2007). In fact, and instead of, traditional approaches to teaching and learning, several authors recommend the use of collaborative learning strategies, such as 'Problem-based learning (PBL)', where students are encouraged to explore their prior knowledge structures, experiences and existing knowledge links, and to articulate their reasoning around patient cases. Group discussion about reasoning processes associated with solving a case study can promote more active student learning (Hayward & Cairns 1998; McGinty, 2000), and serve as an arena for increasing students' range of perspectives about a case, which facilitates, for example, clinical reasoning (Tichenor *et al.* 1995). Research findings also report that students graduating through a PBL curriculum have better

interpersonal skills and confidence in their communication abilities than students from traditional curricula (Schmidt *et al.*, 2006).

In summary, to promote an appropriate graduate profile considering the actual challenges in health care services, teaching and learning should be informed by contemporary evidence-based practice, as well as developments in educational theory, in order to develop the skills of problem solving, diagnosis, intervention and reflection. Student-centred learning should encourage students to take on increasing responsibility for identifying their own learning needs. Graduates should be autonomous learners with developed lifelong learning skills and an ability to engage in continuing professional development. Considering the findings of this investigation, this research have open up interesting avenues for curriculum design and development of Portuguese undergraduate courses.

Final Remarks

The findings of the present investigation highlighted that participants were more likely to use an instrumental approach to reasoning and practice. The practice and reasoning approach of clinicians, lecturers and near graduate students reflected a paternalistic philosophy that has traditionally dominated the view of health care consultation, and within which patients were assumed to play minimal and passive roles. This perspective of practice and reasoning have several different implications on physiotherapy profession; physiotherapy practice; educational models; life-long-learning and in the development of expertise. These implications are addressed in the following chapter.

10.4. Limitations of the study

While this investigation has contributed to provide insight into the current understanding of clinical reasoning in musculoskeletal physiotherapy held in Portugal, the limitations of the research undertaken must be acknowledged. The information about clinical reasoning and how it is promoted in undergraduate musculoskeletal programmes was generated using mainly qualitative methodologies. From an empiricist point of view an immediately obvious limitation of this investigation is the impossibility to generalise findings of qualitative research. The limit size and location of this investigation do not allow generalisation of its findings to the whole population of Portuguese physiotherapists, in the same way that a more

quantitative approach might assert to do. However, this project has not been conceptualised in an empirico-analytical manner; rather its aim has been to study a local setting in depth, at the expense of a broader yet more superficial study. The aim of this study has not been to statistically measure or compare concepts and the phenomenon of clinical decision making, but to understand them in greater depth.

The interpretive paradigm was chosen to inform this research

because of its appropriateness and congruence with the research phenomena. In this paradigm, findings are not generalisable because there is no single truth or one way of seeing things (Crotty, 1998). Instead of generalisability, Hammersley (1992) nominated transferability of the research findings to other settings as an important indicator. Guba & Lincoln (1994) noted that studies like this one provides for the transfer of knowledge from one setting to another through vicarious experience. The characteristics of the experts, the occupational environment where they perform, and the similarities found in participants' approaches to reasoning and practice identified in this research lead the researcher to believe that these findings may be transferable to a broader population of Portuguese physiotherapists and also to other countries with similar contexts of practice and professional development. However, generalisability is not normally an issue for the researcher who is involved in studying a specific situation. It is the readers who must decide whether or not the context and findings being described are sufficiently representative or similar to their own local situation.

Another limitation that relates with transferability is the limited sample size used in the first study. Only four participants were scrutinised as part of the first study of this investigation, consequently the transferability of the results may be limited. However, data collection was continued until the point of redundancy was reached.

Rigor and credibility were the criteria used to ensure quality in this research. The trustworthiness of qualitative research (its consistency, truth value and transferability) is directly related to the credibility of the investigator and the rigor of the research methods used to conduct it. Every effort was made to increase the consistency and truth value of this study by detailing the researcher's position, assumptions and biases, detailing an audit trail of the study that included triangulation, prolonged engagement and member checks of results and to increase the transferability of the study by providing rich, thick description.

In this investigation the researcher is also a physiotherapist. Some interpretive researchers consider researchers to be among the research tools. It is their sensitivity to the data and life experience and knowledge that enables them to respond to and interpret the data. Being an insider was both facilitative and a difficulty. First it facilitated the confidence of the participants in the study, thereby allowing the researcher to establish rapport with the participants early in the data gathering process and providing access into their clinical world and thoughts. It also alerted the researcher to probe beneath the surface of what was being said and done, and in analysing and presenting my data.

CHAPTER 11

Conclusions

This chapter presents a final comment on the research questions formulated in this investigation. The first part considers the methodological approach and methods used. In the second part, implications of this investigation are presented. Analysis and interpretation of data furnish important evidence about the current perspective on clinical reasoning in musculoskeletal physiotherapy in Portugal. This evidence is useful to promote critical reflection about the role of the profession in healthcare and current models of practice, education and expertise development. Therefore, the chapter finishes with recommendations for practice development and education, as well as suggestions for further development of this investigation.

This investigation aimed to explore current perspective on clinical reasoning held by Portuguese physiotherapists and how it is promoted in the undergraduate curricula. The goals were to identify which clinical reasoning strategies are more emphasised in the various forms of clinical management, how do Portuguese physiotherapy educators and students understand the concept of clinical reasoning in musculoskeletal physiotherapy, and what kind of approaches to reasoning and practice are being promoted in the undergraduate courses.

This research was conducted in the interpretative paradigm using a hermeneutic approach. Using this paradigm enabled to understand the research phenomenon in context considering participants' experiences. It was seen as the most appropriate paradigm to investigate a complex human activity as it occurs in the real and consequence-laden contexts of clinical practice.

Hermeneutic proved to be an appropriate methodology to investigate clinical reasoning in Portuguese musculoskeletal physiotherapists. Philosophical/ interpretative hermeneutics provided a method of engaging participants in bringing to awareness, describing and interpreting a particular aspect of their clinical practice and reasoning and making this accessible to the interpretation by the researcher (Smith *et al.*, 2008). Using hermeneutic as

the methodology of this study has enabled the researcher to examine the clinical reasoning of participants as it is expressed in actions and interactions in tasks of their practice. It also allowed the exploration of how lecturers and near graduate students conceptualise their approaches to reasoning and practice, through their experiences.

This allows clinicians, lecturers, students and the researcher's own pre-understanding and preconceptions about notions of "practice" and "reasoning" to be recognised within the theoretical discussion. There was a constant dialectical interplay or hermeneutical circular exchange between what literature theorises about "ideal" clinical reasoning and what research participants' prior understanding and realities of actual reasoning and practice are. This hermeneutic exchange or dialectical interplay between theory and practice through the investigation provided the researcher a window to understand how clinicians, lecturers and near graduate students approached clinical reasoning, the connections that they were making between their field experiences and their course work.

The study was conducted using a mixed-methods approach comprising non-participant observation, semi-structured interviews, documental analysis, a questionnaire survey and focus groups with a wide range of participants in the fields of physiotherapy practice and education. Researcher' reflective notes were also developed during the whole process. All interviews were transcribed verbatim and these transcriptions, along with field notes, video recording of observation, and all written documents collected from the institutions, were used for data analysis.

Findings highlighted that Portuguese expert' physiotherapists were more likely to use and value an instrumental approach to clinical practice. There was little evidence of patients sharing their perspectives about their problems or participating in clinical decisions made. In this sense, the practice and reasoning of this sample could be seen as more instrumental than communicative. This perspective of practice and reasoning has several different implications on physiotherapy profession, physiotherapy practice, educational models, life-long-learning and in expertise development.

11.1 Implications of the study

Results obtained from this investigation are of great importance in planning and educating physiotherapists about clinical reasoning in Portugal, in order to increase their understanding and reflection about practice and reasoning. This will be a valuable resource to improve healthcare services and the well being of their patients. These accounts of Portuguese practice and reasoning reveal differences in the way physiotherapists conceive their role as health professionals and their expertise and also how they determine what is important to include in educational physiotherapy programmes.

11.1.1. Clinical Implications

The approach to reasoning and practice used by this group of Portuguese expert' clinicians when interacting with their patients in-situ contexts, in order to solve or manage their problems, as well as the current perspective held by lecturers and near graduates in their undergraduate courses, are consistent with a traditional biomedical model of care and showed the dominance of the medical model/ instrumental practice and reasoning in participants' perspectives. The dominance of this approach could limit patients' participation in the management programme and constrain learning by both patient and clinician (Schon, 1983; Kennedy, 1987; Cervero, 1988; Edwards *et al.*, 2006). For example, there is evidence that musculoskeletal therapists' perception, reasoning and management approaches may be constrained, in clinical practice, by a biomedical (or instrumental) reasoning 'lens' (Jorgensen, 2000; Rainville *et al.*, 2000; Ostelo *et al.*, 2003; Daykin & Richardson, 2004; Frost *et al.*, 2004; Latimer *et al.*, 2004; Houben *et al.*, 2005).

Findings of this investigation call attention to the observed lack of integration of patient' values and perspectives in Portuguese Musculoskeletal Physiotherapists' clinical practice and educational frameworks. Since clinical reasoning provides a mean to use knowledge in clinical practice, as well as for knowledge generation (Higgs & Titchen, 2000), the current approach to reasoning and practice found in this investigation, may difficult the development of an integrated conceptual framework of biomedical and psychosocial thinking with consequences in the musculoskeletal therapists' inquiries, interpretations and decision making (Edwards *et al.*, 2006).

Hypothetico-deductive or instrumental reasoning and action involve physiotherapists engaging in critical reflection about the underlying assumptions (i.e., hypothesis testing) behind the content and process of their own decision-making and knowledge structure. This contrast with the mutual learning process therapist and patient achieve through a common understanding of patient' situation (Edwards *et al.*, 2004a). This kind of learning process involves physiotherapists in endeavouring to understand assumptions underlying patients' beliefs and decision-making and to communicate their own assumptions to the patient (Edwards *et al.*, 2006). As a consequence, this traditional model of reasoning and practice could also have a strong impact in expertise development. Expertise develops in part through clinical reasoning, and seems to be essential to improve clinical effectiveness and to contribute to professional autonomy.

11.2. Educational Implications

The insights into the promotion of clinical reasoning in the undergraduate musculoskeletal curricula provided by this study have important implications for curriculum design, teaching and assessment in physiotherapy courses. Apparently, the curriculum design adopted by undergraduate courses constrains the integration of knowledge and skills and makes application in real life work contexts difficult. This was referred both by students and lecturers.

The traditional pre-clinical/clinical model separates (both conceptually and temporally) pre-clinical knowledge and skills from clinical knowledge and skills. The students are taught the science building blocks prior to applying this knowledge in clinical practice. In this model, teachers explain, and then demonstrate; then students practise, first with supervision, then without supervision, and are finally examined on their techniques. Thus, the emphasis is usually on the acquisition of technical skills versus understanding and analysis (Shepard & Jensen, 1990). In this view the problems in clinical practice are instrumental and professional practice is a process of problem solving (Richardson *et al.* 2004). The above contrast with the current concerns in health professions courses across Europe. In the last twenty years, there have been increasing pressures on health educators for curriculum reform, and as a consequence we have seen the decline of the traditional pre-clinical/ clinical model. As physiotherapy has developed and the extent of knowledge increased, growing concerns have been expressed about the exponential volume of knowledge in physiotherapy curricula

(Crosbie *et al.* 2002) and the increase in factual knowledge overload (General Medical Council, 2003). The temporal separation of course-content from clinical practice has also been highly criticized in the light of developing understanding of student learning, and, as situational models of learning became more influential, there has been a shift in health curricula towards more integrated curriculum models (Prideaux, 2003b).

In many European countries, like the United Kingdom, Netherlands or Sweden, the traditional approach has largely been modified towards a more integrated approach to curriculum planning and design. An integrated approach is still subject centred but transcends the traditional subject boundaries. Teaching units from subject disciplines are fused together around meaningful organizing themes/ modular schemes such as body systems or community physiotherapy (Bithell, 2007). In health education the term “vertical integration” describes the blurring of boundaries between pre-clinical and clinical courses whereas horizontal integration describes how knowledge and skills from many disciplines are clustered around themes such as body systems (e.g. a cardiovascular systems course might include anatomy, physiology, biochemistry, pathology, sociology, epidemiology, etc. relating to the cardiovascular system), or health policy and management. The consequences of these shifts led to curricula being reviewed and reformed so that students gained early clinical experience and scientific learning extended into the clinical years.

Although no formal evaluation has been carried out enabling the model’s effectiveness to be compared (Bithell 2007), critics of the traditional model claim that the integrative models can lead to more shared learning with other disciplines and allow a greater degree of integration between theoretical and clinical learning and for reflection on practice activities (Bithell 2007). This could impact in the quality of clinical reasoning students develop during their undergraduate course. In developing clinical reasoning, it is crucial for students to master the knowledge base and establish their competence in integrating their knowledge into practice (Neistadt & Atkins, 1996). In the curriculum, the components of clinical subjects and fieldwork practice are important in this process. Clinical subjects provide the opportunity for students to apply what they have learnt in terms of theories, clinical and technical knowledge and professional practices to actual case management. Most importantly they provide the possibility for students to reflect on incidents in their practice and to learn through practice.

Another relevant implication from this study's findings is the emphasis placed on propositional knowledge and technical skills. It seems that students and lecturers are not satisfied with the level of critical thinking and analysis, nor with the level of reflection and clinical reasoning achieved in their undergraduate physiotherapy courses. If undergraduate programmes are designed to prepare students for working in changing health care contexts then it should be expected that the development of an ability to understand and use the process of reflection would be central to the curricula. Therefore, undergraduate courses curricula need to include the explicit promotion of critical thinking and reflection and should foster skills in communication, collaboration and critical self-evaluation to promote the development of clinical reasoning capability.

Fostering reflexivity and explicit clinical practice and reasoning among health professionals is the responsibility of individuals, universities and the workplace. Educators need to adopt learning and assessment strategies compatible with the ability to reflect upon practice. Experiential strategies that promote this learning may include guidance, reflection, modelling, self-appraisal and feedback from others, in the academic and workplace contexts. To help new graduates and students to focus on the specific problems that are related to clients' problems and to use appropriate clinical reasoning, it is suggested that practice-related contextual problem-based learning be incorporated into the physiotherapy curriculum. Problem-based learning helps students to develop lifelong learning skills in integrating pathology and physiotherapy theory, and to focus on patients' specific needs in their life contexts resulting from the effect of their clinical problems.

In summary, the curriculum model in use does not facilitate the integration of the biomedical and biopsychosocial aspects of patient care. Lecturers tend to overemphasize the patient's clinical condition and the instrumental view of clinical reasoning and practice (diagnosis and procedural reasoning). Students however tend to overemphasize propositional knowledge and technical skills. This poses important problems considering the new challenges that the health system is now facing. In this sense, clinical reasoning understanding as reported through this investigation could shed light on the design of a musculoskeletal curriculum that would enhance students' integration of knowledge and usage of appropriate clinical reasoning

during practice and simultaneously inform educators in designing educational programmes that can promote effectiveness in reasoning and practice.

11.3. Implication for the Profession

Results of this investigation gave information about how Portuguese physiotherapists conceptualise the nature of their care, their role in health care contexts and the notion of expertise in musculoskeletal physiotherapy. The way physiotherapists described how they reason and practised provided insights into their understanding of their professional role. All physiotherapists working with clinical reasoning, in practice contexts, had an operational definition of what constitutes a physiotherapy health problem. Each of these aspects of practice can be shaped, understood and applied differently. The justifications for their way of practise illuminated their frames of reference. Their role understanding was closely linked to their clinical reasoning, practice context, professional power, and practice knowledge and how they defined physiotherapy health problems (Trede, 2006).

The evolving changes in political and social contexts establish new demands for clinical practice in physiotherapy. Nowadays, efficacy and efficiency, productivity and professionalism are paramount and this is implicit through the increase pressure over health care professionals to reduce costs and length of treatment whilst maintaining high quality standards. Moreover, patients' needs and expectations are increasing. Patients are better informed about their problems and also about the effectiveness of possible interventions. In this context it seems of particular relevance that musculoskeletal physiotherapists find and implement more adequate models of practice through cooperation with patients, taking their aims into consideration, negotiating, explaining their treatment programmes, giving alternatives and asking for permission (Gwee, 2003).

11.4. Recommendations

The insights into the promotion of clinical reasoning in the undergraduate musculoskeletal curricula provided by this study have important implications for curriculum design, teaching and assessment in physiotherapy courses. As diagnostic and narrative reasoning are both important to establish competent practice it is imperative that students develop this set of reasoning strategies. Recommendations based on this investigation are as follows:

1. The Profession should reflect on the nature of physiotherapy care and the role of the profession in the provision of care.
2. Curriculum planners need to discuss the reasoning that they expect students to demonstrate and ensure that the learning and assessment practices are consistent with this expectation. In curriculum design, teaching and assessment, greater emphasis needs to be placed on encouraging a deep approach to learning and developing students' abilities to integrate knowledge, so that they can apply information from their elaborated knowledge bases to their clinical reasoning.
3. Undergraduate Curriculum design should promote not only integration of knowledge but also integration of narrative and diagnostic approaches to reasoning and practice. The fact that a program seeks to focus on developing students' clinical reasoning needs to be carefully articulated in programme design, teaching and assessment. This may then enable students to understand the importance of mastering this set of skills and encourage them to personally focus on developing their clinical reasoning.
4. Lecturers and clinicians should improve their levels of awareness concerning reasoning and practice, in order to function as role models. Modelling of clinical reasoning is important to help students to understand the reasoning process. This modelling should be explicit and graduated to enable students to understand the process. It should be integrated into programmes and included in "Problem/ Case Based Learning", and small and large clinical group teaching sessions. Lecturers and clinical educators have an important role in developing students' reasoning abilities.
5. Students need to be given opportunities to practice clinical reasoning and receive feedback on their clinical reasoning performance. Online cases could be developed to demonstrate to students how to reason clinically and how to practise the required skills. Teaching workshops could be developed for students who demonstrate difficulty with a particular element of clinical reasoning (e.g. hypothesis generation, or developing learning issues). However, caution should guide the development of paper or simulated cases as they tend to overemphasise instrumental approaches.
6. Clinical educators have an important role in developing students' reasoning abilities. Tutors need to be taught to role model the reasoning process for students and to encourage and critique students' clinical reasoning performance. Further training of

tutors so that they can develop this expertise, may be necessary.

7. Development of students' abilities to think critically should be integrated into programmes. This critical thinking ability could be developed through a variety of educational activities and would not necessarily need to be based on clinical cases in the first instance.
8. In curriculum design, teaching and assessment, greater emphasis needs to be placed on encouraging a deep approach to learning and developing students' abilities to integrate knowledge so that they can apply information from their elaborated knowledge bases in their clinical reasoning.
9. To effectively deliver physiotherapy services in Portugal, a unique society with a distinctive culture, physiotherapists need to examine the relevancy of current physiotherapy practice frameworks and how they comply with the changing environments of practice.

11.5. Strategies to taking forward the recommendations

Many research findings and associated recommendations fail to translate into meaningful changes across multiple contexts. In fact, some estimates indicate that two-thirds of organizations' efforts to implement change fail (Burnes, 2004). Barriers to implementation may arise at multiple levels of healthcare or educational delivery: the teacher/ clinician level, the staff/ working team level, the organizational level, or the market/ policy level (Ferlie & Shortell, 2001).

The majority of the recommendations presented above demand changes in the way clinicians interact with their patients, the role they ascribe to themselves and the current educational practice in undergraduate physiotherapy courses. Embracing these kinds of professional changes means making a paradigm shift that is often difficult because the traditional approach to care seems to be embedded in the training and socialization of Portuguese musculoskeletal physiotherapists. In some cases these recommendations could even present conflicting values for individual practitioners or educators, thus care should be taken in analysing the various possibilities for taking forward the challenges that have been highlighted by this investigation.

Despite the scarcity of research on organizational, economic, and political approaches to successful change, educational strategies are the most frequent activity reported in the literature to promote change. Grimshaw & Hutchinson (1995) have separated educational strategies into two types: *dissemination strategies*, designed to influence awareness, knowledge, and attitudes; and *implementation strategies*, designed to improve adherence to recommendations, turning changes in knowledge and attitudes to changes in practices. The successful introduction of these strategies is dependent of many factors, including the clinical/ educational context and the methods by which they are disseminated and implemented. Taking into account the current status of the profession in Portugal (in practice and education (see for example the absence of specific educational training on physiotherapy teaching staff), both dissemination and implementation strategies are proposed.

Dissemination strategies

Dissemination strategies comprise educational processes, which aim to influence targeted groups' awareness, knowledge and attitudes towards specific issues (in this situation, educational and clinical practice). There is considerable overlap in the types of activities and strategies that can be used to affect knowledge, awareness, attitudes, and skills. However, activities designed to affect knowledge and awareness are more informative, while those needed to affect attitudes and skills require interaction and opportunities to practise skills. The traditional educational formats of lectures, academic and scientific journals, and other forms of electronic dissemination are usually good for increasing awareness (Grimshaw & Hutchinson, 1994). To help promote awareness of understanding the current clinical and educational practice among MPT in Portugal, three dissemination strategies are planned:

- a) Write a paper for publication in a national journal;
- b) Present research papers at national conferences;
- c) Present the study findings at an international conference;

Since dissemination strategies only provide knowledge and increase awareness, but have little impact in changing attitudes, skills, and practice, implementation strategies to take forward the recommendations of this study have also been considered.

Implementation strategies

Implementation strategies comprise processes which aim to turn changes in knowledge and attitudes into changes in practice. In addition to disseminate the findings of this research report, the researcher also planned the possibility of presenting and discussing the findings of this study with teachers and clinical educators of the participating institutions through the organization of a series of workshops. Workshops offer opportunities for interaction and multiple teaching and learning strategies. Participants can practise and learn about their educational practice using role-playing and discussions of case scenario examples.

This kind of strategy could also help to generate and support change by enabling teachers to develop, refine and practise ideas within a reflective and supportive environment. Reflective practice is a key component within effective teaching and professional development (Ferraro, 2000). It comprises a deliberate act of reviewing and critically thinking about practice with the purpose of increasing learning opportunities for students and teachers. Reflection on practice can lead to self-generative change. It is a collaborative process where colleagues enter into a reflective dialogue about practice and/or student achievement data, promoting a shared focus and negotiated understanding within a school/ course.

11.6. Contribution to knowledge

Clinical reasoning is a complex and context dependent phenomenon. The findings of this investigation suggest that the way clinicians' approach clinical reasoning and practice is strongly influenced by clinicians' personal and professional framework and the context where they operate. Clinicians organise their approach to clinical reasoning and practice according to what they think their role is. In traditional biomedical environments clinicians' ascribe themselves a role where patient tends to be excluded from the decision process and the clinician's role is emphasised. Clinical reasoning models, such as the collaborative model described by Edwards and colleagues (2004a) need further investigation to establish their adequacy in relation to actual practice, and to identify how clinical reasoning differs between experts, but also within different contexts of practice.

11.7. Suggestions for further research

This investigation provided insights into the clinical reasoning approach of Portuguese

musculoskeletal physiotherapists. The nature and quality of clinician-patient interaction documented in this investigation highlighted the traditional inequality found in biomedical approaches to health care. Further research is necessary to explore the reasons why clinicians practice as they practice. Additional studies are also necessary to explore the factors clinicians and patients consider important in the interaction. The importance of the interaction between patients and physiotherapists has been described previously (Sluijs *et al.*, 1993; Thornquist, 1994; Klaber Moffett, & Richardson, 1997). Collaborative partnerships between therapists and patients are associated with different kind of benefits, such as improved patient satisfaction, co-operation with health professionals, better management of disease, increased trust and enhanced patient–professional relationships. Therefore a further study could be undertaken to understand the therapist and patient’s perspectives of this type of practice.

As a result of this research, further study could now be undertaken to more deeply understand the complex nature of clinical reasoning in musculoskeletal physiotherapy and the applicability of this study’ findings to other areas of clinical practice in Portugal. Previous research into clinical reasoning in different areas of physiotherapy practice has found important differences between clinicians’ modes of practice and patterns of interaction (Thornquist, 2000). Given the particularities of the Portuguese health care and professional context, it seems relevant to explore if the nature and quality of the interaction found in this investigation is a specific characteristic of musculoskeletal physiotherapists or could be related with a more overarching professional culture.

Clinical reasoning was highlighted in this study as a skill students find difficult to develop. Given that clinical reasoning is fundamental for students to become proficient physiotherapists, further analysis of this skill and investigation of the reasons why it is a difficult skill for students to develop, including how students can increase their abilities in this area, is warranted. As clinical reasoning is such an important component of clinical competence, more research needs to be conducted to explore how clinical reasoning develops, and the best strategies to enhance the development of this important set of skills.

CHAPTER 12

References

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