

# **Satisficing for sustainability in critical care practice: a constructivist grounded theory**

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## Abstract

The National Health Service (NHS) in England is facing resource management challenges. There are NHS initiatives promoting sustainability of resources, although minimal research exists about frontline practitioners' understanding of and concerns about sustainability issues. This research focused on critical care because it uses a large amount of NHS resources by serving patients with complex health needs and life-threatening illness. There is limited research-based literature about sustainability in critical care practice. This study, therefore, aimed to address the gap by generating a substantive theory from asking: 1) How is sustainability constructed by practitioners working in critical care? and 2) What are the social processes involved in making sustainability a component of critical care practice?

The constructivist grounded theory study collected qualitative data through in-depth, semi-structured interviews in an online session or telephone call. There were eleven participants (nurses, physiotherapists and a technician) who worked in NHS critical care units in the South of England. Sampling began as purposive and progressed to theoretical. Other fundamental grounded theory methods included memoing and concurrent data generation and analysis. Constant comparison analysis was facilitated by dimensional analysis, and constructivist grounded theory coding procedures were used for conceptualising, abstracting and theorising. Data analysis continued until theoretical sufficiency had been reached.

Sustainability was defined by participants as a way of sustaining resources for critical care practice into the future. Those resources had financial, environmental and social properties along with broader contextual and conditional influences impacting upon critical care practice and the NHS. Sustainability existed on a continuum with normative, responsible, sustainable and flourishing stages. Full sustainability occurred when all four of these stages were achieved. *Satisficing* (satisfy + suffice) emerged as the central social process which significantly

strengthened the level of sustainability. *Satisficing* referred to decision-making in practice when someone was satisfied quality critical care had been given within the limits of available resources. *Bounded rationality* represented the cognitive and environmental factors influencing decision-making and showed 'how' *satisficing* happened. *Stewarding* was found among participants to be an ethic to use resources responsibly and explained 'why' *satisficing* occurred. The substantive theory, based upon *satisficing*, *bounded rationality* and *stewarding*, is the first theoretical framework for sustainability in critical care practice. This theory offers new insight into how practitioners realise sustainability within their working lives and frames the way sustainable critical care practice can be fostered, taught, and managed.

**Keywords:** Critical Care, Intensive Care, Sustainability, Satisficing, Stewarding, Bounded rationality, Constructivist Grounded Theory

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## Acronyms

AandE – Accident and emergency unit

AMU – Acute medical unit

BACCN – British Association of Critical Care Nurses

CC3N – Critical Care Networks-National Nurse Leads

CQUIN – Commissioning for Quality and Innovation

DEFRA – Department for Environment, Food and Rural Affairs

HDU – High dependency unit

ICS – Intensive Care Society

ICU – Intensive care unit

ITU – Intensive therapy unit which is another term for intensive care unit (ICU)

NHS – National Health Service

NICE – National Institute for Health and Care Excellence

SDU – Sustainable Development Unit

SSD – sterile services department

STP – Sustainability and transformation partnership

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Salma and Sami, the biggest thank you goes to you both. I dedicate this thesis to you.

## 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:

A solid black rectangular box redacting the author's signature.

Dated:

26/03/2019

# Chapter 1 Introduction

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This thesis reports on a constructivist grounded theory generated from a research study about sustainability in critical care practice. Critical care is a specialist type of healthcare providing continuous monitoring and advanced interventions for people with life-threatening illness or injury (Evans 2016). The research explored what the concept of sustainability meant to practitioners working in critical care and illuminated the social processes involved with sustainability becoming a component of critical care practice. The substantive theory produced from the research explained the core social process facilitating sustainability in critical care. The theory also included two other influential social processes which explained how and why this central organising phenomenon occurred.

The initial motivation to develop a theory about sustainability in critical care practice stemmed from the researcher's experience as a critical care nurse in practice and as a critical care nurse lecturer. This clinical and education background prompted the researcher to develop an interest in how resources for critical care practice can be sustained into the future. Subsequently, the constructivist grounded theory study was planned and implemented as part of a doctoral programme. The purpose of Chapter 1 is to justify the importance of the topic of sustainability in critical care practice and to rationalise the significance of this research study. There will also be an overview of the thesis structure indicating the content of each chapter.

## 1.1 Significance of the study

In England, the Sustainable Development Unit (SDU) supports NHS, public health and social care systems to be more sustainable (SDU 2018c). English healthcare practice, in the present model, is unsustainable because current healthcare delivery will not be able to stay within the limits of financial, environmental and social resource availability in the future (SDU 2018c). In response, the *Five Year*

*Forward Review* set an ambitious target to reduce the £30 billion/year gap between financial resources available and patient needs by 2021 (NHS England 2014, 2017). Environmentally, the NHS aimed to decrease carbon emissions by 34% before 2020 (SDU 2014c). Improving staff health and well-being was the first indicator goal in the current Commissioning for Quality and Innovation (CQUIN) scheme illustrating the NHS set social sustainability targets from a sense of corporate social responsibility (NHS England 2018b). CQUIN is an NHS scheme where healthcare organisations earn a financial payment for meeting national and local targets based on clinical quality improvements and transformational change (NHS England 2018a).

A national strategy from the SDU (2014c) proposed how the NHS could sustain quality care and promote social well-being of healthcare staff and society, despite reducing its monetary cost and damage to the Earth's biosphere. Supplementary documents supported this strategy to guide healthcare organisations on sustainability metrics, carbon hotspots, sustainable clinical care and creating social value (SDU 2014a). The SDU (2018a) provided additional direction on sustainable healthcare to the executive boards of NHS organisations. Recently, the NHS Confederation commissioned the Institute of Fiscal Studies and The Health Foundation for recommendations on how to maintain affordable healthcare when there is continually growing demands on the service (Charlesworth and Johnson 2018). Furthermore, the *Sustainable Development Management Plan for NHS England 2018-2020* emphasised the NHS aimed to be a socially responsible employer who respected the needs of staff, communities and the environment while delivering healthcare practice (Mazotta 2018). This plan drew from the following United Nations (2015) sustainable development goals: no poverty, zero hunger, good health and well-being, quality education, gender equality, decent work and economic growth, reduced inequalities, sustainable cities and communities, responsible consumption and production and climate change (Mazotta 2018). The scope of all these strategic documents highlighted the sustainability of healthcare practice is currently a significant concern for the NHS.

The SDU's (2018b) latest annual health check demonstrated the NHS was successful in recent years with progressing its own economic, environmental and social sustainable development. However, the 2018 health check also showed the NHS still needs to make considerable improvements across all three areas. The Department of Health established Sustainability Transformation Partnerships (STPs), as a collaboration between NHS organisations and local authorities, to enhance the sustainability of services through new models of care (NHS England 2016). Each of the 44 STPs across England has a five year, locally agreed plan to simultaneously improve both quality and efficiency of healthcare services (The King's Fund 2017). Safety and quality lie at the core of sustainability because trying to increase productivity alongside decreased resource allocation should not compromise patient care (Pencheon 2013). For example, the *Francis Report* concluded patient neglect occurred from prioritising financial savings and healthcare targets over safe healthcare delivery (Francis 2013). Patient safety and quality care are considerably put at risk when frontline practitioners face reduced resource availability, notably in areas like critical care that deploy advanced clinical technologies for severely unwell patients with life-threatening illness (Al-Saad, Skedgel and Nortje 2017).

This research study focused on practitioners working in critical care because it is a particularly resource-intensive department (Huffling and Schenk 2014; Luchetti 2013). From a financial viewpoint, each critical care patient bed costs between £630 to £1800 per day depending on the type of care provided (Bion 2016). Environmentally, critical care practice involves a proportionately higher amount of medications, therapeutic interventions, medical equipment and staff time compared to hospital ward settings (Batchelor 2013), which creates greenhouse gas emissions, clinical waste and an overall environmental cost (Huffling and Schenk 2014). Fair and equitable distribution of critical care services for society becomes compromised if resource allocation is insufficient for the number of presenting critically ill patients (Al-Saad, Skedgel and Nortje 2017). A lack of critical care bed capacity is a pertinent issue complicated by an ageing population with increased co-morbidities and patients surviving longer due to new technologies (Batchelor 2013; Batchelor et al., 2017; Sjoding et al., 2016). Other contributing factors to critical care bed availability are population growth and

demographic changes which will both influence the demand for intensive care medicine in England which is projected to increase 26% by 2033 (Centre for Workforce Intelligence 2015). However, the need to expand critical care services is set against the backdrop of NHS pressures to reduce the financial and environmental cost of healthcare practice. This approach to 'do more with less' surfaced in the *Carter Review* which recognised critical care in the top twelve specialities prioritised for improved productivity in the NHS, with potential efficiency savings of £209 million (Department of Health 2015; Lord Carter of Coles 2016).

It is, therefore, essential for people working in critical care to practice more sustainably. The publications and government initiatives cited thus far were quite strategic though and did not specifically address the operational aspects of sustainable healthcare practice from the viewpoint of the practitioners delivering clinical critical care practice. This study researches sustainability from the context and perspective of practitioners working in critical care. The debates about what constitutes reasonable life-saving measures are recognised, but the ethics of 'worth', patient outcome and quality of life following critical care interventions are not central to the thesis.

## 1.2 Thesis structure

**Chapter 1 (Introduction)** opened the thesis with an initial exploration of the significance of sustainability in critical care practice to justify research into this topic.

**Chapter 2 (Background)** describes the context of critical care practice as the substantive area of research. The initial literature review conducted at the beginning of the thesis project establishes what was already known about sustainability in critical care before data collection began. The research questions are then identified to recognise the intention of the study.



**Chapter 3 (Methodology)** explains the researcher's philosophical positioning which included a relativist ontology and constructivist epistemology. This section of the thesis also rationalises constructivist grounded theory as the chosen overall approach, with links made to symbolic interactionism and pragmatism.

**Chapter 4 (Methods)** outlines how the researcher conducted the study, including the constructivist grounded theory procedures for sampling, data collection and data analysis. Techniques borrowed from other research approaches are explained, namely the conditional/consequential matrix and storyline from Straussian grounded theory (Corbin and Strauss 2015) and Schatzman's (1991) dimensional analysis. This chapter ends by examining the ethical considerations and methodological rigour within the research.

**Chapter 5 (Findings)** presents direct participant quotations and memos from the researcher to highlight significant findings from the analytical procedures. The data are organised according to the central organising phenomenon and the other major categories to show the development of the emergent substantive theory. Diagrams add pictorial illustrations and tables summarise similar patterns to emphasise the fundamental ideas developed from the findings.

**Chapter 6 (Discussion)** begins with a summary of the substantive theory followed by a critical evaluation to locate the new sustainability in critical care practice theory with the extant literature base. The substantive theory is presented based upon *satisficing* as the central organising phenomenon along with *bounded rationality* and *stewarding* as two other major categories. Significantly, there is also an analysis of how the substantive theory fills in gaps in the literature base and makes an original contribution to new knowledge.

**Chapter 7 (Reflections and Implications)** evaluates the strength of the substantive theory based upon Charmaz's (2014) criteria for a constructivist grounded theory including credibility, originality, resonance and usefulness. The limitations of the study provide a critical view of the thesis after reflecting on the implications of the substantive theory for critical care clinical practice, management, education and further research.

Throughout the thesis, footnotes offer further definitions and contextual details when supplemental information would otherwise disrupt the flow of the argument. Secondly, conducting grounded theory research is not a linear process and footnotes are used to show the iterative nature of the data analysis and conceptual development. The cross-referencing within footnotes to other sections of the thesis or literature also demonstrates how the emergent theory remained grounded in the data.

## Chapter 2 Background

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### 2.1 Context

Critical care is healthcare provided to intensive care or high dependency patients in hospital settings. The classification of critical care (level of care) applies to medical, surgical, general and specialist patients and depends on the number of organs receiving treatment or technological monitoring at a given time. Level 0 and 1 patients are not part of critical care because they have healthcare needs met in a hospital ward. Level 2 and 3 patients have more complex and life-threatening conditions and are the levels of patient acuity making up critical care. Level 2 patients require high dependency care for single organ failure support, complex post-operative management or rehabilitating down from a higher level of care (Evans 2016). Level 3 patients need intensive care, consisting of either advanced respiratory support (e.g. mechanical ventilator) or therapies for multi-organ failure (Evans 2016). Some critical care units include a combination of Level 2 and 3 beds while other hospitals separate intensive care and high dependency care. Patients may also be critically ill as a Level 2 or 3 patient but are managed outside the critical unit itself, such as in Accident and Emergency, post-operative recovery or on a ward overseen by critical care outreach (Bion 2016). The critical care team is multi-disciplinary with medical, nursing, allied health, pharmacist, support and technical staff. This study considered a 'practitioner in critical care' to be any person working in critical care services across the spectrum of roles for clinical care, management and education. As a general umbrella phrase for the thesis, 'practitioner in critical care' included all professions, roles and grades of practice. However, this phrase should not be confused with the specific roles of 'advanced critical care practitioner' or 'critical care practitioner'.

The substantive area of the research was critical care practice within NHS England hospitals for all age groups and specialities. In March 2018, the number of NHS critical care beds in England was 4064 for adults (82.6% occupancy), 455

for paediatrics (78.7% occupancy) and 1434 for neonatal (71.5% occupancy) (Government Statistical Service 2018). At the time of the thesis publication, the most recent available data about hospital admitted patient care activity in England was for adult critical care from April 2016 to March 2017 (NHS Digital 2017). There were 293,170 adult critical care records reported in this 2016-17 analysis, an increase of 8.1% from the previous financial year (NHS Digital 2017). These background figures demonstrated the contextual scale of critical care services in NHS England.

## 2.2 Literature review

An initial literature search, conducted at the beginning of the research project, identified what the literature-base had already established about the topic of sustainability in critical care practice and what remained unknown. The intention was to conduct a general appraisal of the literature at that time, not an exhaustive review. In doing so, the researcher began developing preliminary *theoretical sensitivity* towards the substantive topic area, identified gaps in the knowledge-base and established there was a genuine need to conduct the study (Giles, King and de Lacey 2013; Thistoll, Hooper and Pauleen 2016). *Theoretical sensitivity* is the conceptual insight the researcher develops into the understanding and meaning of data (Glaser 1978; Hoare, Mills and Francis 2012). Some grounded theorists purposefully delay this type of initial literature review though and wait until after data collection and analysis to prevent pre-conceived ideas from contaminating and influencing the theory development (Glaser 1992, 1998, 2001). However, a preliminary search of the literature was required to develop the research questions within the study's design proposal in readiness for scrutiny by the ethics committee. Moreover, the researcher concurred with Thornberg's (2012) notion of 'informed grounded theory' which acknowledges that an initial literature review enhances the research planning, as long as constant reflexivity prevents forcing of pre-conceived ideas. Similarly, the analogy of an 'open mind versus an empty head' is used by Giles, King and de Lacey (2013) to explain how a researcher can remain open to new ideas, but still, have some exposure to the topic before entering into the data collection phase.

This next section of Chapter 2 explains how the publications found during the introductory search served to locate and refine the research questions. Appendix 1 lists the search methods, key terms and databases used for this introductory search. Ongoing and updated search strategies ensured the research questions remained relevant (see Appendix 1). Keeping the literature about sustainability in critical care practice current also confirmed the research questions were not already answered by any other research to verify the originality of this study. Although this thesis is structured according to sequential chapters, grounded theory research is not a linear process. Therefore, the literature presented throughout Section 2.2 is an accumulation of publications found during the introductory, ongoing and updated literature searches throughout the entire research project timeline. The concepts and themes explored in the literature during those later searches were only searched for and selected after the data collection and analysis indicated it would be relevant to do so, to keep the theory development grounded in the data.

### 2.2.1 Sustainability

The meaning of sustainability varied in the literature due to various broad conceptual understandings across different disciplines and a lack of a universal definition (Purvis, Mao and Robinson 2018). There has been a particular proliferation of sustainability as a trendy buzzword over the last decade, which is now commonly used by governments, scientists, organisations, voluntary sector, businesses and the general public (Laasch and Conaway 2015). However, sustainability's vague, ambiguous connotation has led to widespread overuse and misuse, leaving the term to mean 'everything' to some people and 'nothing' to others (Károly 2011; Leal Filho and Brandli 2016; Lein 2016; Smith and Farley 2013). Without a distinct, consistent definition throughout the literature, the researcher then reviewed dictionary descriptions of sustainability<sup>1</sup>:

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<sup>1</sup> The researcher did not review these dictionary meanings of sustainability until after completing data collection and analysis to prevent forcing the data from pre-conceived ideas and to ensure the definition of sustainable critical care practice authentically emerged from the participants.

- Oxford Dictionaries (2019)
  - *“The ability to be maintained at a certain rate or level.”*
  - *“Avoidance of the depletion of natural resources in order to maintain an ecological balance.”*
- Cambridge Dictionaries (2019)
  - *“The quality of being able to continue over a period of time.”*
  - *“The quality of causing little or no damage to the environment and therefore able to continue for a long time.”*
- Merriam-Webster Dictionary (2019)
  - *“Capable of being sustained.”*
  - *“Of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged.”*
  - *“Of or relating to a lifestyle involving the use of sustainable methods.”*
- Wiktionary (2019)
  - *“The ability to sustain something.”*
  - *“A means of configuring civilization and human activity so that society, its members and its economies are able to meet their needs and express their greatest potential in the present, while preserving biodiversity and natural ecosystems, planning and acting for the ability to maintain these ideals for future generations.”*
  - The Latin roots (*sustinere*) mean to support or hold up.

Across these dictionary descriptions of sustainability was a general theme of something persisting and enduring into the future, with the more extended definitions indicating a relationship with people’s financial, environmental and social activities. The closely related concept of sustainable development reflects the application of sustainability to growth, advancement and progress in a responsible manner (Thiele 2016). The phrase sustainable development was first introduced and defined by the World Commission on Environment and Development (1987, 41) in their hugely influential *Brundtland Report* (also referred to as *Our Common Future*):

*“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:*

- *the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and*
- *the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs."*

Long before the *Brundtland Report* was published in 1987, an extensive history of sustainable development existed though, reflecting the concern people have for how their lives impact on other human beings and surrounding eco-systems. For instance, protecting natural resources can be seen in the ancient cultural norms and rules of the Australian Ngunnabarra, New Zealand Maori, Polynesian Tikopia and Cree First Nations people of North America, amongst numerous other indigenous populations (Laasch and Conaway 2015). In 1798, *An Essay on the Principle of the Population* by Thomas Robert Malthus explored unsustainable living patterns by showing how the growing population contributed to increased labour supply, which subsequently decreased wages and brought famine from an inability to produce enough food (Malthus and Gilbert 2008). The economist William Forster Lloyd introduced the *tragedy of the commons* concept in 1833, highlighting that resource depletion for personal self-interest conflicts with the sustainable common good of others in a shared-resource system (Hardin 1968; Garrity 2012). The fair-trade movement, which developed across the 19<sup>th</sup> and 20<sup>th</sup> centuries, showed a collective consciousness towards equity and social justice in the ethical production and consumption of food, clothing and other products (Anderson 2015). The idea that businesses are accountable for their influence on the health of people and the Earth surfaced in the 1950s with the introduction of corporate social responsibility (Bowen 2013). During the 1960s and 1970s, environmentalism, deep ecology (Naess 1973; Devall and Sessions 2001) and the 'green agenda' gained momentum from these types of publications: *Silent Spring* (Carson 1962, 2002), *A Blueprint for Survival* (Goldsmith 1972) and *The Limits to Growth* (Meadows et al., 1972).

The *Brundtland Report*, therefore, symbolised the accumulation of the various sustainable development concepts outlined in the literature of the previous paragraph and signified the global concern towards resource production,

consumption and sustainment with financial, environmental and social implications (World Commission on Environment and Development 1987). The numerous international sustainable development attempts to prevent anthropogenic ecocide (Adams 2016) revealed a focus on worldwide environmental catastrophes, such as climate change, global warming, excessive greenhouse gas emissions, fossil fuel depletion, loss of biodiversity, energy limitations and air pollution (Baker 2016). See Table 1 for a selection of sustainable development conferences and reports addressing current international issues related to environmental sustainability.

Table 1 – International sustainable development milestones

Date	Event or publication	Reference
1972	United Nations Conference on Human Environment (Stockholm)	(United Nations 1973)
1987	<i>Brundtland Report (Our Common Future)</i>	(World Commission on Environment and Development 1987)
1992	United Nations Earth Summit Conference (Rio de Janeiro)	(United Nations 1992)
1997	<i>The Kyoto Protocol</i>	(United Nations Framework Convention on Climate Change 1998)
2002	<i>Johannesburg Declaration on Sustainable Development</i>	(United Nations 2002)
2015	<i>The Paris Agreement</i>	(United Nations Framework Convention on Climate Change 2015)
2018	United Nations Climate Change Conference (Katowice)	(United Nations Framework Convention on Climate Change 2018)
2018	<i>Report on Global Warming of 1.5 °C</i>	(Intergovernmental Panel on Climate Change 2018)

Additionally, sustainability promotion that incorporates financial, environmental and social dimensions is explicit in the United Nations' (2015) most recent Sustainable Development Goals for all countries (see Figure 1 on page 13). These goals draw together themes of social well-being, equality and justice, responsible economic growth and the holistic health of people and the Earth to create financially, environmentally and socially sustainable societies (Hopper 2018).



Figure 1 – United Nations Sustainable Development Goals



(United Nations 2015)<sup>2</sup>

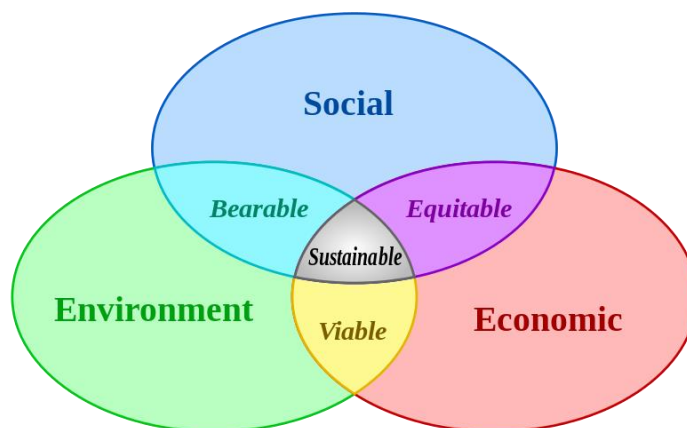
Elkington (1999) also recognised sustainability's inter-connectivity between people, planet and profit when he coined the phrase *triple bottom line*. Corporate social responsibility encourages *triple bottom line* principles whereby businesses and non-profit organisations do not just focus on financial concerns, but also aim to be environmentally friendly and morally sound towards the social needs of all stakeholders (Moratis 2016; Aluchna 2017; Rasche, Morsing and Moon 2017). In comparison to the other two elements of the *triple bottom line*, the literature had less emphasis and clarity for social sustainability. Specific examples of social sustainability included ethical procurement, philanthropic goodwill and the enhancement of staff well-being (Dežmar-Krainz 2015). More prominent in the literature were sustainability's economic and ecological aspects, operationalised as a *circular economy* where all types of waste are recovered, rejuvenated and recycled as much as possible to efficiently maximise resources (Geissdoerfer et al., 2017; Kirchherr, Reike and Hekkert 2017). Therefore, the closed-loop supply

<sup>2</sup> Image source: <https://www.un.org/sustainabledevelopment/news/communications-material/>  
 Guidelines for the use of the SDG logo: <https://www.un.org/sustainabledevelopment/wp-content/uploads/2017/12/UN-Guidelines-for-Use-of-SDG-logo-and-17-icons-December-2017.pdf>

chain of a *circular economy*, within a *triple bottom line* approach, contrasts the unsustainable *take-make-dispose* steps of a linear economy with limited resources (Souza 2018).

The literature search revealed illustrative models of sustainability which depicted the *triple bottom line* through a Venn diagram, independent pillars or concentric circles (Elliott 2013; Purvis, Mao and Robinson 2018). The Venn diagram's overlapping circles represented a positive relationship between the three main types of resources. Sustainability exists when all three aspects simultaneously fuse together, bringing multiple co-benefits (see Figure 2). Joining up environmental and social resource use ensures the process is 'bearable'; a healthy connection between social and economic aspects creates 'equality'; and, the intersection between ecology and finances shows 'viability' (Barbier 1987).

Figure 2 - Sustainability illustrated through a Venn Diagram

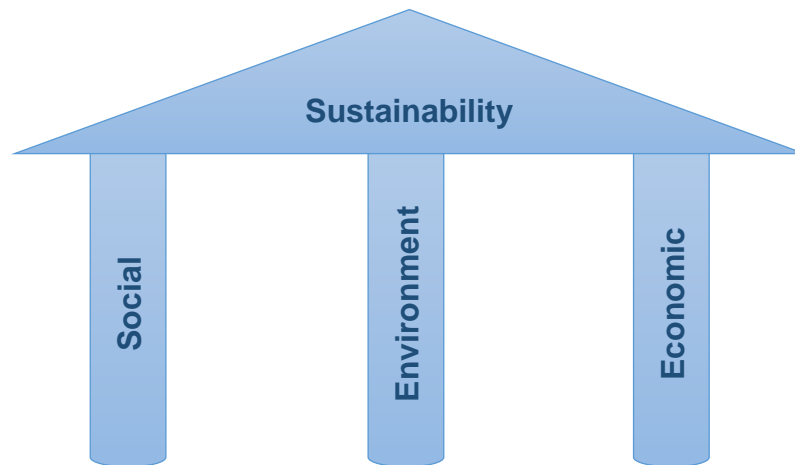


(Barbier 1987)<sup>3</sup>

Another model of sustainability separated the three elements of the *triple bottom line* into distinct pillars (see Figure 3 on page 15). The social, environmental and financial columns are the same size to symbolise they are all equally important in holding up the overarching roof of sustainability, but they do not overlap as shown in the other two diagrams (Brinkman et al., 2011).

<sup>3</sup> Image source (Creative Commons): By Johann Dréo - Own work inspired from *Developpement durable.jpg*, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=1587372>

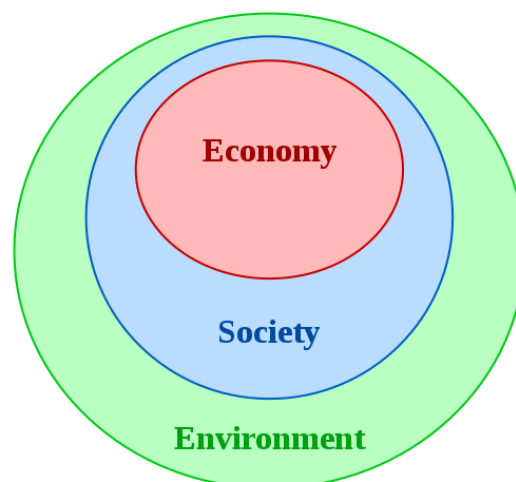
Figure 3 – Sustainability illustrated through pillars



(Brinkman et al., 2011)

The connotation of the concentric circle diagram (see Figure 4) signifies sustainability as a combination of the three aspects of the *triple bottom line*, but with the economy as a smaller circle inside a medium size society which nests inside the larger environment. The image in Figure 4 differs because of the emphasis on financial sustainability depending on the surrounding society, which in turn is limited by the size of the environment (Scott Cato and Kennet 2009).

Figure 4 - Sustainability illustrated through concentric circles



(Scott Cato and Kennet 2009)<sup>4</sup>

<sup>4</sup> Image source (Creative Commons): By KTucker - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=17030898>

In summary, the literature search revealed sustainability to be a concept without a universal definition. However, themes throughout the literature showed sustainability meant maintaining something into the future, without having adverse effects. Sustainable development was the application of sustainability to something which is growing and expanding. Sustainable development explained the responsible use of the *triple bottom line* of economic, environmental and social resources for an individual, business entity, organisation, localised society or global population.

### 2.2.2 Sustainability in healthcare

The literature search identified a variety of organisations who aim to improve sustainability within healthcare practice by incorporating the sustainability and sustainable development principles discussed in the previous Section. Table 2 on page 17 lists three such organisations with the most relevance to NHS England hospitals, identifies their remit and indicates examples of resources they provide to support sustainable healthcare settings. Others identified during the literature search included the International Society of Doctors for the Environment<sup>5</sup>, Practice Greenhealth<sup>6</sup> (American), the Alliance of Nurses for Healthy Environments<sup>7</sup> (American) and the Canadian Coalition of Green Healthcare<sup>8</sup>. The range of these various groups demonstrated an abundance of national and international initiatives promoting hospitals to become more sustainable in how they function as secondary care providers. Although many of these organisations defined sustainability according to the *triple bottom line* for financial, environmental and social dimensions, they primarily focused on ecological aspects of healthcare. Economic savings or improved social sustainability from their work occurred as desirable secondary co-benefits, rather than primary intentions.

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<sup>5</sup> <http://www.isde.org/>

<sup>6</sup> <https://practicegreenhealth.org/>

<sup>7</sup> <https://envirn.org/>

<sup>8</sup> <http://greenhealthcare.ca/>

Table 2 – Sustainability and healthcare organisations

Name of organisation	Remit of organisation	Examples of support for healthcare practice
<b>Sustainable Development Unit</b>	Funded by NHS England and Public Health England to promote sustainability throughout the NHS, public health and social care.	<a href="http://www.sduhealth.org.uk">www.sduhealth.org.uk</a> Guidance, case studies and events on procurement, clinical practice and metrics for sustainability.
<b>Centre for Sustainable Healthcare</b>	Registered charity in England and Wales which is helping the NHS to reduce the carbon footprint of the NHS by 80% by 2050.	<a href="http://sustainablehealthcare.org.uk">sustainablehealthcare.org.uk</a> Networks for clinical specialities, green space projects, education materials and sustainability support.
<b>Health Care Without Harm</b>	International non-profit organisation which supports healthcare to transform itself for a reduced environmental footprint. Includes a European regional office.	<a href="http://noharm.org">noharm.org</a> Global Green and Healthy Hospitals project, Global Health Care Waste project and guidance on pharmaceuticals and medical devices.

Textbooks with suggestions on how to improve the sustainability within healthcare services included *Sustainable Healthcare* (Schroeder et al., 2012), *Sustainability for Healthcare Management: A Leadership Imperative* (Rich, Singleton and Wadhwa 2018) and *Greening Health Care: How Hospitals Can Heal the Planet* (Gerwig 2014). These books referred to the *triple bottom line* concept and principles of sustainable development in promoting sustainable healthcare to meet a growing population, despite reduced resource availability. However, much like the organisations identified in Table 2 and the previous page, these books primarily focused on prioritising ecologically sensitive healthcare, which then brought improved financial and social aspects of practice.

Similar to the general literature reviewed in the previous Section, the search within healthcare specific publications found social sustainability to be the least clearly explained of the three components of the *triple bottom line*. However, the SDU (2015a) endorsed NHS organisations to create social value by delivering improved

and more equitable health outcomes with less environmental and economic costs. Ethical procurement was another example of social sustainability which involved fair trade through legally acceptable labour standards during the production of healthcare supplies (SDU et al., 2017). Current examples of a lack of social sustainability from unethical procurement included how the NHS imports vast quantities of gloves, metal instruments and uniforms manufactured in other countries with hazardous, unsafe working conditions (British Medical Association 2018).

The literature search also revealed publications which advocated for the integration of sustainability into healthcare education to prepare practitioners for the strain on resources they will face in their future and to deliver healthcare more sustainably. A variety of general articles promoted sustainability teaching for nurses (Adlong and Dietsch 2015; Barna, Goodman and Mortimer 2012; Goodman and East 2014; Goodman 2011, 2013). Research studies showing the positive benefits of embedding sustainability into nursing curricula included a case study about design students participating in clinical skills teaching (Richardson et al., 2014), a thematic analysis of an @WeNurses twitter discussion (Richardson, Grose, et al., 2016) and an observational study about the NurSusTOOLKIT (Alvarez-Nieto et al., 2018). As a free online collection of educational materials for nurses, the NurSusTOOLKIT disseminated a sustainability literacy and competency framework across Europe (NurSus 2018). Other studies recommended increasing education about sustainability in nursing practice using a scenario-based approach (Richardson et al., 2015; Richardson, Heidenreich, et al., 2016; Richardson et al., 2017). In relation to medical education, the General Medical Council endorsed the following sustainable healthcare learning outcomes for medical school curricula in the United Kingdom (Thompson et al., 2014, 1924):

1. *“Describe how the environment and human health interact at different levels.*
2. *Demonstrate the knowledge and skills needed to improve the environmental sustainability of health systems.*
3. *Discuss how the duty of a doctor to protect and promote health is shaped by the dependence of human health on the local and global environment.”*

Finally, the Centre for Sustainable Healthcare (2019) hosts an online network to facilitate sustainable healthcare education for working professionals and students. The extent of this education-related literature and resources showed the growing demand and interest across the healthcare sector to learn more about transforming practice into becoming more sustainable.

The introductory literature search included acute healthcare because critical care falls under the umbrella of acute care practice. Most of the acute care literature was non-research based and focused on environmental sustainability. Some publications discussed financial viability, particularly concerning more productive, efficient and less wasteful healthcare practices. Very few articles explicitly considered social sustainability as the third aspect of a sustainable healthcare system. A selection of acute care literature about environmental, financial and social sustainability is now discussed, chosen because of their potential applicability to critical care practice. This review includes books and grey literature because of the limited amount of journal articles about sustainable acute care practice found during the literature search.

Research studies critiqued with some relevance to sustainability in acute care included publications by Naylor and Appleby (2012), Grose et al. (2012), Nichols et al. (2013), Connor and Mortimer (2010) and Kaplan and Frost (2017). The study by Naylor and Appleby (2012) was a sizeable scoping review undertaken for the King's Fund. It concluded that the environmental sustainability of health and social care is a significant issue needing to be addressed, due to the substantial negative impact the current care delivery has on the environment. Naylor and Appleby (2012) also identified the co-benefits of financial and environmental savings to be achieved through less wasteful and more efficient healthcare services. Different research about healthcare waste used interviews with a range of stakeholders to explore issues affecting the behavioural changes required for more sustainable approaches to waste management (Grose et al., 2012; Nichols et al., 2013). By surveying sustainability practices in renal services, Connor and Mortimer (2010, 159) concluded: "*sustainable healthcare requires not only sustainable estates management but also sustainable clinical practice*". A literature review and qualitative survey of hospital sustainability directors by

Kaplan and Frost (2017) linked environmentally sustainable healthcare with improved patient and worker health, better job satisfaction and enhanced productivity. These research studies all highlighted the need for further research about sustainability and healthcare practice from the perspective of frontline clinical staff. Pencheon (2013) concurred, recognising a whole systems approach to sustainable healthcare was required, including how individual practitioners understand, make sense of and use the concept of sustainability in their daily clinical practice.

A concept analysis of sustainability and nursing by McMillan (2014, 764) also acknowledged the lack of a research-based definition of sustainability according to the meaning held by nurses and other stakeholders:

*“This paper has further highlighted sustainability as a concept dependent on a multitude of stakeholders; however, there is a dearth of literature exploring what sustainability means to those stakeholders...It is now time to engage those grassroots supporters and stakeholders in sustainability research to understand the concept better, and what it means to those it is meant to better.”*

Similarly, Anåker and Elf's (2014) concept analysis of sustainability in nursing advocated for more research about sustainable healthcare practice because of the ecological footprint nursing care has on the physical environment. Kangasniemi, Kallio and Pietila (2014) reviewed the literature about ecologically responsible nursing and concluded hospital nurses have a crucial role in improving the environmental and financial sustainability of clinical healthcare. The literature search did not find a concept analysis or literature review specific to sustainability and other professional roles working in critical care, for instance, for medical doctors, physiotherapists or pharmacists.

A literature review about decreasing waste in the NHS acknowledged the potential for nurses and other healthcare professionals to make the healthcare system more sustainable through improved efficiencies and eliminating unnecessary clinical care (Minogue and Wells 2016). Likewise, a general article by Kleber (2018) recommended nurses take a more active role in waste reduction and making waste disposal methods more financially and environmentally sound. Guidance



for medical doctors to minimise waste and become more sustainable practitioners came from the Academy of Medical Royal Colleges (Maughan and Ansell 2014) and the Royal College of Physicians (2017, 2018).

### 2.2.3 Sustainability and critical care practice

Critical care, as previously noted, is hospital-based intensive or high-dependency care for patients with severe, complex and potentially life-threatening health needs (Evans 2016). While providing comprehensive clinical management of critically ill patients, the critical care team care uses a range of resources to support dysfunctional or failing organs (Marshall et al., 2017). Sustainability was an established concept in sustainable development literature (Blewitt 2018; Caradonna 2014; Jacques 2014; Kopnina and Shoreman-Ouimet 2015; Vries 2013). These types of publications drew from the *Brundtland Report's* central principle that sustainable development involves maintaining sufficient financial, ecological and social resources to meet the needs of the world now and into the future, without compromising upcoming generations (World Commission on Environment and Development 1987). Momete (2016, 1) applied the premise of the *Brundtland Report* into defining sustainable healthcare as “*a complex system that is economically, socially, and environmentally viable in the long term for all human beings, with no negative impacts on any subsystem of the healthcare system.*” Momete (2016) also presented a model of sustainable healthcare illustrated as a balance between affordable inputs (resource investment) and desirable outputs (health and disease-related outcomes) of healthcare practice. However, this was a generic model for the entire healthcare system to meet the health needs of populations across multiple countries. A specific theoretical framework was absent in the literature which conceptually defined and explained sustainable critical care practice.

Although there was no research-based literature pointing to an overall critical care sustainability framework, there were publications about critical care financial sustainability (Hutchings et al., 2009; Reis Miranda and Jegers 2012; O'Brien, Kumar and Metersky 2013). An extensive survey of critical care doctors, nurses

and allied health professionals working in the United Kingdom ( $n=511$ ) indicated they had significant concerns about how critical care will be able to sustain itself in the current financial climate (Batchelor et al., 2017). The respondents felt the present amount of funds allocated to critical care was unsustainable to maintain safe staffing models and to meet the increasing demands placed on the service. The survey authors also recommended NHS Sustainability and Transformation Partnerships should include the critical care community while reconfiguring acute hospital services (Batchelor et al., 2017). An updated national survey revealed practitioners working in critical care ( $n=386$ ) still viewed the supply and demand for critical care services as imbalanced due to a perilous lack of bed capacity from insufficient financial investment (Faculty of Intensive Care Medicine 2018a). Further details of these two national surveys along with other national critical care workforce evaluations are summarised in Table 3.

Table 3 – Critical care workforce surveys in the United Kingdom

Report	Key information
<b>In-depth review of the anaesthetics and intensive care medicine workforce (Centre for Workforce Intelligence 2015)</b>	<ul style="list-style-type: none"> <li>• Projected baseline demand for intensivists (anaesthetists and intensive care medicine specialist doctors) is expected to increase annually by 4.7%.</li> <li>• Demand for intensivists is likely to continue exceeding the supply leading to a shortage in the medical workforce for critical care services.</li> </ul>
<b>Critical futures: a report on the first wave survey (Batchelor et al., 2017)</b>	<ul style="list-style-type: none"> <li>• All members of the multidisciplinary critical care team, including the newly developed role of advanced critical care practitioner, need to have sustainable career paths.</li> <li>• Critical care practice requires improved efficiencies to be more resourceful.</li> </ul>
<b>Critical capacity: a short research survey on critical care bed capacity (Faculty of Intensive Care Medicine 2018a)</b>	<ul style="list-style-type: none"> <li>• 62% of critical care units lacked sufficient registered nurses.</li> <li>• 40% of critical care units closed beds each week due to staffing issues.</li> <li>• 80% of critical care units transferred patients out from a lack of bed capacity.</li> </ul>
<b>Critical engagements: key findings and recommendations</b>	<ul style="list-style-type: none"> <li>• Critical care staffing shortages impeded the ability to adequately provide a quality service,</li> </ul>

<b>from the regional engagements (Faculty of Intensive Care Medicine 2018c)</b>	including a lack of medical, nursing, allied health and pharmacist team members. <ul style="list-style-type: none"> <li>• Clinical factors contributing to an increased demand for critical care included the ageing population and patients presenting with more frailty and complex health needs.</li> </ul>
<b>National critical care non-medical workforce survey (Berry, Himsworth and Littleton 2016)</b>	<ul style="list-style-type: none"> <li>• 46% of critical care units relied on agency or temporary workers for &gt; 20% of registered nurses on any given shift, which exceeded the national standard.</li> <li>• Staffing deficiencies existed across the multi-disciplinary team including for dietetics, speech and language therapy, occupational therapy, physiotherapy, psychology and pharmacy.</li> </ul>
<b>National critical care nursing and outreach workforce survey (Horsfield et al., 2018)</b>	<ul style="list-style-type: none"> <li>• Nationally, 9.9% of registered nurses came from the European Union and 16.6% from non-European Union countries, although some regions have 50% of their registered nursing workforce recruited from overseas.</li> <li>• There were 1440 registered nursing vacancies (8.35% of total registered nursing workforce).</li> <li>• Nationally, the annual turnover of registered nurses was 10.1%, but 18 critical care units had a yearly turnover &gt; 20%, and the highest unit turnover was 42%.</li> </ul>

No literature specifically mentioned social sustainability in relation to critical care practice. However, reports about the critical care workforce linked to the social needs of critical care patients and their family members, as well as sustaining the staff as people. For instance, the survey literature presented in Table 3 on page 22 indicated the financial squeeze on the NHS limited critical care units' ability to adequately care for the psychological and rehabilitation needs of patients and their families (Berry, Himsworth and Littleton 2016). Furthermore, staffing vacancies, high staff turnover rates and bed capacity issues all had an association with low morale, high rates of sickness and increased burnout of critical care team members (Batchelor et al., 2017; Faculty of Intensive Care Medicine 2018d). A new national working group to promote critical care staff wellbeing produced guidance on reducing burnout as a joint endeavour and goal of the Intensive Care Society, Faculty of Intensive Care Medicine and British Association of Critical Care Nurses (2018). Financial and social resource issues merged within *Critical*

*Futures*, a long-term national critical care project addressing the rising demand on an overstretched service from changing societal expectations, a growing population, insufficient funding, not enough staff and harmful work-life balance (Faculty of Intensive Care Medicine 2018b). *Critical Futures* produced a public engagement leaflet entitled *Critical Condition: Building a Sustainable Future for the Sickest Patients in the Hospital*, (Faculty of Intensive Care Medicine 2018b). The leaflet summarised the present concern about the sustainability of critical care practice in this statement: “*the proud tradition of sustained, high quality led care, at all times of the day and night, is under significant threat*” (Faculty of Intensive Care Medicine 2018b, 4).

The introductory literature search also found non-research based general articles advising on improving the environmental sustainability of critical care units (Chapman and Chapman 2011; Huffling and Schenk 2014; Pate 2012). There was also an editorial challenging nurses to consider their carbon footprint (Scholes 2009). Only two pieces of primary research directly related ecological sustainability to critical care practice (de Oliveira Furukawa et al., 2016; Pollard et al., 2014). The first demonstrated that a Lean Six Sigma<sup>9</sup> intervention reduced waste and improved environmental sustainability of medication use in a Brazilian intensive care unit (de Oliveira Furukawa et al., 2016). Secondly, the Pollard et al. (2014) study evaluated a new model for predicting carbon emissions associated with electricity consumption in a critical care unit based on the level of care provided. Nichols et al. (2016) attempted a systematic review of ecological sustainability and waste in neonatal intensive care but found only one publication (Nichols 2013). A qualitative enquiry about family centred neonatal intensive care recommended further research into ‘resource managed care’ (lean, efficient and productive practice), because this could potentially contribute to financial and environmental sustainability co-benefits (Nichols 2014).

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<sup>9</sup> Lean thinking originated in business and used the Toyota Production System and Six Sigma model to add value while reducing waste (Bradley 2015). Lean thinking is now used in healthcare practice to improve resource efficiency (Dannapfel, Poksinska and Thomas 2014; Kasivisvanathan and Chekairi 2014; Toussaint and Berry 2013).

No empirical research or other literature directly explored how practitioners from critical care defined the concept of sustainability. Nor was any research or general literature found on the influencing social processes for how sustainability becomes a part of critical care practice.

#### **2.2.4 Decision-making in critical care practice**

Resource use, as an underpinning theme related to sustainability, was evident throughout the review of the literature thus far<sup>10</sup>. Decision-making about the use of critical care resources then becomes intrinsically linked to sustainability in critical care practice. Theories and knowledge about clinical decision-making, judgements and reasoning for any type of healthcare practice were well established in the literature (Alfaro-LeFevre 2017; Carvalho, Oliveira-Kumakura and Morais 2017; Cooper and Frain 2016; Higgs et al., 2019; Irfan 2019; Schell and Schell 2018; Standing 2014; Trimble and Hamilton 2016). There was also an abundance of literature distinctive to the context of clinical decision-making in critical care practice (Benner, Hughes and Sutphen 2008; Benner, Tanner and Chesla 2009; Benner, Stannard and Hooper-Kyriakidis 2011; Maharmeh et al., 2016; Razieh, Somayeh and Fariba 2018; Lighthall and Vazquez-Guillamet 2015).

These general and critical care specific publications considered clinical decision-making to be a thought process where cues and information from a healthcare situation are analysed to guide further investigations and actions. Models of clinical decision-making drew from seminal theories such as hypothetico-deductive reasoning (Elstein, Shulman and Sprafka 1978), pattern recognition (Groen and Patel 1985) and intuition (Benner 2001). Another frequently cited clinical decision-making model depicted three essential elements of practice-based knowledge, reasoning skills and metacognition, as influenced by the context of the clinical problem, patient situation and environment (Higgs et al., 2019).

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<sup>10</sup> The introduction to the literature review explained that Chapter 2 is a combination of literature found throughout the entire research study. For enhanced transparency and clarity of the project timeline, it is important to note that Section 2.2.4 was written after data collection and analysis during the final editing phase of the thesis. Therefore, the concepts of resource use, decision-making and *satisficing* emerged from the research data and were not forced upon the theory development.

One type of decision-making process called *satisficing* appeared in some critical care publications (Lighthall and Vazquez-Guillamet 2015) representing when a decision-maker becomes 'satisfied' of reaching a goal while 'sufficing' with available resources (Simon 1955). *Satisficing* was not extensively developed within the critical care literature and primarily focused on diagnostic reasoning where premature closure leads the decision-making to stop consider other possibilities and jumps in early to an incorrect conclusion (Nickson 2016). *Satisficing*, with a more direct and explicit link to sustainability in critical care practice, was not found in any of the literature searches.

### 2.2.5 Summary of literature search

It was apparent from the literature that sustainability in critical care practice was a considerable issue in the NHS due to the pressures on financial, environmental and social resources. To be a more sustainable healthcare system, the NHS has resource improvement goals including lowering monetary cost, decreasing greenhouse gas emissions and promoting staff wellbeing and retention. What the literature also suggested was the possibility for healthcare practitioners to actively contribute to enhancing the sustainability of the clinical area of the NHS in which they work. What was missing from the literature though was an established theory to explain what the concept of sustainability meant to practitioners working in critical care. Additionally, the literature did not indicate if / how practitioners from critical care intentionally or unintentionally influence sustainability agendas within the NHS. Nor did the literature recognise the social processes involved with sustainability becoming a part of critical care practice. Without research into front-line practitioners' understanding of and concerns about sustainability, there is a risk for strategic sustainability policies and programmes to be ineffective in that area of clinical practice, in this case, critical care.

## 2.3 Research questions

The literature review highlighted a gap in the existing knowledge base about sustainability in critical care practice and led to the following research questions for this study to address:

- How is sustainability constructed by practitioners working in critical care?
- What are the social processes involved in making sustainability a component of critical care practice?

## 2.4 Research aim

The overall aim of the study, in response to the research questions, was to generate an explanatory substantive theory about how practitioners in critical care construct the concept of sustainability and the social processes involved with sustainability being a part of critical care practice.

## Chapter 3 Methodology

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### 3.1 Introduction

The research questions sought to explore the subjective meaning of sustainability and to examine social processes involved with sustainability in critical care practice. A pragmatist paradigm, drawing from a symbolic interactionist theoretical framework, was the lens used to view these open-ended, exploratory questions. The philosophical positioning of a relativist ontology and constructivist epistemology is now explained in this chapter, as influenced by symbolic interactionism and pragmatism. Grounded theory research was the most suitable type of study to address the research questions. A rationale explains the specific choice of a constructivist grounded theory methodological approach. Finally, this chapter explains the analytical techniques borrowed from other forms of grounded theory methods.

### 3.2 Philosophical perspective

#### 3.2.1 Relativist ontology

The type of knowledge being sought by the research questions was subjective in nature which reflected the relativist ontological positioning of the researcher. Relativism rejects the notion of absolute truth and views reality as conditional, local, personal and able to take on different forms depending on the perspective of each individual person (Lincoln, Lynham and Guba 2018). Thus, how sustainability is defined by one practitioner in critical care may be different compared to the meaning of sustainability for another. In addition, sustainability issues for one critical care patient situation may be influenced by the current context with different issues arising in other moments of time for that patient or with other patients. Additionally, the complex health needs of critically ill patients are multi-faceted and holistically involve a number of different elements such as the patient's physiological self, psychological self and family (Adam 2017). A relativist ontological position was taken by the researcher to embrace the



possibility of multiple constructions for how practitioners view sustainability in critical care practice (Green and Thorogood 2018). Reality for practitioners in critical care was also recognised as value-laden, involving subjective interpretation of the influence of culture, context and past experience, which fits with the ontological assumptions of relativism (Lincoln, Lynham and Guba 2018).

### 3.2.2 Constructivist epistemology

The researcher's constructivist epistemological position allowed for a qualitative enquiry underpinned by the supposition that all people, including researchers, construct the realities surrounding them (Charmaz 2018). Constructivist research "*starts with the experience and asks how members construct it*" (Charmaz 2014, 342). This kind of research thus involves the researcher co-constructing meaning of the phenomenon of study with participants. A constructivist epistemological approach was compatible with the first research question because it asked how practitioners in critical care construct sustainability. In other words, what does sustainability mean to people working in critical care? The findings from constructivist research result from the interaction between the researcher and participants and researchers are unable to completely separate their previous knowledge and experiences with the phenomenon being studied (Lincoln, Lynham and Guba 2018). By using a constructivist lens, the researcher acknowledged she was an educator teaching novice critical care nurses and a practising clinical nurse providing direct care to critically ill patients. The researcher was also involved with sustainability initiatives within her home life outside of work and as part of a professional role in the University's Sustainability Special Interest Group. Along with the introductory literature review, these past experiences with critical care nursing and sustainability projects provided early *theoretical sensitivity* which is inevitable if researching a topic of a professional interest (Thornberg 2012).

As a constructivist, the researcher did not shy away from past experiences influencing how critical care and sustainability were viewed, nor was previous exposure to the research topics considered to be negative (Ramalho et al., 2015). Additionally, the researcher's personal views, perceptions, opinions and

knowledge from past experiences were reflexively managed to be critically engaged with prioritising the participants' views and to not inadvertently force the data (Charmaz 2018). Reflexivity ensured the researcher was sensitised to the participants' main concerns about sustainability while recognising both the researcher and study participants had personal interpretations of what sustainability in critical care practice meant for them. The thesis is written in the third person as a deliberate choice to not emphasise the voice of the researcher while presenting the co-construction of the meaning of sustainability in critical care practice. Some constructivist grounded theorists write in the first person, but the researcher felt the third person voice would enhance the explanation of merged meaning for this thesis. Further discussion about how reflexivity enriched this research can be found in Section 4.4.2.1.

### 3.2.3 Symbolic interactionism and pragmatism

Constructivism draws from symbolic interactionism, a philosophical perspective which *“focuses on dynamic relationships between meaning and actions, it addresses the active processes through which people create and mediate meanings”* (Charmaz 2014, 345). With its roots in symbolic interactionism, constructivism was an appropriate epistemology to address both research questions due to the focus on active processes and the meaning created from social interaction (Carter and Fuller 2015; Charmaz and Belgrave 2013). Symbolic interactionism, as a social theory, originated out of the pragmatist traditions of George Herbert Mead and more notably his student Herbert Blumer (Sandstrom 2014). Blumer (1986) established 3 fundamental aspects of symbolic interactionism which Charmaz (2014) extended by adding 3 more for further clarification. See Table 4 for a comparison of the 6 premises of symbolic interactionism to this research study.

Table 4 – Symbolic interactionism premises

Symbolic interactionist assumptions	Application to this study
<i>“Human beings act towards things on the basis of the</i>	Practitioners in critical care will hold meaning for sustainability

<b>Blumer (1986, 3)</b>	<i>meanings that things have for them.</i>	as it relates to critical care practice.
	<i>“The meaning of such things is derived from, or arises out of, the social interaction that one has for one’s fellows.”</i>	The meaning practitioners hold for sustainability in critical care practice will come from social interaction with other people.
	<i>“These meanings are handled in, and modified through, an interpretative process used by the person in dealing with the things he encounters.”</i>	Practitioners are human beings actively engaged with the people and things involved with critical care practice.
<b>Charmaz (2014, 270-271)</b>	<i>“Meanings are interpreted through shared language and communication.”</i>	The meaning of sustainability is voiced through language, symbolising the construction of what sustainability means to practitioners in critical care.
	<i>“The mediation of meaning in social interaction is distinguished by a continually emerging processual nature.”</i>	Social processes will influence if / how sustainability becomes a component of critical care practice.
	<i>“The interpretive process becomes explicit when people’s meanings and/or actions become problematic or their situations change.”</i>	Practitioners’ main concern about sustainability in critical care practice and their actions will have an impact on and be influenced by the meaning they hold with this concern.

Pragmatism, as the basis of symbolic interactionism, provided further philosophical insight into the researcher’s constructivist point of view for this study. For pragmatists, there is no certainty, truth is conditional and reality is fluid with multiple perspectives (Ritzer and Stepnisky 2014). These points have already been discussed as congruent with the researcher’s way of looking at sustainability in critical care practice because an assumption was made that there is no absolute true definition of sustainability. Instead, the meaning of sustainability, as influenced by contexts and conditions, can be co-constructed between the researcher and the participants. Other essential features of pragmatism include knowledge being seen as what has proved useful, a focus on actions related to problem-solving and an emphasis on the practical application of ideas (Bryant 2017). With pragmatism, there is a sense of knowledge creation aimed at ‘what works’ from a practical point of view. These elements of pragmatism fit well with

the researcher's aim to create a theory about sustainability being part of the 'practice'. In other words, the 'doing' of critical care.

The researcher developed *methodological sensitivity*<sup>11</sup> towards the substantive subject area by:

- Reflecting on the significance of the research, background context and findings from the introductory literature search.
- Carefully considering the intent and direction of the research questions and aim of the study.
- Memoing<sup>12</sup> about the philosophical positioning taken by the researcher on the topic of sustainability in critical care practice (relativism, constructivism, symbolic interactionism and pragmatism).
- Learning about different types of research to identify and rationalise the methodology and methods which were most suitable for answering the research questions and achieving the aim of the study.

By comprehensively acquiring *methodological sensitivity* in this way, a constructivist grounded theory approach was selected for the research design which will be explained and justified in the next section.

## 3.3 Grounded theory

### 3.3.1 Rationale for grounded theory

Grounded theory research aims to generate a theory based upon a structured and systematic approach to simultaneously gathering, analysing and coding data about the basic social processes related to the studied phenomenon (Glaser 1998). The primary reason for selecting grounded theory for this study was because the project intended to build a substantive theory about sustainability in critical care practice. Additionally, grounded theory research is appropriate when little is

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<sup>11</sup> *Methodological sensitivity* is defined by Bryant (2017, 36) as "the skill or aptitude required by researchers in selecting, combining, and employing methods, techniques and tools in actual research situations."

<sup>12</sup> A memo is written by the researcher to record of ideas, reflections, analysis, comparisons and questions which captures the researcher's thinking at the time the memo is completed (Charmaz 2014). See 4.2.3.1 for further discussion on the use of memoing throughout this study.

known about a topic due to grounded theory's exploratory and inductive style of enquiry (Birks and Mills 2015). The introductory literature search did not find a research-based definition or an established theoretical framework for sustainability in critical care which demonstrated the lack of knowledge about this topic and the need to develop an explanatory theory.

A social process is an action entailing a succession of linked activities over time, has human interaction within it and brings about some form of change (Charmaz 2014; Patterson and Morin 2012). By endeavouring to explain significant social processes, grounded theory research moves beyond description into a fuller understanding of the meaning and actions involved with the context, conditions and consequences of the phenomenon of interest (Corbin and Strauss 2015). As indicated in the previous Chapter on page 27, this study questioned what the social processes are which enable sustainability to become a part of critical care practice providing further confirmation that grounded theory was a suitable methodological choice.

Other rationales for using grounded theory was its flexibility and use of concurrent data generation and data analysis (Groen, Simmons and McNair 2018). These allow the researcher to shift and capture the fluidity of a topic as things change and move on throughout the study period (Charmaz 2014). An adaptable research approach was relevant because both critical care practice and sustainability are dynamic from being responsive to ongoing changes in technology, political influences and their underpinning knowledge bases (Batchelor 2013; Koprina and Shoreman-Ouimet 2015; Marshall and Toffel 2005). For this reason, Samuel (2011, 134) encourages researchers investigating the concept of sustainability to consider grounded theory:

*“Sustainability research will require an ability to research rapidly emerging and embryonic phenomena about which relatively little is known, and to intertwine research and practice. Grounded theory is an important research approach in such fields.”*

Confusingly, the phrase 'grounded theory' can refer to the methodology, research design, procedural methods, output; or, used interchangeably by the same author

(Bryant 2017). For clarification of the language of this thesis, the following terminology is defined as follows drawing guidance from Charmaz (2014) and Bryant (2017):

- **Grounded theory research** – exploratory enquiry into a topic where little is known with a focus on social processes and an aim to inductively create a theory.
- **Methodology** – the underlying philosophy explaining the ontological and epistemological positioning of the researcher. For this study, the researcher’s methodology included a relativist ontology and constructivist epistemology with the additional influence of symbolic interactionism framed by the lens of pragmatism.
- **Grounded theory approach** – the type of grounded theory research based upon the philosophical perspective of the researcher with three main strands: classic, Straussian or constructivist (this study took a constructivist approach). All three grounded theory approaches use the same methods and techniques listed below.
- **Grounded theory methods** – a systematic and iterative way of conducting research, using concurrent data collection and data analysis. There is the constant comparison of data throughout inductive and deductive cycles of analysis, along with new insights gained from abductive reasoning.<sup>13</sup> Coding, conceptualising, abstracting and theorising result in the development of a new theory. Grounded theory research may use qualitative or quantitative data, or a combination of both, to develop the theory although this study solely used qualitative data.
- **Techniques** – research activities within the methods for collecting and analysing data including purposive followed by theoretical sampling, *theoretical sensitivity*, coding procedures, memoing and theoretical sorting to reach theoretical sufficiency.

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<sup>13</sup> **Induction** starts with specific information to develop a general conclusion and **deduction** begins with general principles to make a specific conclusion (Gibbs 2018). **Abduction** attempts to find the most likely explanation of observations by creatively imagining all possibilities and checking out these hypotheses until finding the most plausible interpretation (Charmaz 2008; Lipscomb 2012; Reichertz 2010). In grounded theory research, **abduction** is facilitated by *theoretical sampling* and represents the researcher’s developing *theoretical sensitivity* (Bruscaglioni 2016; Schreiber and Martin 2013).

- **Tools** – aids for organising and enhancing data analysing including memos, diagrams, sticky notes, audit trail and reflective journal.
- **Theory** – a framework to present the relationship between abstract concepts as a way of explaining and understanding how these concepts relate to a phenomenon. Pragmatist theories are subjective, co-constructed and emphasise meanings and actions.
- **Grounded theory** – the theory generated from grounded theory methods.
- **Substantive theory** – a theory within the boundaries of a clearly defined subject area. The substantive area of this study was critical care practice.
- **Formal theory** – theory about a broad, generic subject area involving multiple substantive areas of research. Formal theory can be generated from one piece of research, although more commonly they are developed from extending an established substantive theory by using additional data in other contexts and a higher level of abstraction. Developing a formal theory was beyond the scope of a doctoral research project.

Therefore, grounded theory was the methodology, method and output of this study, with further explanation to now follow about the specific grounded theory approach and methods used within the research design.

### 3.3.2 Grounded theory approaches

The history of grounded theory began when sociologists Glaser and Strauss published their seminal text entitled *The Discovery of Grounded Theory* (1967). This book explained their ground-breaking approach to social research which sought to 'discover' a theory within the data without prior hypotheses or assumptions. At that point in time, the predominant research paradigm was positivism using quantitative experimental research to verify theory after logical deductions were made from testing and refuting competing hypotheses (Denzin and Lincoln 2018). Glaser and Strauss (1967) then presented a new, innovative style of research which enabled social scientists to generate a theory rather than just test existing theory. Furthermore, grounded theory offered a structured, robust and credible research design for those wishing to explore qualitative, open-

ended research questions about human experiences and social processes (Charmaz and Bryant 2016; Stern 2013). Previously, the dominant power of quantitative positivism had left many qualitative researchers being told their research was “*impressionistic, anecdotal, unsystematic, and biased*” (Charmaz 2014, 6). Grounded theory, therefore, provided qualitative researchers with a voice and offered practical tools and methods for systematically analysing qualitative data to generate theory about social processes. Grounded theory research has continued to extend beyond its origins within sociology. As such, it is now widely established across a range of different disciplines including healthcare (Foley and Timonen 2015; Holloway and Galvin 2017), business (Gligor, Esmark and Gölgeci 2016; Holton and Walsh 2017) and information systems (Birks et al., 2013; Urquhart 2013).

With its growing popularity and use within different disciplines, grounded theory research has developed, adapted and transformed. Glaser and Strauss are considered to be first generation grounded theorists and other people’s interpretation of their approach as second generation (Morse 2009). Glaser and Strauss did not explain a philosophical framework in *The Discovery of Grounded Theory*, which provides a collection of research methods instead of fully formed research methodology (Hall, Griffiths and McKenna 2013). The philosophical backgrounds of Glaser and Strauss were quite polarised with Glaser coming from the positivist traditions of Columbia University and Strauss the Chicago school of pragmatism and symbolic interactionism (Birks and Mills 2015). Glaser and Strauss merged their contrasting sociological approaches as they collaborated to develop grounded theory, although they were not explicit about an underpinning philosophy. The classic version of grounded theory has since been evaluated as using a positivist paradigm based on a realist ontology and objectivist epistemology (Markey, Tilki and Taylor 2014). Glaser has maintained a strong connection to the original classic version of objectivist grounded theory and he continues to advocate the researcher is a neutral, impartial observer gathering data to ‘discover’ theory as an external reality (Glaser 1978, 1992, 2007a, 2009, 2011). However, Strauss undertook a methodological shift in a revised version which maintained the same core grounded theory methods, techniques and tools, but a relativist perspective allowed for multiple realities to be accepted (Corbin and



Strauss 2015; Strauss 1987). Ralph, Birks and Chapman (2015) proposed the differences in opinion for how to conduct a grounded theory study reflects its 'methodological dynamism'. Continual, dynamic growth with variations in grounded theory methodology occurs due to researchers symbolically interacting with surrounding contexts, contemporaneous interpretations of societal changes and generational developments within groups of researchers (Ralph, Birks and Chapman 2015).

In addition to first generation grounded theory approaches (classic and Straussian), constructivist grounded theory, situational analysis and dimensional analysis were explored in relation to the researcher's philosophical positioning. See Table 5 for a comparison and rationales for what was ruled in and ruled out while designing the research study to be methodologically congruent with the project's research questions. The researcher selected a primarily constructivist grounded theory design, along with some techniques borrowed from other approaches.

Table 5 – Grounded theory approaches and additions

Type of approach	Summary of key aspects of the grounded theory approach	Consideration for ruling in or out for this study
<b>Classic (Glaserian) grounded theory</b>  <b>(Glaser and Strauss 1967; Glaser 1978, 1992, 1998, 2007a, 2009, 2011, 2012; Holton and Walsh 2017; Martin and Gynnild 2011)</b>	<ul style="list-style-type: none"> <li>• Introduced by Barney Glaser and Anselm Strauss.</li> <li>• No claims made on methodology when introduced although some classic grounded theorists now identify themselves as critical realists (Holton and Walsh 2017).</li> <li>• Presented as a package of 'methods' for conducting grounded theory research and considers 'all is data' for qualitative and quantitative data.</li> <li>• Called objectivist grounded theory by some authors and a form of positivist research even if qualitative data is used due to the researcher aiming to be a neutral</li> </ul>	<p>Rejected because it was not aligned to the philosophical positioning of the researcher.</p> <p>However, reading classic grounded theory publications helped the researcher to develop <i>methodological sensitivity</i> and to expand her knowledge about grounded theory research.</p>

	<p>observer from the outside (Charmaz 2014).</p> <ul style="list-style-type: none"> <li>• Focuses on emergent theory construction, basic social processes, theoretical coding families and core category.</li> <li>• Includes core grounded theory methods*.</li> </ul>	
<p><b>Straussian grounded theory</b></p> <p><b>(Corbin 2013; Corbin and Strauss 2015; Devadas 2018; Strauss and Corbin 1990, 1998)</b></p>	<ul style="list-style-type: none"> <li>• Introduced by Anselm Strauss who later co-published with Juliet Corbin.</li> <li>• Originally did not address methodology, but the more recent versions recognise the influence of symbolic interactionism and pragmatism.</li> <li>• Introduced coding techniques applied to the data (not emerging from): <ul style="list-style-type: none"> <li>○ Axial coding – reorganises data after line-by-line coding identifying properties of categories and comparing categories with subcategories (builds relationships around the axis of a category)</li> <li>○ Conditional/consequential matrix - shows relationships between micro and macro conditions and consequences on actions.</li> </ul> </li> <li>• Introduced storyline as an analytical tool during theoretical integration to conceptualise the core category like an extended theoretical memo.</li> <li>• Includes core grounded theory methods*.</li> </ul>	<p>There were some similarities with the researcher’s philosophical positioning, but constructivist grounded theory was even more aligned to the researcher’s ontology and epistemology. Straussian grounded theory on its own was therefore rejected.</p> <p>However, some tools and techniques were borrowed from Straussian grounded theory because they were compatible with a constructivist grounded theory approach. These borrowed data analysis methods included the conditional/consequential matrix and storyline.</p>
<p><b>Constructivist grounded theory</b></p>	<ul style="list-style-type: none"> <li>• Introduced by Kathy Charmaz.</li> <li>• Clearly stated philosophical positioning of relativism and constructivism along with</li> </ul>	<p>Chosen as the primary approach because constructivist grounded theory resonated the most</p>

<p><b>(Bryant 2017; Bryant and Charmaz 2007; Charmaz 2014, 2016; Charmaz and Belgrave 2013, 2018; Charmaz and Bryant 2016)</b></p>	<p>influences of symbolic interactionism and pragmatism.</p> <ul style="list-style-type: none"> <li>• Similar philosophical perspective to Straussian but includes more emphasis on constructivism and the role the researcher plays in co-constructing meaning with the participants.</li> <li>• Aims to build a theory to explain phenomenon being studied from the viewpoint and in consideration of the context of the people who experience the phenomenon.</li> <li>• Flexible with data analysis process and the overall approach is more of a guide rather than prescriptive procedures.</li> <li>• Includes core grounded theory methods*.</li> </ul>	<p>with the researcher's philosophical positioning.</p> <p>The flexible guidance was also appealing to offer modifiability and additions.</p>
<p><b>Situational analysis</b></p> <p><b>(Clarke 2005; Clarke 2009; Clarke and Friese 2007)</b></p>	<ul style="list-style-type: none"> <li>• Introduced by Adele Clarke.</li> <li>• Philosophical perspective draws from Foucault's discourse studies as well as symbolic interactionism, social constructionism and post-modernism.</li> <li>• No such thing as context and a situation's conditions are within the situation which is mapped out in a situational matrix.</li> <li>• Situation being researched is constructed through 3 analytical maps: 1) situational maps, 2) social worlds/arenas maps and 3) positional maps.</li> <li>• Presented as a theory/methods package which can supplement grounded theory methods or used with other types of research (e.g. ethnography) and different kinds of data (interview, historical, visual and/or narrative discourse).</li> <li>• Does not strictly use core grounded theory methods*.</li> </ul>	<p>Rejected because it was not fully aligned to the philosophical positioning of the researcher despite some overlapping perspectives.</p> <p>Did not appear as most appropriate approach for addressing research questions.</p> <p>Borrowing situational matrix as an analytical technique did not appear to enhance the study design.</p>

<p><b>Dimensional analysis</b></p> <p><b>(Bowers and Schatzman 2009; Gilgun 1993, 2010; Kools et al., 1996; Schatzman 1991)</b></p>	<ul style="list-style-type: none"> <li>• Introduced by Leonard Schatzman.</li> <li>• Philosophical perspective draws from symbolic interactionism.</li> <li>• Grew out of Straussian grounded theory and has same aim of generating theory from data.</li> <li>• Broader view of data analysis with delayed comparative analysis until dimensions identified in the data.</li> <li>• Researcher considers properties and value of dimensions and subdimensions to enhance the analytical process.</li> <li>• Does not focus on a single basic social process and seeks 'what all is involved'.</li> <li>• Shares some but not all core grounded theory methods* but can be an addition to a grounded theory study.</li> </ul>	<p>An entirely dimensional analysis approach was rejected because the researcher's philosophical positioning was more aligned to constructivist grounded theory.</p> <p>However, dimensional analysis was used as an additional, compatible analytical technique when Charmaz's guidance on analysis was found to be vague.</p>
<p>* Core grounded theory methods: memoing, concurrent data collection and data analysis, constant comparison method, coding and categorising, theoretical sensitivity, theoretical sampling, theoretical integration, theoretical sufficiency and theory generation from the data and not pre-conceived ideas.</p>		

### 3.3.3 Constructivist grounded theory critique

A primarily constructivist grounded theory approach was rationalised in Table 5 on page 38, although the researcher borrowed techniques and tools from other traditions that were compatible with her philosophical perspective. Glaser (2002b) disagreed with mixing different approaches within a grounded theory study which he calls "*downgrading and eroding the GT goal of conceptual theory*" (Glaser and Holton 2007, 48). Similarly, Evans (2013, 46) referred to 'method slurring', which in his view, "*tends to erode the quality of the research instead of enhancing it.*" Breckenridge et al. (2012) advised against a 'pick and mix' selection of different approaches and advocated for researchers to choose one path for greater clarity. Simmons (2011) also criticised mingling different grounded theory strategies and claimed only Glaser's classic approach should be strictly followed to enable a

denser and richer grounded theory. However, Birks and Mills (2015, 4) recognised debate remains about approaches to grounded theory research by stating: *“Few things are ever black and white, especially when it comes to research with an overtly interpretive component, and there is much to be learned from all antecedent grounded theorists.”* The researcher of this study took the more flexible stance of Birks and Mills (2015) which differed from the claims made by Glaser (2002b), Evans (2013) and Simmons (2011) that researchers should only follow the classic grounded theory style. Instead, the researcher felt different approaches can be used, providing the underpinning methodology remained consistent throughout the research project. The flexibility to ‘dip into’ various grounded theory approaches was justified because she concurred with the notion that the boundaries between the different grounded theory styles are blurred (Kenny and Fourie 2015) and permeable (Apramian et al., 2016). In doing so, the researcher took the perspective that integrating other grounded theory tools and techniques into a constructivist approach complemented rather than competed within the research design.

Some authors criticised Charmaz’s (2014) constructivist approach for not being an authentic grounded theory process because of its differences with the original classic version. For instance, Glaser (2002b) and Hernandez and Andrews (2012) proposed the constructivist approach produced ‘descriptive theory’ from qualitative data analysis and discovering an ‘explanatory theory’ was only possible through classic grounded theory. By taking a constructivist epistemological position though, the researcher aimed to ‘co-construct’ meaning, rather than ‘discover’ a theory. She also systematically and rigorously analysed the data for patterns, relationships and links using higher levels of abstract conceptualisation as theoretical integration progressed (methodological rigour is discussed further in Section 4.4). In doing so, an explanatory theory was generated from the thesis research because it ‘explained’, and not just ‘described’, what the concept of sustainability meant to people working in critical care, as well as the influencing social processes. Furthermore, Table 3 on page 22 demonstrated how this research study used the fundamental methods shared across the different grounded theory approaches. These core methods included: memoing, concurrent data collection and data analysis, constant comparison method, coding

and categorising, *theoretical sensitivity*, *theoretical sampling*, theoretical integration, theoretical sufficiency and theory generation from the data and not pre-conceived ideas. Therefore, the researcher argues this thesis does present a grounded theory about sustainability in critical care practice.

Gibson and Hartman (2014, 59) endorsed methodological pluralism in grounded theory research by stating “*variation should be encouraged, so long as the differences are made clear.*” They agreed with the researcher of this study that a constructivist approach does more than merely re-describe data because of the higher level of conceptualisation compared to qualitative data analysis.

Furthermore, Gibson and Hartman (2014, 59) stated: “*It should also be clear that we reject any claim that constructivist grounded theory is not grounded theory.*”

They recommended the ‘slippery slope’ of falling away from grounded theory into incoherence can be avoided by understanding the consequences of a constructivist grounded theory approach. For instance, Gibson and Hartman (2014) proposed a constructivist approach presents a paradox of simultaneously being open and closed. A constructivist researcher is open to finding meaning but closed by focusing in on the participants’ constructs of their everyday personal experiences. Another consideration is how data collection is negotiated rather than an open, neutral process because of the researcher’s involvement in co-constructing meaning (Gibson and Hartman 2014). The researcher of this study attended to the paradox of being open and closed at the same time by reflexively managing her interests, experiences and potential influences, thereby preventing data generation and theory development from being forced. See Section 4.4.2.1 on page 88 for further discussion on the use of reflexivity.

Critics of constructivist grounded theory also disapproved of the way constructivist grounded theory literature interchangeably referred to ‘social constructionism’ and ‘constructivism’ (Andrews 2012; Glaser 2002b). These two concepts are intrinsically linked together though because they both hold a symbolic interactionist perspective that people construct meaning through subjective interpretations, as expressed through language (Vall Castelló 2016). Despite sharing some commonality, constructivism emphasises one person’s viewpoint as “*the meaning-making activity of the individual mind*” whereas constructionism is “*the collective*

*generation [and transmission] of meaning*" (Crotty 1998, 58). Therefore, constructivists consider meaning as coming from someone interpreting personal experience from his or her lived events and actions, whereas social constructionists see meaning-making as a social process which develops through interaction and relationships between people (Burr 2015). In other words, constructivism centres on the individual, compared to social constructionism's broader perspective of sociological groups of people.

Charmaz (2014) responded to critiques about her use of terminology by clarifying she deliberately shifted away from the phrase social constructionism in the 1980s with a preference for the word constructivist. Her rationale was, at that time, she felt constructionists did not adequately acknowledge the role of personal subjectivity which she believed held great importance. Charmaz (2014) has since explained she can now relate to the more accommodating social constructionism of the evolved versions of current times, but she also separates herself from the purist individualistic positioning of some radical constructivists. The researcher of this study agreed with Charmaz (2014) that knowledge and understanding derive from both personal interpretation and social interaction, mutually drawing together elements of constructivism and social constructionism. For consistency and clarity in the thesis though and to be aligned to the language in Charmaz's (2014) most recent approach to grounded theory, the researcher purposely chose the term constructivist for this study.

### **3.4 Summary**

Chapter 3 presented a methodological tour of the research, beginning with the researcher's philosophical positioning of a relativist ontology and constructivist epistemology and continuing with an exploration of the influencing roles of symbolic interactionism and pragmatism. Constructivist grounded theory was justified as the most appropriate methodology to answer the research questions. Borrowing from other approaches was also rationalised, including the conditional/consequential matrix and storyline from Straussian grounded theory and Schatzman's dimensional analysis. The next Chapter will explain in more

detail the specific methods, techniques and tools used to conduct the research demonstrating that data generation and analysis remained congruent with the underpinning research methodology throughout the study.



## Chapter 4 Methods

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### 4.1 Introduction

This chapter explores the design of the constructivist grounded theory research study, including procedures for sampling, data generation and data analysis. Ethical considerations include an explanation of how the researcher addressed ethics and governance, provided information to potential participants for informed consent and kept data safe and confidential. The chapter finishes by critically evaluating methodological rigour achieved through trustworthiness, authenticity and the following determinants of quality grounded theory research: researcher expertise, methodological congruence and procedural precision (Birks and Mills 2015; Lincoln, Lynham and Guba 2018). By explaining the research conduct, this chapter illustrates that constructivist grounded theory methods aligned with the research methodology.

### 4.2 Research data

The research questions asked about subjective knowledge related to the meaning of sustainability in critical care practice and significant social processes. The data collected for the study was therefore qualitative in nature and came from interviewing practitioners working in critical care. This section will explain in detail the methods for generating and analysing the data.

#### 4.2.1 Sample

The inclusion criteria for participants in the sample were deliberately broad to include anyone who either worked in critical care or who linked with critical care practice in some way. As a grounded theory study, this allowed for flexibility while inviting different types of people to participate as the research progressed, all the while using theoretical sensitivity to steer the sampling process. See Table 6 for

the full details of the inclusion and exclusion criteria used to ensure the selection of participants recruited into the research sample was appropriate.

Table 6 – Sample inclusion and exclusion criteria

	Criteria details	Rationale
<b>Inclusion criteria</b>	<p>Practitioners working in adult critical care, paediatric critical care, neonatal critical care, general critical care, specialist critical care or critical care outreach (critical care includes both high dependency care for Level 2 patients and intensive care for Level 3 patients).</p> <p>Other people who do not directly work in a critical care area but who influence or are linked to critical care practice in some way.</p>	<p>Critical care in its entirety (adult, paediatric, neonatal, general and specialist units and critical care outreach) was included because there was no literature indicating sustainability issues would be any different amongst the various critical care settings.</p> <p>Inclusion criteria were deliberately broad to allow flexibility for different types of people to participate as the study progressed using <i>theoretical sensitivity</i> to guide the sampling process.</p>
<b>Exclusion criteria</b>	<p>University student currently taking, or about to start taking, any module for which the researcher provides teaching, assessing or tutorial support.</p>	<p>As an employee of a University, the researcher needed to avoid recruiting her own students to avoid an unethical, power relationship with participants.</p>

#### 4.2.1.1 Initial sampling

Participant recruitment began with a purposive sample of registered critical care nurses working in the NHS in England. The rationale for beginning with registered nurses was they make up the most substantial part of critical care because a national standard requires a minimum registered nurse to patient ratio of 1:1 for Level 3 patients and 1:2 for Level 2 patients (Berry and Richardson 2016). The scope of the number of registered nurses working in critical care was evident in a recent survey which identified 17768 whole time equivalent positions in 242 critical care units out of the total of 288 units in England, Wales and Northern Ireland

(Horsfield et al., 2018). Moreover, nurses are the only member of the healthcare team to provide continuous, 24-hour monitoring of critical care patients (Berry and Richardson 2016). Critical care nurses, therefore, provided a sizeable professional group to initially sample from who also had contact with the range of multi-disciplinary team members for subsequent snowballing.

Recruitment began by advertising the study on the British Association of Critical Care Nurses (BACCN) online areas, including their Facebook page, Twitter feed and as a news item on their website (see Appendix 2). The researcher created a website to facilitate online recruitment via social media and snowballing emails. For example, the advertising information posted by the BACCN included this study's website which meant within one click, potential participants could quickly view the following: contact details for the researcher and supervisors, study's rationale, participant information sheet, consent form and guidance on how to volunteer to be a participant. Research studies are now drawing from the opportunity of social media and websites to recruit study participants with increased support in the literature endorsing this type of online recruitment advertising (Fenner et al., 2012; Kapp, Peters and Oliver 2013; Lohse 2013; O'Connor et al., 2014; Valdez et al., 2014). However, Arigo et al. (2018) and Gelinis et al. (2013) recognised the lack of established guidance on social media-enabled recruitment and recommended researchers reflect carefully on how they use online advertising. Table 7 considers the benefits, limitations and practical implications for advertising to recruit research participants via social media for this study. See page 84 for further details about the ethical considerations with using the BACCN to advertise the recruitment information online.

Table 7 – Participant recruitment via social media

Benefits	Limitations	Considerations
Fast, convenient method to advertise for volunteer study participants  BACCN Facebook page had 1744 likes as of 07/12/2014	Only people who engage with Facebook, Twitter and BACCN website would have seen the advertisement	Requested the BACCN administrator to post this advertising information on their Facebook page and in a Tweet on their Twitter page:

BACCN Twitter account had 916 followers as of 07/12/2014	Likely to only recruit BACCN members and nurses	Research study seeking to interview people who work in critical care about their thoughts on sustainability
BACCN online news distributed to members who may not be active on social media	People who saw the advertisement may not know about the term 'sustainability' leading them to not volunteer for the study	Online news item advertising the study was put onto BACCN website

Snowballing involved asking participants to forward an email invitation to other people (see Appendix 3). Snowballing helped to address the limitations of recruiting through social media sites as a deliberate attempt to advertise for potential participants who may not be active online. One participant also voluntarily opted into the study, not from seeing an advertisement on a social media site or due to snowballing, but from finding out about the research through a presentation given by the researcher. See page 84 in Section 4.3 for an explanation of maintaining ethical principles throughout this situation of unexpectedly finding a study participant at an event where the researcher was not actively recruiting.

#### 4.2.1.2 Theoretical sampling

Sampling started purposively with critical care nurses, but *theoretical sensitivity* developed during concurrent data analysis. *Theoretical sensitivity* is a core component of grounded theory research and involves recognising what is important in the data, acknowledging the data's meaning in abstract terms and understanding conceptual relationships between patterns in the data (Hoare, Mills and Francis 2012; Charmaz 2014). As the researcher developed sensitivity and increased awareness of key ideas emerging during data analysis, it became evident that a range of different healthcare practitioners influenced sustainability issues within critical care practice. Sampling then moved from purposive to theoretical which is an ongoing, iterative process of drawing from the analysis of previous data to guide decisions for how to continue with more data generation (McCann 2018; Polacsek, Boardman and McCann 2018). *Theoretical sampling* of a critical care technician, physiotherapist, nursing practice educator and a nurse

actively championing sustainability happened after previous interviews identified these as being useful for the developing data collection. See Box 6 on page 68 for further discussion and an example in of how analytical memoing enhanced theoretical sampling.

The following roles were not included in the sample because nobody from those backgrounds volunteered and theoretical sampling did not indicate they would be required: ward clerk, healthcare assistant, occupational therapist, speech and language therapist, pharmacist, patient or family member. Ideally, the sample would have included a critical care doctor because participants often referred to resource decision-making by their medical colleagues which led to an initial intention to theoretically sample critical care medical doctors. From the early snowballing, one medical doctor had volunteered to be a participant, but he did not reply when contacted again. No other doctors came forward to be in the study, despite asking all participants to forward the snowballing email onto critical care doctors. The researcher also contacted the Intensive Care Society, a professional body with many medical doctor members, to request if they could advertise the study through their social media sites and online distribution networks. However, the Intensive Care Society did not reply. Shortly afterwards, the Intensive Care Society newsletter also highlighted their decision to limit sending out advertising notices to members with requests for volunteer responses to surveys. The researcher ruled out contacting critical care units directly because of the lengthy NHS ethics approval process which was not feasible to apply for at that point of study due to the time restrictions of the doctoral research project. Therefore, recruiting medical doctors was problematic, as seen in the supervision meeting notes in Appendix 4.

This recruitment issue constrained the ability to achieve the initial theoretical sampling goals and reflected the 'messy reality' of actual research practice by showing how challenging it is to find volunteer participants (Archibald and Munce 2015). Recruiting people into a research sample can be particularly difficult for novice researchers, doctoral students and studies with restricted time or funding (Joseph, Keller and Ainsworth 2016). With grounded theory research, Timonen et al. (2018) recognised that theoretical sampling becomes limited if the specific type

of desired data is too cumbersome to access, or is unavailable within a feasible timeframe for the study. When the recruitment strategies were unsuccessful in finding any medical doctors to include in the sample, the researcher considered guidance on theoretical sampling from her supervisors and constructivist grounded theory methodological literature (Charmaz 2012, 2014; Thornberg and Charmaz 2012, 2014). It became apparent there was a need to be practical and pragmatic in accepting barriers outside of the researcher's control, such as a lack of response by medical doctors to volunteer for the study. However, maintaining a robust, high-quality research process also requires authentically following the study design for data generation and not straying away from core grounded theory methods. The researcher recognised that although medical doctors were missing from the sample, the data analysis and theory development successfully progressed by using other theoretically sampled data to explain relationships between emerging concepts and fill out properties within categories to the point of theoretical sufficiency. Sections 4.2.2 and 4.2.3 discuss further how the analysis of previous data guided new data generation through theoretical sampling. Also, a more detailed explanation about the justification of *theoretical sufficiency* is found in Section 4.2.2.3 starting on page 58.

#### 4.2.1.3 Summary of participants

There were eleven participants in the final sample with a participant number allocated to anonymise each person's identity. All participants worked in the South of England with adult critical care patients, although they came from a range of different hospitals, professions and roles. See Table 8 for further details of each participant's background information.

Table 8 – Participants overview

	Work place	Role	Current job title	Type of critical care experience	Time critical care
<b>P01</b>	Hospital A	Nurse	Critical care outreach nurse	General ICU/HDU, adult	11 years
<b>P02</b>	Hospital A	Nurse	Critical care practice educator*	General ICU/HDU, adult	13 years

<b>P03</b>	Hospital A	Technician	Critical care technologist	General ICU/HDU, adult	21 years
<b>P04</b>	Hospital A	Nurse	Critical care practice educator	General ICU/HDU, adult	25 years
<b>P05</b>	Hospital A	Physio-therapist	Critical care physiotherapist	General ICU/HDU, adult	15 years
<b>P06</b>	Hospital B	Physio-therapist	Critical care physiotherapist	General ICU/HDU, adult	11 years
<b>P07</b>	University	Nurse	University lecturer**	Cardiac and general ICU/HDU, adult	28 years
<b>P08</b>	Hospital C	Nurse	Clinical nurse specialist advanced respiratory failure	ECMO*** and general ICU/HDU, adult	7 years
<b>P09</b>	Agency	Nurse	Critical care agency nurse****	General ICU/HDU, adult	20 years
<b>P10</b>	Hospital D	Nurse	Critical care practice educator	General ICU/HDU, adult	26 years
<b>P11</b>	Hospital D	Nurse	Critical care senior sister Int1 and matron Int2*****	General ICU/HDU, adult	24 years

\* A practice educator is employed by a hospital to facilitate staff development.  
 \*\* P07 previously worked as a critical care nurse, and her current University role includes teaching critical care topics to pre- and post-registration students and visiting critical care units linked to her University.  
 \*\*\* ECMO (extracorporeal membrane oxygenation) is an advanced cardiorespiratory therapy provided in specialist intensive care units.  
 \*\*\*\* An agency nurse is an employee of a private agency providing temporary staff to hospitals. P09 also recently worked as a permanent employee of the critical care unit in Hospital A.  
 \*\*\*\*\* P11 was a senior sister during her first interview (Int1). A senior sister is a nurse with supervisory responsibilities. P11 became a matron by the time of her second interview (Int2), which is the senior critical care unit manager role.

### 4.2.2 Data generation

This next subsection explains how the researcher generated data. All eleven participants had an initial semi-structured interview. Seven of these had follow-up contact intended as member checking<sup>14</sup> to answer focused questions through their

<sup>14</sup> See Section 4.4.2.2 for further discussion about member checking.

choice of an online video call, telephone call or email reply (see Figure 5). The participant information sheet (Appendix 5) informed participants from the outset about the possibility of further contact with this statement:

I may ask you for a follow-up interview to clarify points made during your initial interview, but it will be your choice to decide if you want to participate in another interview.

Figure 5 – Data generation

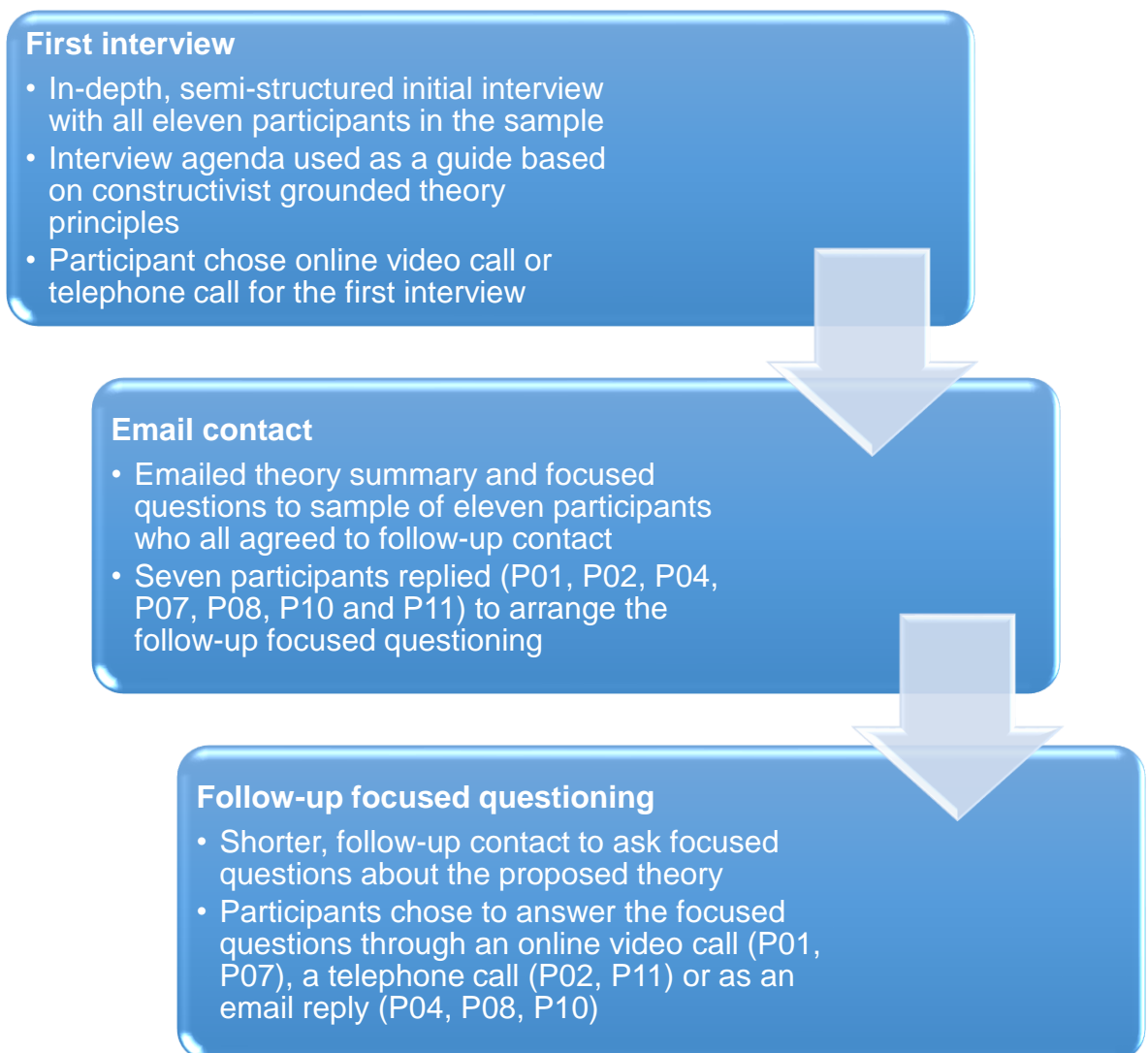


Table 9 (page 53) indicates the participants' preference for how the interviews took place and the overall timeline for the first interviews and follow-up contact.



Table 9 – Type of first interview and follow-up contact

	Interview 1		Follow-up contact		
	Online video call	Telephone call	Online video call	Telephone call	Email reply
P01	April 2015		April 2017		
P02	May 2015			April 2017	
P03		May 2015	Did not reply to 2 <sup>nd</sup> interview request		
P04		May 2015			May 2017
P05		July 2015	Did not reply to 2 <sup>nd</sup> interview request		
P06	July 2015		Did not reply to 2 <sup>nd</sup> interview request		
P07		July 2015	Mar 2017		
P08	July 2015				Mar 2017
P09	July 2015		Did not reply to 2 <sup>nd</sup> interview request		
P10		Oct 2015			Mar 2017
P11		Oct 2015		April 2017	

#### 4.2.2.1 Initial interview

In-depth, semi-structured interviewing to collect qualitative data during the first interview was congruent with a constructivist grounded theory approach (Charmaz 2014). The in-depth interviews explored the participants' interpretation of sustainability in critical care practice by asking open-ended, non-judgemental questions. For instance, these questions illustrate the interviewing style used with further details of the full initial interview agenda found in Appendix 6:

When you hear the word sustainability, what comes to mind for you? How did you come to view the word sustainability in this way?

The researcher was the data collection 'instrument' with each interview then acting as a social interaction between herself and the participants. A pilot interview was intentionally not completed because it was not compatible with the research methodology and methods. By taking a constructivist grounded theory approach, the researcher would have been influenced by emerging concepts, even during a practice pilot interview (Charmaz 2018). Furthermore, the dynamic with the interviewee is not repeatable due to time, context and conditions altering in each encounter. A semi-structured interview agenda had been prepared though, to provide a starting point for questions (Appendix 6). Not all questions were asked to each participant, with the agenda intended more as a guide for the researcher than a rigid schedule. Questions and explanatory probes were adjusted

throughout the interview to clarify, expand and enhance the concurrent data analysis occurring within the interview time itself. Appendix 6 specifies a list of phrases planned to probe further, including these examples:

Please say more about \_\_\_\_\_.  
Could you give me an example of \_\_\_\_\_?  
How often does \_\_\_\_\_ happen? Where does it happen? When does it happen?

The interview agenda questions and exploratory probes followed guidance by Charmaz (2014) to draw out the participants' perspective of definitions, situations, events, main concerns, assumptions, implicit meanings and tacit intuition. Thus, the interviews were informed by constructivist grounded theory principles to explore the symbolic meaning and social interactions influencing the participant's views of sustainability in critical care practice.

The first interviews took place as an online video call or telephone call at a time of convenience for the participant. Online interviewing, using-video calling technology, allows for both non-verbal and verbal communication to be noted (Janghorban, Roudsari and Taghipour 2014; O'Connor and Madge 2016). Telephone interviews were offered as an alternative option to increase the recruitment of people who were not able to conduct a video call or who preferred another interview method. Telephone interviews lost the advantage of non-verbal communication, but reflection by the researcher revealed this did not limit data analysis. Online/telephone interviewing was not restricted by geography, allowed for a higher number of people to receive the study invitation information and was aligned with the sustainability agenda of minimising excess travel (Deakin and Wakefield 2013).

Another justification for using online/telephone interviewing was to offer participants a flexible, efficient way to conduct interviews outside of the work environment. Due to the busy nature of hospitals, the researcher felt that interviewing during the participant's work time on a clinical shift would not be feasible. The researcher spoke with critical care nurses during the planning stages of the study which confirmed it would be extremely challenging for practitioners to find free time and quiet physical space to be interviewed for an

hour during a clinical shift. They also stated many practitioners in critical care work long hours, often without full breaks. The researcher concluded it would be unlikely that practitioners would be willing to stay on at the end of a shift to be interviewed. Conducting focus groups was ruled out as another data generation method because feedback indicated it would be complicated to gather multiple practitioners for a group interview during or after a clinical shift. Furthermore, some participants may be more open to discussing thoughts honestly and freely in the comfort of their own home compared to the work setting (Salmons 2014). However, a virtual meeting space in a video call could be uncomfortable and limit conversation for some people. The researcher actively tried to establish rapport during the interview introduction time and continually evaluated the influence of verbal and non-verbal communication during each interview to overcome this barrier. Table 10 provides an overview of the strategies used to promote the effectiveness of using an online meeting space for interviewing.

Table 10 - Strategies for an effective online meeting space

Online meeting space (Salmons 2014)	Strategies for this study
<b>Will participants have the equipment, internet access and ICT (information and communications technology) literacy to participate in an online interview?</b>	Online video calling has become increasingly accessible through smartphones, tablets and widespread use of broadband internet (Salmons 2014). Once participants agreed to an online interview, they were asked to identify the type of video calling programme they preferred.
<b>Will potential participants be excluded if they lacked the necessary equipment, internet access or ICT literacy to participate in an online interview?</b>	Online interviews may inadvertently exclude people from the study if potential participants lack equipment, skills or confidence with online video calling. A telephone interview option was for people who were unable or unwilling to communicate via a video call. It was not possible to observe non-verbal communication with telephone interviews, which was considered during data analysis.
<b>Will participants be comfortable in an online interview?</b>	An introduction period reviewed the participant information sheet, re-validated consent and explained the process of the interview. This initial time helped the interviewee to settle into the online or telephone medium and established a rapport with the researcher before recording started for the data collection. Participants had the opportunity to ask

	questions before the interview began, they were reassured questions could be asked at any point and the researcher closed by asking participants if they have any questions for the researcher.
<b>How will distractions in the physical setting be kept to a minimum?</b>	The researcher was alone in a quiet room to ensure there was privacy and no extra noise added to the interview recording. The participants were asked to position themselves in a physical setting where they felt comfortable with minimal distractions.

Table 11 details the interview process including the time before, during and immediately after each interview. The interview discussions were recorded with a digital voice recorder and directly transcribed by the researcher.

Table 11 – Interview process

<b>Adapted from Salmons (2014) and Charmaz (2014)</b>	
<b>Preparing</b>	<ul style="list-style-type: none"> <li>• Introductions and thank you</li> <li>• Time for establishing rapport</li> <li>• Trial of video/audio call and voice recording</li> <li>• Review study details and regain consent</li> <li>• Confirm interview process</li> <li>• Clarify expectations and interview ground rules for both the participant and researcher</li> </ul>
<b>Opening</b>	<ul style="list-style-type: none"> <li>• Background information</li> <li>• Initial open-ended questions to introduce subject and encourage participants to discuss issues most relevant to them</li> </ul>
<b>Questioning and guiding</b>	<ul style="list-style-type: none"> <li>• Intermediate questions</li> <li>• Ending questions</li> <li>• Exploratory probes - use throughout to draw out depth and information about social processes</li> <li>• Cooling out prompts - use 15 minutes before end of interview</li> </ul>
<b>Closing</b>	<ul style="list-style-type: none"> <li>• End interview by asking participant if there is anything else they would like to discuss</li> <li>• Thank participant for the interview</li> <li>• Clarify details about interview transcript being sent to participant and whether further follow up may be needed</li> <li>• Snowballing - question about passing on study details to other potential participants as guided by theoretical sampling</li> </ul>
<b>Post interview</b>	<ul style="list-style-type: none"> <li>• Reflect on interview content and process</li> <li>• Initial review of data collected and analysed during interview</li> <li>• Memo ideas while interview is still fresh on researcher's mind</li> <li>• Refine interview questions for next interview</li> <li>• Consider theoretical sampling</li> </ul>

Concurrent data generation and analysis occurred because the researcher evaluated the data from interviews and memos throughout the research timeframe. A pause in sampling and data collection happened after the first interviews with eleven participants. At that time, the data analysis and level of abstraction had progressed to the point where a co-constructed meaning of sustainability had emerged and as a possible central organising phenomenon identified. The central organising phenomenon represented the most significant social process explaining the participant's main concern about the substantive area of research. 'Central' implied it was the core, fundamental process. 'Organising' indicated this process was what all other related ideas were centred around within the conceptual framework. 'Phenomenon' is defined as something known through the senses. The researcher chose to use the phrase central organising phenomenon because it importantly emphasised the 'organisational' aspect of the core category, rather than just state its centrality from the term 'core'.

#### **4.2.2.2 Follow-up contact**

This early development of the substantive theory was 'checked out' with participants to verify the proposed theory resonated with their own experiences and remained grounded in the data. The researcher contacted the same eleven participants for a second interview because everyone in the sample gave consent for this at the end of their first interview. In preparation for the second interviews, the draft substantive theory and focused questions were emailed to participants (see Appendix 7). The participants then had the choice of replying to the focused questions within a second online/telephone interview or by emailing back a written response (see Appendix 7). Four participants chose the online/telephone option, and three emailed their replies to the questions. See Section 4.4.2.2 for discussion on the implications of re-interviewing the same participants as a form of member checking.

Observation of clinical practice was another possible form of data collection for this study, in conjunction with the initial interviews and follow-up contact. At the beginning of the research design planning stage, the researcher considered including observing actual critical care practice in the ethics proposal information.

However, at that point, it was unclear how sustainability was going to be defined by practitioners working in critical care. Therefore, the researcher selected in-depth interviewing to start the data collection in a very open-ended, exploratory manner, rather than going into practice observing for topics from pre-conceived ideas or the initial literature review. Farther along during the study timeframe, once the initial shaping of the substantive theory began to emerge, the researcher questioned again whether observation of clinical practice could be used to help develop categories and eventually verify the proposed substantive theory. The 'messy reality' of research practice became evident again though, much like the barriers faced while recruiting volunteer participants, as discussed on page 49. Direct observation of practitioners working in critical care would have required the researcher to overcome the complexities of gaining consent from the patients or assent from families. Obtaining permission to collect data is particularly difficult in the critical care setting because critically ill patients often lack the mental capacity to make informed consent decisions (Matei and Lemaire 2013; Pattison et al., 2017). Furthermore, surrogate decision-making through family assent becomes ethically challenging while trying to arrange during a time when family members are experiencing extreme stress and worry (Ecarnot et al., 2017). Therefore, verification of the theory through observation of clinical practice was ruled out as a possibility for this doctoral study and follow-up contact with the same sample participants was used instead.

#### 4.2.2.3 Theoretical sufficiency

Charmaz (2014) defined *theoretical saturation* as the time when data collection for a category does not demonstrate any new properties or theoretical insights, and there is convincing, robust, dense data with adequate depth and scope to substantiate the theoretical categories. The phrase *theoretical saturation* was called an "*unfortunate metaphor*" by Dey (1999, 257) and a "*misleading metaphorical picture*" by Nelson (2016, 556) because the connotation of the term saturation suggests absolute fullness and completeness with no room for additions. Charmaz (2014) also recognised a theory might not ever be fully exhaustive because contexts and conditions change over time, subjective

interpretation of new ideas could lead to further development of the theory, and it may not be feasible for the researcher to know absolutely everything about the researched phenomenon. Similarly, Glaser and Strauss (1967, 40) stated:

*“One is constantly alert to emergent perspectives that will change and help develop his theory. These perspectives can easily occur even on the final day of study or even when the manuscript is reviewed in page proof; so the published word is not the final one, but only a pause in the never-ending process of generating theory.”*

Consequently, Charmaz (2014, 213) recommended researchers consider saturation as *theoretical sufficiency* when “*you have defined, checked and explained relationships between categories and the range of variation within and between your categories*”. Initial dissemination of the substantive theory occurs once the researcher has an adequate amount of data for ‘some’ level of *theoretical sufficiency*. For instance, the researcher can justify *theoretical sufficiency* if there is evidence of ‘conceptual depth’ within the central organising phenomenon and any other major categories of the theory (Dey 1999). Rather than a static moment in time though, *theoretical sufficiency* continues as a developing process if new, emergent perspectives offer further insight to enrich and expand the explanation of category properties (Constantinou, Georgiou and Perdikogianni 2017).

*Theoretical sufficiency* thereby becomes “*an ongoing, cumulative judgment that one makes, and perhaps never completes, rather than something that can be pinpointed at a specific juncture*” (Saunders et al., 2018, 1901).

This thesis, therefore, offers an initial presentation of the ‘theoretical essence’ (Breckenridge et al., 2012) of sustainability in critical care practice, based upon data from the eleven participants in the sample. The previous discussion on pages 49 and 58 acknowledged how the ‘messy reality’ of research practice impeded theoretically sampling medical doctors and collecting data through direct observations in critical care practice. Post-doctoral research could potentially then enhance the substantive theory even more through additional data from interviewing doctors and directly observing clinical practice. Interviewing medical doctors in future follow-up research would strengthen the evidence for ‘adequacy’ of data because of the way *theoretical sufficiency* exists along a continuum.

There was no further data collection after seven participants replied for the follow-up contact because the researcher considered the amount of data generated up until that point to be enough for *theoretical sufficiency* of a preliminary substantive theory. For example, the interview data from the first eleven interviews and the seven follow-up contacts sufficiently enlightened how practitioners in critical care defined sustainability (see data in Section 5.2). The analysis of the data accumulated by then also adequately explained the properties of the theoretical categories which had emerged as the key social processes enabling sustainability to become a part of critical care practice. See Section 5.3 for data about the most significant social process (*satisficing*) which was the central organising phenomenon of the substantive theory. Data are presented in Sections 5.4 and 5.5 about two other social processes (*bounded rationality* and *stewarding*) as additional major categories in the theory. Therefore, the extent of the findings presented in Chapter 5 acts as underpinning evidence that there was sufficient ‘conceptual depth’ to disseminate the substantive theory in the doctoral thesis. The researcher recognises the theory is only at a starting point with a beginning level of *theoretical sufficiency*, due to the relatively small, local sample and limited range of the practitioners working in critical care. Further discussion on pages 69-70 expands on the explanation for how the researcher recognised this initial level of *theoretical sufficiency*. The role of member checking in helping to verify *theoretical sufficiency* also continues on pages 92-93.

### 4.2.3 Data analysis

As previously noted, the researcher simultaneously analysed the data throughout the data collection period. Data analysis during the interviews included adapting questions and exploratory prompts in response to the participant’s discussion. More extensive data analysis between the interviews then followed. Iterative cycles of data collection and analysis enabled emerging theoretical ideas to be refined, which then guided further theoretical sampling. The constant comparison method of data analysis identified increasingly abstract ideas by continually comparing data through sequentially increasing levels of abstraction. The constant comparison method, originating from Glaser and Strauss (1967), is a



fundamental aspect of all grounded theory approaches because it ensures systematic development an abstract conceptual framework moving beyond a descriptive account of the data (Birks and Mills 2015). Specifically, the constant comparison method involved comparing new data with existing data, codes with data, codes with codes, codes with categories, categories with categories, categories with concepts and concepts with extant theories in the literature. The context, conditions and consequences within the data were also analysed in a constructivist manner by “*developing a partnership with participants that enables a mutual construction of meaning during interviews and a meaningful reconstruction of their stories into a grounded theory*” (Mills, Bonner and Francis 2006, 8). The specific procedures used for analysing the data to co-construct the substantive theory will now be explained, including memoing, constructivist grounded theory coding and dimensional analysis. Excerpts of data and introduction of concepts within the substantive theory are included in this methods chapter to be transparent about ‘how’ the theory emerged from the data analysis. The full findings to illustrate ‘what’ the theory is are presented in Chapter 5, with a critical discussion of the theory following in Chapter 6.

#### 4.2.3.1 Memoing

Memoing occurred during all stages of the study to capture the researcher’s thoughts, feelings, reflections and insights throughout the research process (Birks and Mills 2015). Birks, Chapman and Francis’ (2008) mnemonic **MEMO** summarises the reasons for memoing in grounded theory research: **M**apping research activities, **E**xtracting meaning from data, **M**aintaining momentum and **O**pening communication. As advised by Charmaz (2014), memos were spontaneous, raw and unedited writing to allow creative freedom while analysing the data. Memoing frequently helped the researcher to stay connected to the data, to sustain active involvement with the data analysis and to maintain momentum throughout the study. Ideas were written in a memo as soon as they surfaced without any restrictions or hesitancy. This free exploration of ideas allowed the researcher to take risks within the thinking, safely expressed in a memo. Memoing also released the researcher from what Birks and Mills (2015)

call ‘analytic paralysis’ through continual writing to push through any blocks in thinking.

An audit trail table of operational memos was kept mapped out the research activities. Each operational memo was a dated, descriptive, brief comment to describe research activities. There was additional reflection and analysis if the action involved key decision-making or breakthroughs with the abstraction of significant concepts and theory generation. The purpose of this audit trail table was to provide an overview of the research project, to capture learning events and networking as a developing researcher and to organise the operational memos. If an operational memo prompted other more reflective, analytical or theoretical memos, a note in the final column of the audit trail table facilitated a cross-referencing system (see Table 12). An operational memo about a meeting with the researcher’s supervisors noted key points for the audit trail, but more extensive notes provided an extended memo about the meeting. See Appendix 4 for an example supervision meeting memo which highlighted key concepts emerging from the data analysis at that point of the study. The collection of operational, supervision, reflective, analytical and theoretical memos showed the progression of theory generation across the timeframe of the research study.

Table 12 – Operational memo examples within audit trail

Audit trail of activities	Operational memo describing the activity	Link to other memos
<b>18/06/2015</b> <b>Supervision meeting</b>	Updated supervisors on data collection and analysis (interviews with P01, P02, P03, P04) with themes so far about waste, efficient practice, feelings of frustration and a lack of control over how resources are procured and used, tension between infection control policy and use of supplies, negotiating care with doctors and change in values/culture/behaviour needed. P03 and P04 found it difficult to define sustainability but P01 linked environmental/financial/social and P02 broke it down into the human (time, emotional labour) and non-human (clinical supplies, equipment, energy)	Supervision memo and action plan 18/06/2015

	elements. Interviewing techniques were discussed with supervisors, along with recruitment opportunities, preparing for transfer and ongoing development.	
<b>26/06/2015</b> <b>P03-Int transcript</b>	Finished transcribing the first interview with P03 and the transcript emailed back. Informed P03 I may contact him again in the future to request a shorter follow-up interview, as he had agreed. I clarified the second interview would be after I interviewed more people and analysed more data (and only if he still wished to continue being a study participant). Line-by-line coding started but not yet finished.	P03-Int1 memos  Analytical memos comparing first three interviews
<b>01/07/2015</b> <b>Sustainability Network Masterclass</b>	Attended presentations about sustainable healthcare hosted by South Region Sustainability and Health Network. Presentations were about sustainability opportunities for NHS Trusts. Networked with other healthcare professionals, although nobody was from critical care. I also informed the group that I was working on a PhD research project about sustainability in critical care. In the follow-up emails with the Network lead who was thanking me for helping arrange the venue, I provided her with the research study's website.	Research journal memo 01/07/2015
<b>03/07/2015</b> <b>P05 first interview (P05-Int1)</b>	Phone interview done with P05 who is a critical care physiotherapist in Hospital A recruited from snowballing email sent out by P01. P05 phoned from work during last hour of a clinical shift (late afternoon on a Friday). Agreed to a follow-up interview. Thank you email sent on 07/07/2015 and said transcript would be sent back as soon as completed.	P05-Int1 memos
<b>10/07/2015</b> <b>Conference presentation</b>	Co-presented with another PhD student at the Centre for Teaching and Learning's annual conference about the work and role of the School of Health Science's Sustainability Special Interest Group. Informed the presentation attendees that we are both undertaking PhD studies related to sustainability	

	and provided an overview of my research to date.	
<b>17/07/2015 P06 first interview (P06-Int1)</b>	Online video call interview done with P06 who is a critical care physiotherapist in Hospital B recruited from snowballing sent out by P05. P06 was at home during the Skype call in the early evening following a clinical shift. Agreed to a follow-up interview. Thank you email sent on 19/07/2015 and said transcript would be sent back as soon as completed.	P06-Int1 memos
This table is not the full audit trail for the research project, or all operational memos during the Jun 2015 – Jul 2015 timeframe. These activities were selected to show a range of operational memo examples and to illustrate how the audit trail listed operational memos as rows in a table and cross-referenced to other memos in the final column.		

Reflective memos were written within a research journal while reflecting on the practice of conducting a constructivist grounded theory study and on the researcher's personal development. See Box 1 for an example of a reflective memo about the researcher considering her relativist perspective for the research and the implications for reflexivity within the constructivist approach. Memos provided an opportunity to manage the researcher's own previous experiences and bias reflexively and to be transparent in documenting this<sup>15</sup>.

#### Box 1 – Memo: reflecting on relativist positioning

##### **Reflective memo: Embracing similar and different points of view**

I've only done 1 interview so far and this participant held similar views to my own. I tried hard not to let my own personal biases influence being open-minded to explore and respect the participant's concerns and issues. This was easy to do with her though because she was quite like-minded to me and we had similar previous experiences. I'm wondering if this will be more challenging if a participant holds quite different views in relation to sustainability. With my relativist positioning, I am embracing the opportunities for multiple views and feel they are all 'real' because that's the experience and viewpoints of those individual people. I will need to continue to use reflexivity to be aware of myself as the researcher and my intention to stay open minded regardless of what the views are for each participant.

<sup>15</sup> Memos are presented in a box to delineate them from the rest of the thesis. They are the researcher's original writing in first person to demonstrate freely expressed, creative and analytical thinking at that point of the study. Presenting memos as raw, unedited data contributes to the audit trail of evidence that the substantive theory emerged from and is grounded in the data.

The researcher transcribed the interviews herself to become fully immersed within the data analysis. While transcribing and evaluating ‘what’ was said, other factors were considered such as ‘how’ participants spoke regarding emphasis, speed, tone, timing and pauses. Other contextual features assessed were demographic information of the participant, setting of the interview and timing of the interview. For example, the memo in Box 2 evaluated the impact of conducting a phone interview at the end of the participant’s clinical shift on a Friday afternoon.

#### Box 2 – Memo: context of interview timing

**Analytical memo: Participant views at end of a busy clinical shift**

I’ve just completed an interview with P05, a critical care physiotherapist. This was a phone interview and she was still on shift although just finishing off. We booked the interview from 15:00-16:00 (she was due to finish her shift by 16:00) although because of her busy day, she didn’t end up calling me until 15:07 and we had to finish by 15:55 due to a bleep she was expecting in. I think the timing of the interview today at the end of a busy Friday day shift affected what was at the forefront of her thoughts. The main themes coming through were more in relation to financial sustainability and sustaining critical care as a service with limited resources (people, finances, equipment). P05 gave examples from the shift today and recent similar shifts about lack of staff, lack of equipment, lack of money, differences between daytime and night time availability of resources. I wonder if these connections between resources and sustainability would have been as strong for her had she not just been on a shift going into the weekend when there aren’t enough staff around to care for the patients and she wasn’t able to access the equipment she would have liked for the best possible patient care.

Analytical memos prompted uninhibited exploration, conceptualisation and abstraction of the data. See Box 3 on page 66 for a memo written after the concept of aspiration threshold emerged as a significant concept in the data exploring what this could mean concerning sustainability in critical care practice. These memos included in the Methods chapter are not intended to be presenting the content of the data as research findings at this point in the thesis. Instead, the memos serve as examples of how memoing was integral as a grounded theory analytical technique. Chapter 5 fully presents the findings related to the concepts evaluated in the memos (e.g. *aspiration threshold* and *satisficing*).

## Box 3 – Memo: conceptualising abstract ideas

**Analytical memo: Aspiration threshold**

There is so much uncertainty and high levels of risk in critical care because of life-threatening clinical conditions. Participants talked about erring on the side of caution (particularly junior staff) which then uses more resources than necessary. Setting the 'good enough' threshold higher than it needs to be for clinical care creates a safety net, increases confidence and covers people legally (although legalities wasn't mentioned by participants). But prioritising a safe/quality 'good enough' threshold could be at the expense of a 'good enough' threshold for staying within financial limits or being as environmentally friendly as possible. Is satisficing for each priority complementary or mutually exclusive?

Action: go back to data already collected and in future data, evaluate relevance of the concept of aspiration threshold for how decisions around resource use are made in clinical practice.

Memos showed how ideas from the literature or the researcher's experience were used as conceptual levers to open new insight and possibilities of meaning in the concepts emerging during data analysis (Schatzman and Strauss 1973). A conceptual lever was a notion taken from literature or personal experience which was not forced onto the data, but 'tried out' as the potential language for explaining the data (Marshall and Rossman 2015). For example, the memo in Box 3 demonstrated how the researcher borrowed the terms good enough, aspiration threshold and *satisficing* from the literature (Simon 1997a) after the data allowed her to be sensitised towards ideas related to decision-making, risk and quality care. Therefore, the researcher acquired *theoretical sensitivity* during data analysis as an iterative process because it developed from the data first which then led to literature that contained further conceptual levers. Memoing captured the researcher's deliberate use of reflexivity to ensure conceptual levers from the literature were *sensitising concepts* that guided data analysis, without dominating or controlling the analytical process. Reflexively managing conceptual levers from the literature followed Blumer's (1954, 7) seminal symbolic interactionist perspective that "*sensitising concepts merely suggest directions along which to look*".

Similarly, the researcher displayed Charmaz's (2014, 30) constructivist view about how *sensitising concepts* provide "*initial but tentative ideas to pursue and questions to raise*" as a starting point, not an end to a line of inquiry during data

analysis. See Box 4 for an analytical memo prompted after reading a journal article which further sensitised the researcher to concepts already seen in the data, thereby confirming the analysis was grounded in the data. The memo in Box 4 allowed the researcher to consolidate different ideas emerging as significant in the data and brought new insight by using systems thinking as another conceptual lever.

#### Box 4 – Using literature as a conceptual lever

##### **Analytical memo: Who defines the threshold of quality care**

I've just read an article about service user and healthcare professional views on priorities for intensive care research. It was interesting to read how service users' perspectives of what should be researched was not the same as the critical care team priorities. Service users suggested things like follow-up clinics and psychological care and the practitioners focused more on physiological topics like ARDS, ventilation and sepsis. This got me thinking about how 'quality' is defined and who sets the threshold for what is 'good enough' to reach that definition of quality care. Practitioners are potentially doing actions and even admitting the patient to critical care when this is not what the patient/family wants. Some of the participants did talk about how resources are often overused without consulting service users in these types of decisions. Systems thinking comes up a lot in sustainability literature which I previously memoed about and I can see the relevance in the data more now. The concept of quality care could be applied to the threshold of health well-being of an individual patient as one system or the running of a unit that day as another system or even critical care practice as a service / department for an even larger system.

Memoing about negative cases allowed for variations in the data to be explored for a richer and more well-rounded analysis. Negative cases were defined by Charmaz (2016, 198) as *“data that demonstrate sharp contrasts with the major pattern that accounts for most of the data.”* According to Morse (2015), understanding negative cases is as essential as the frequently occurring situations to have a more in-depth comprehension of processes as a whole. Analysing alternative perspectives is also advocated by Kolb (2012) to provide further insight into the topic, aid with theoretical sampling and guide data collection. A negative case occurred as 'absent data' if a topic, which emerged as significant in other data, was not discussed at all in an interview. Another type of negative case was 'negative data' when participants referred to something as not occurring. For instance, P04 and P08 stated they did not have an awareness of sustainability

issues as children, which meant the theme of childhood influences was 'negative data' for those two participants. Another example of a negative case was the alternative view of sustainability that P02 observed with some of her colleagues, as seen in the memo presented in Box 5.

#### Box 5 – Memo: negative case in the data

##### **Analytical memo: Alternative views of sustainability**

P02 expressed a negative view of sustainability that she has observed some people having which is quite a different perspective compared to all the other participants. Although this is not necessarily P02's viewpoint, she does highlight that sustainability may not always be considered as a positive thing. It's not clear if the negative connotation towards sustainability is common, what are the influencing factors, how this comes about and what that means in relation to decision-making about how resources are used.

Rationales for theoretical sampling were also explored within analytical memos to explain the recruitment of individual participants. Box 6 is an example of memoing about theoretically sampling a technician after analysing the interview data from the two previous participants.

#### Box 6 – Memo: theoretical sampling

##### **Sampling memo: Technician interview**

P03 was a critical care technician theoretically sampled because this role was identified by the previous 2 participants as someone who influences how resources are ordered, stored and used in the critical care unit. After analysing the first two interviews (P01 and P02) and comparing these interviews with each other, resources seem to be linked to sustainability in terms of needing to sustain different resources for critical care practice. So, it seemed that sampling should include technicians because of their direct involvement with resources.

Analytical memos enhanced the process of extracting meaning from data because memoing identified gaps in the data and areas needing further data generation, analysis and development were identified. See Box 7 on page 69 for an example of this where memoing allowed the researcher to see there was a distinct lack of 'critical care' in the diagram developed while auditioning different concepts to be the central organising phenomenon. Subsequent data generation and analysis then addressed the gap identified from this memoing.



## Box 7 – Memo: where is the critical care?

**Sampling memo: Critical care is missing**

If you only looked at the developing diagram of satisficing related to bounded rationality and stewarding, then it could explain any healthcare practice. What's missing is the data analysis I've been doing around the context of critical care being a service which cares for people with life-threatening conditions and a type of practice which is incredibly resource intensive. The context of critical care is missing from the diagram to show that there is 'critical care' in the ideas I'm developing. And also to evidence the source of the developing theory coming from data that is rooted in the critical care practice seen in the data. I keep coming back to: Where is the critical care in the emerging data analysis?

Memos provided a record of the logical processes used while extracting meaning from the data, including how data were coded and categorised and ultimately how the grounded theory developed. As the data analysis progressed into the later stages of the study, theoretical memos explored the higher level of abstraction which occurred during theory integration. These memos rationalised the central organising phenomenon, along with concepts chosen as other major categories in the substantive theory. As an extended theoretical memo, the storyline analysis technique was borrowed from other grounded theory approaches (Birks et al., 2009; Birks and Mills 2015; Corbin and Strauss 2015). This technique involved writing a 'story of the case' which captured and explained the draft substantive theory auditioned by the researcher. The researcher emailed the storyline summary to participants before the second round of interviews which they reviewed before answering focused questions about the draft substantive theory (see Appendix 7 for this summary and the focused questions).

Final theoretical memoing then took place on the data from these second interviews which confirmed the storyline resonated with the participants' perspectives and experiences as seen in the memo of Box 8.

## Box 8 – Theoretical sufficiency 1

**Theoretical memo: Theoretical sufficiency apparent**

6 participants have had a 2<sup>nd</sup> interview (4 phone/Skype interviews + 2 email responses) which addressed focused questions after reading the storyline summary. All participants felt the concept of satisficing resonated with their experiences along with the other major categories of stewarding and influences on

resource use. They gave examples for this which provided further depth to the categories and the theory based upon satisficing as a central organising phenomenon which appears to fit and have relevance. The participants kept providing similar examples when comparing across and within participant responses (also compared to first interviews) and last 2 interviews in particular felt like I was hearing the same thing over and over. At this point, there therefore seems to be theoretical sufficiency with the amount of data collected and no further interviews or data collection is planned with a goal to now focus on writing up the draft report.

Although the researcher decided to stop collecting data after follow-up contact with six of the participants (four re-interviews and two email replies), P04 emailed back her response to the focused questions one month later. Memoing about P04's follow-up email captured further evidence of *theoretical sufficiency* because of how P04 agreed that the storyline summary related to her experiences in critical care practice (see Box 9). This memo in Box 9 also reflected how P04's response to the focused questions about the central organising phenomenon and other major categories provided the same type of examples already identified in other data which increased the researcher's confidence that the theory had *theoretical sufficiency*.

#### Box 9 – Theoretical sufficiency 2

##### **Theoretical memo: Confidence in theoretical sufficiency**

At the end of the last follow-up contact interview with P11, there seemed to be no new ideas coming out and her answers to the focused questions were just more examples of things previously discussed by herself in the 1st interview and the 1st/2nd interviews with other participants. No further follow-up had been planned at that point, but I've since received another email follow-up response from P04. She too agreed that this concept of satisficing resonated with her understanding of sustainability and that they are not currently satisfied they are reaching a 'good enough' level of staffing experienced practitioners (organisational / managerial decision-making). With her other examples and the responses to the rest of the focused questions, there were no new ideas surfacing and this follow-up data all appeared to fit into the properties of satisficing, stewarding and bounded rationality. This has given me more confidence that my previous decision about reaching theoretical sufficiency was sound and reasonable.

Memoing, therefore, provided a record of patterns and connections identified in the data, explored questions about how further data generation and documented choices made throughout the data analysis and theory building. Memos also

showed the substantive theory was grounded in the data, provided evidence of decisions related to *theoretical sufficiency* and fostered co-construction by sharing the storyline summary with participants. A memo bank collected each memo's original, unedited free-writing and any further text writing, images or diagrams. The memo bank became additional data which symbolised the merging of data collection and analysis processes used for the research.

#### 4.2.3.2 Initial coding

Data analysis used constructivist grounded theory coding which is the process of defining, describing and extracting meaning from the participant's views and actions (Charmaz 2014). Codes were constructed as a symbol to represent an abstract understanding of the data. Coding enabled the raw interview data to be systematically organised and condensed down into manageable amounts of analysed information. During coding, the researcher remained open-minded and willing to explore whatever ideas and eventualities emerged from the data which was an active attempt to avoid forcing the data from preconceptions and personal biases. The researcher was already theoretically sensitive to some concepts related to sustainability and critical care practice from the introductory literature search and experience as a critical care nurse interested in sustainability issues. However, the researcher used memoing and personal awareness throughout the data analysis to reflexively manage these pre-existing views.

**Line-by-line coding** during the initial stages of data analysis involved labelling each line of the interview transcript. **Line-by-line coding** helped the researcher to notice small nuances, and it enabled full engagement with finding an initial sense of how participants constructed sustainability and the influencing social processes. On page 72, see Table 13 for an example of early data analysis using **line-by-line coding**<sup>16</sup> and Box 10 for the accompanying memo.

Table 13 – Line by line coding example

Transcribed interview data	Line by line coding
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<sup>16</sup> Interview data is labelled throughout the report with an abbreviation to indicate the participant and whether it was the first or second interview. For example, P01-Int1 is Participant 1's first interview and P01-Int2 her second interview.

<p><i>When we've chopped and changed services at our workplace, it's usually about less money or less time available. Somebody in power [gives] 4 options that you could have for quality of service. Then [someone chooses] an option based on what's doable otherwise you can end up trying to do unachievable things with a smaller workforce. (P06-Int1)</i></p>	<p>Cutting resources            Redesigning services            Managing with less resources available            Being constrained by limited resources            Making decisions in position of power            Rationing services            Deciding what is doable and feasible            Comparing decision options            Doing more with less            Reduced staffing</p>
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### Box 10 – Memo: Line-by-line coding

This memo was written after completing the line-by-line coding in Table 13:

#### **Analytical memo: Goal-setting in resource decision-making**

The hour's interview with P06 was mostly filled with discussion focused on financial sustainability and resources in terms of money, time and staffing. P06 brought up the concept of 'quality care' numerous times exploring how from her experience, it is difficult to provide quality care with minimal resources and everyone is doing the best they can in the current financial situation. There was a sense of *setting realistic goals for practice* and *doing more with less*. Making decisions about how resources are used which ends up with quality care as the outcome seems to be a concern for this participant. She's aware there are of implications for aims set while decision-making and *setting realistic goals* then needs to take into account resource availability. There was also interaction between various people involved with decision (she mentioned senior people with power, staff in unit but then there's also the impact on patients and families).

Codes were expressed using gerunds<sup>17</sup> where possible to emphasise action within the social processes as recommended in grounded theory research (Carmichael and Cunningham 2017; Charmaz 2014). Some codes were **in-vivo** codes which used the participant's own words as a deliberate attempt to preserve the original intention and meaning of the participant's point of view (Charmaz 2014).

Examples of **in-vivo** codes were: *seeing the bigger picture*, *throw-away culture* and *equipment-centred care*. The initial coding during the early data analysis identified numerous codes which were then compared with each other. These codes were also compared across other interviews to see the replication of similar

<sup>17</sup> Gerunds are words ending in 'ing'. Charmaz (2014) emphasised gerunds while coding to prevent merely re-describing the data by using a higher level of abstraction towards more analytical linking of emergent processes.

ideas, recognise gaps and identify which codes appeared to be the most significant representation of the participants' perspective. Another initial coding technique recommended by Charmaz (2014) was comparing **incident-with-incident** from the same participant or excerpts from two different participants side by side. See Table 14 and Box 11 for an example of how this type of direct comparison enhanced the analysis.

Table 14 – Incident-with-incident coding example

P01-Int1 excerpt	P01-Int1 Coding	P02-Int1 excerpt	P02-Int1 Coding
<i>Experience and education [help you to] cut a lot of corners and you can be incredibly creative. Very often doing nothing is as effective as doing a lot. And doing a lot can create more waste and more problems.... As you get more experienced you might be able to negotiate with the medical staff to ask is what we're doing necessary.</i>	Being creative from experience Doing nothing when warranted Preventing waste Developing expertise Negotiating care Preventing futility	<i>If you have staff that work with you for a long time and gain a lot of experience, ultimately that's more cost-effective. You have less repeat training. You have a large pool of experience you can draw on to support other staff. That makes the whole workplace more sustainable where you have less use of temporary staff.</i>	Developing experience Using experience for resourcefulness Investing in staff Building pool of experience Nurturing experienced staff to stay Ensuring sufficient levels of staff

Box 11 – Memo: incident by incident coding

This memo was written after completing the line by line coding in Table 14:

**Analytical memo: Using experience**

P01 and P02 both talked about experience and people being resources which are needed for sustainability. The examples they gave were different such as P01 talking about experienced staff streamlining their practice to only do what is necessary and they also have more confidence to question prescribed treatments and negotiate with doctors to prevent futility. P02 recommended valuing and investing in staff because experienced, long-term staff are more cost effective than having a high turnover of people and relying on agency staff. *Negotiating care, developing expertise* and *investing in staff* – these things require non-technical skills like communication, leadership, situation awareness and teamwork. A nurse

could draw from previous clinical experience to know that the prescribed care isn't inappropriate, but non-technical skills and confidence are also needed for the nurse to be aware of the situation and bring up with the doctor. The comparison of the 2 excerpts has also made me see there were underlying concepts of efficiency and effectiveness in both the discussions about using experience.

As the data continued to be sifted, sorted and refined, groups of similar codes formed into categories. See Appendix 8 for an overview of the main categories and codes identified towards the end of the initial coding phase. From the analysis at this stage, it became evident that participants constructed sustainability as related to the resources needed to maintain critical care practice, including financial, environmental and social resources.

#### 4.2.3.3 Dimensional analysis

Memoing revealed some of the initial codes focused on quite concrete concepts that re-labelled the participants' discussion but did not fully draw out abstract ideas. Data analysis also stagnated once all eleven participants had a first interview and the identified categories did not develop into concepts. Other grounded theory analytical techniques were sought to enhance the abstraction of concepts from the emerging categories. Dimensional analysis (Bowers and Schatzman 2009; Gilgun 1993, 2010; Kools et al., 1996; Robrecht 1995; Schatzman 1991) was then integrated into the analytical procedures to complement the constructivist grounded theory approach. See Table 5 on page 40 for an overview of the principles of dimensional analysis.

Dimensional analysis helped the researcher to rationalise why some codes and categories emerged as more pertinent for addressing the research questions. A more significant, abstract category was labelled a dimension. Codes which had properties related to a dimension became the sub-dimensions. Each dimension and its properties were then mapped out in a grid table for comparison across all participants. In practical terms, the grid's columns contained the dimensions, and the relevant participant data organised into rows. Direct quotes from the interview transcripts were used in these rows to remain grounded in the data throughout the

analysis. Table 15 is an example of part of a dimensional analysis grid for the dimension of influences.

Table 15 – Partial dimensional analysis grid example

Dimension – Influences			
	<p><b>Childhood codes</b></p> <ul style="list-style-type: none"> <li>• Learning sustainability as a child</li> <li>• Not learning sustainability as a child</li> <li>• Growing vegetables as a child</li> <li>• Feeling connected to natural world as a child</li> </ul>	<p><b>Family codes</b></p> <ul style="list-style-type: none"> <li>• Having family with a sustainability job</li> <li>• Being influenced by parents</li> <li>• Having children</li> </ul>	<p><b>Home life codes</b></p> <ul style="list-style-type: none"> <li>• Making sustainability efforts in home life</li> <li>• Recycling at home as a token gesture</li> <li>• Overusing natural resources in home life</li> </ul>
P01-Int1	<p><b>Learning sustainability as a child:</b> <i>I'm of the generation in this country that really recognised we can't sustain our living without putting back what we take from the environment. In my childhood years, [sustainability] became a very big issue.</i></p> <p><b>Growing vegetables as a child:</b> <i>I come from a family where they grow their own veg and I'm very conscious of the mark that I make from what I do everyday.</i></p>	<p><b>Having family with a sustainability job:</b> <i>My husband works for a large metal and plastic recycling company and my brother-in-law works in sustainability in the local council too.</i></p> <p><b>Being influenced by parents:</b> <i>My parents were both born during the second world war and when they were children, everything was rationed. My parents are very very careful about what they do and what they use. Everything's, reused.</i></p>	<p><b>Making sustainability efforts in home life:</b> <i>I'm very conscious of the mark that I make on you know what I do everyday. Um, without sounding too sort of trite, the mark on the planet so I'm quite conscious of it even though I drive a car and it's not a very fuel-efficient car. And I do recycle as much as I can.</i></p>
P02-Int1			<p><b>Recycling at home as a token gesture:</b> <i>[Sustainability] is not something discussed in our practice. It feels like one of those</i></p>

			<i>issues that is very very far down the pecking order because everyone has lots and lots of other pressures on them. It's a bit like in your home, I do a bit of recycling but I haven't got time.</i>
<b>P03-Int1</b>			
<b>P04-Int1</b>	<b>Not learning about sustainability as a child:</b> <i>I don't remember having those influences [about recycling and excess packaging] growing up as a child. I don't remember my parents ever talking about it particularly. Whereas now they would.</i>	<b>Having children:</b> <i>It's a real cliché but since I've had a family you start to look forward more and I wonder what my children will be doing in [the future] and you want it to a healthy living environment for them. You think more about it when you've got other than yourself to think about. You start to look forward.</i>	<b>Making sustainability efforts in home life:</b> <i>I do the usual things that probably a lot of people do at home in terms of recycling and general green issues but I wouldn't say it's one of my passions and I wouldn't have any more knowledge about it than the average man in the street.</i>
<p>The full dimensional analysis table for the dimension of influences was in landscape view with three more sub-dimension columns (media, living in other countries and studying sustainability) and seven more participant rows (one row for each of the remaining participants P05-P11). Only a small section of the table is shown here to illustrate an example of how codes and interview data were compared within each participant and across the different participants.</p>			

Constant comparison of data, sub-dimensions and dimensions occurred while completing a dimensional analysis grid, as in the example in Table 15 for the dimension of influences. Memoing continued throughout to capture breakthroughs the dimensional analysis brought to the emergence of categories with less literal description and a higher level of conceptual abstraction. Box 12 on page 77 is one of the memos written while undertaking the dimensional analysis grid for influences which led to tokenism and competing priorities as new categories.



## Box 12 – Memo: dimensional analysis table

This memo was written while completing dimensional analysis table for the dimension of 'influences' as partly displayed in Table 15:

**Analytical memo: Tokenism and competing priorities**

When I first read P02's statement about doing a bit of recycling at home, I took that as her talking about recycling at home as a way of being active with sustainability outside of work in the home environment. But having done the dimensional analysis table and compared with P01's discussion around being consciously actively involved, it seems as though P02 is saying the recycling at home can be a bit *tokenistic*. P02 seemed to imply that people doing a small amount of recycling at home is some form of an effort to being more sustainable but the way she relates this to her experience in working in critical care, is that sustainability isn't really high on the agenda due to other pressures taking more priority (*competing priorities*). I've put this down as 'negative data' rather than an influence because P02 mentioned something related to home life which fits this dimension but she doesn't seem to be using recycling at home as an example of something which has actually influenced her – particularly if she is referring to recycling as a token gesture rather than a genuine and significant sustainability effort at work.

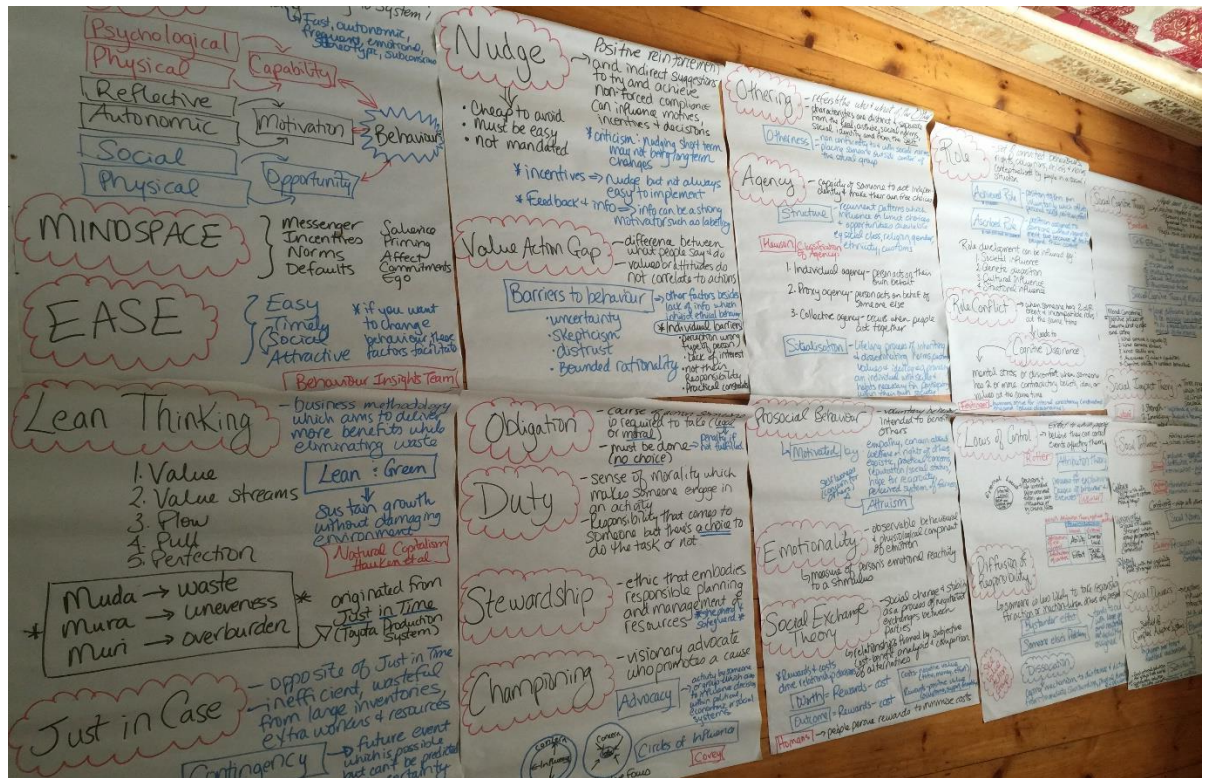
Other new ideas which significantly emerged from the constant comparison of the topic of influences included: social influence, media influence, nature connectedness, legacy, seeing the bigger picture and rationing. Sub-dimensionalising for the dimensions within Box 12 brought new insight into the links and patterns amongst the properties of each dimension's sub-dimension which moved the data analysis forward into the focused coding stage.

#### 4.2.3.4 Focused coding

Dimensional analysis enhanced the *theoretical sensitivity* towards key ideas, which enabled further data generation to embellish and fill in the gaps of the significant categories. Sociological literature was also reviewed for the researcher to become more theoretically sensitive to social processes not seen during the initial coding. Care was taken to make sure publications used as conceptual levers were only for concepts already in the data. Literature thus aided the analysis by providing language to explain 'emerging' social processes, without forcing ideas 'onto' the data. Existing theories, which appeared to capture the most significant social processes in the data, were then compared with each other. These theories, 'tried out' as provisional concepts to explain the data's social processes, were also evaluated while re-visiting the interview transcripts, initial

coding, dimensional analysis grids and memoing done up until that point of the study. Flip chart paper and diagramming provided one comparative view of relevant theories related to social processes to aid with the abstraction of ideas (see Figure 6).

Figure 6 – Comparing extant theories to social processes in data



There continued to be iterative cycles of data generation (new memos) and data analysis using the theoretical sampling of the literature based on the developing *theoretical sensitivity*. Coding became increasingly focused. Collections of similar codes were re-examined using higher levels of abstraction from the borrowed sociological theories. Categories which emerged as the most meaningful in explaining social processes for sustainability in critical care practice included: *stewarding*, *bounded rationality* and *satisficing*. Table 16 on page 79 portrays the progression into these three categories from initial and focused coding.

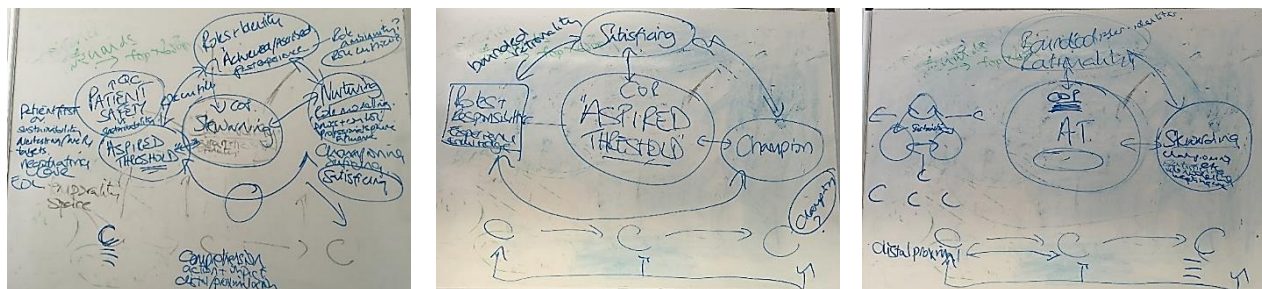
Table 16 – Initial and focused coding leading to abstract categories

Initial codes	Focused codes	Category
Supporting emotional needs of staff Promoting physical well-being of staff Working as a team Preventing burnout Feeling guilty about wasting resources Trying to reduce financial cost Greening up work environment Having sustainability champions Feeling a sense of legacy Sustaining resources into the future Feeling frustrated about resource use Feeling angry about resource use	Nurturing staff Sustaining emotional labour Preventing waste Feeling responsible for resources Seeing the bigger picture Championing sustainability	<b>Stewarding</b>  Properties: Responsible use of resources
Being influenced by family Being influenced by media Living in other countries Growing up on a farm Living in a throw-away culture Focusing on technology Drawing from experience and intuition Learning from colleagues Managing change Dealing with stress Technical and non-technical skills Working with insufficient resources	Being influenced by other people Being influenced by other things Competing priorities Developing resilience Interacting within a team Using situational awareness Communicating with others	<b>Bounded rationality</b>  Properties: Cognitive and environmental influences on decision-making
Practicing 'just in case' Avoiding risks Following protocols and policies Disagreeing with standardised care Needing to meet targets in practice Putting patients at centre of care Supporting both families and patients Overconsuming resources Underusing resources Maintaining safe and competent care	Working creatively Negotiating goals Justifying care Rationing care Aiming for minimum threshold Achieving quality care	<b>Satisficing</b>  Properties: Combination of being 'satisfied' and 'sufficing' to stop looking for other decision options once a goal for a decision ( <i>aspiration threshold</i> ) has been reached

Meeting expectations of service users		
Fulfilling expectations of staff		
This table was not an exhaustive list of all codes and categories. A selection was presented to illustrate the analytical process of how initial codes developed into focused codes which were grouped together into categories. The categories of <i>stewarding</i> , <i>bounded rationality</i> and <i>satisficing</i> emerged as the most significant abstract concepts and the basis for theory development.		

The context, conditions and consequences<sup>18</sup> from the perspective of the three significant categories were explored in the form of an explanatory matrix (Bowers and Schatzman 2009; Kools et al., 1996). The use of an explanatory matrix also drew from Corbin and Strauss' (2015) conditional/consequential matrix. Each of the major categories (*stewarding*, *bounded rationality* and *satisficing*) were tried out as the central organising phenomenon while drafting a matrix. This 'auditioning' involved evaluating whether each concept could fully explain the social processes influencing sustainability in critical care practice to become the end consequence. Diagramming on a whiteboard helped to explore the associated contexts, conditions and consequences of each category (see Figure 7).

Figure 7 – Auditioning concepts to be central organising phenomenon



*Satisficing* eventually emerged as the fundamental concept which appeared to have the most 'fit' to be the central organising phenomenon. *Bounded rationality* and *stewarding* were recognised as inter-related and significant supporting major categories. The memo in Box 13 on page 81 showed how *satisficing* continued to

<sup>18</sup> Context – the substantive situation which identifies boundaries around the inquiry. Condition – a prominent dimension which facilitates, impedes or shapes deliberate or unintentional actions. Consequence – outcome of the process actions influenced by conditions.

be the major category with the most centrality as previous data, memos and coding were re-analysed.

### Box 13 – Memo: central organising phenomenon

**Theoretical memo: *Stewarding, satisficing and bounded rationality***

*Stewarding while satisficing...or satisficing while stewarding.* I'm trying to think about whether one is more central than the other. Or if one underpins the whole thing (or the other). Is one a process during sustainability and the other the outcome (or vice versa). *Stewarding* appears to capture the data and codes about 'why' participants were wanting to use resources in a sustainable way as an ethic to not waste resources and use those resources available in an effective way. So many of the participants discussed examples related to *stewarding* as noted in the dimensional analysis table leaving me to think it's a major category. But it doesn't explain 'how' the resources are used in practice. I've just noted in the paragraph above I've written *bounded rationality* explains 'how' limits to time, effort, knowledge etc influence setting an *aspiration threshold* for best use of resources. *Aspiration threshold* is essentially part of the process of *satisficing* and I keep coming back to *satisficing* in memos. *Satisficing* as a concept seems to draw together *stewarding* and *bounded rationality* - it is starting to feel like *satisficing* really is the central organising phenomenon.

Thus, *satisficing* appeared to be the central idea that all other aspects of the participants' main concern could be explained around. Table 17 is the explanatory matrix outlining the context, conditions and consequences from the perspective of auditioning *satisficing* as potentially the most significant social process influencing sustainability in critical care practice.

Table 17 - Explanatory matrix: satisficing as central organising phenomenon

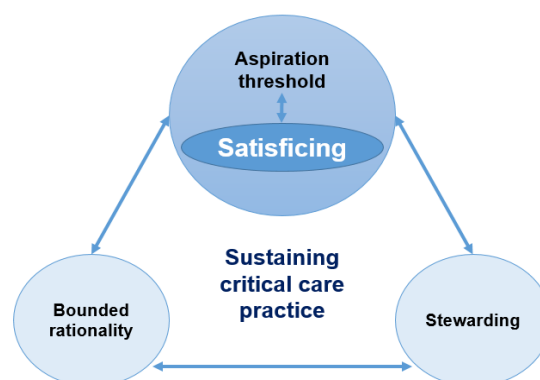
Matrix with satisficing as central organising phenomenon		
Context	Conditions	Consequences
Critical care practice (Level 2 and 3 patients in NHS hospitals in England)	Knowledge, skills (technical and non-technical) and attributes	Championing for or withdrawing from sustainability
Large amount of resources required for critical care practice within limited resource availability	Influences on values and beliefs Social norms around resource use	Impact of critical care practice on resources in other parts of the system and the system as a whole

Spatial and temporal proximity to resource issues	Self-efficacy and circles of concern, influence and commitment	Sustainability of critical care practice: environmental, financial, social
Uncertainty within clinical practice	Systems thinking	
Ageing population	Lean thinking	

#### 4.2.3.5 Theoretical coding

Focused coding merged into theoretical coding while the major categories of *stewarding*, *bounded rationality* and *satisficing* continued to resonate when compared to the data from the first interviews with all eleven participants. Theoretical integration came while diagramming a potential explanatory matrix. The rough images in Figure 7 on page 80 eventually grew to become Figure 8 which was an early model of the proposed substantive theory. Further elaboration of this diagram ultimately resulted in the substantive theory summary presented as Figure 16 (page 156) in the Findings chapter.

Figure 8 – Early diagram with satisficing as central organising phenomenon

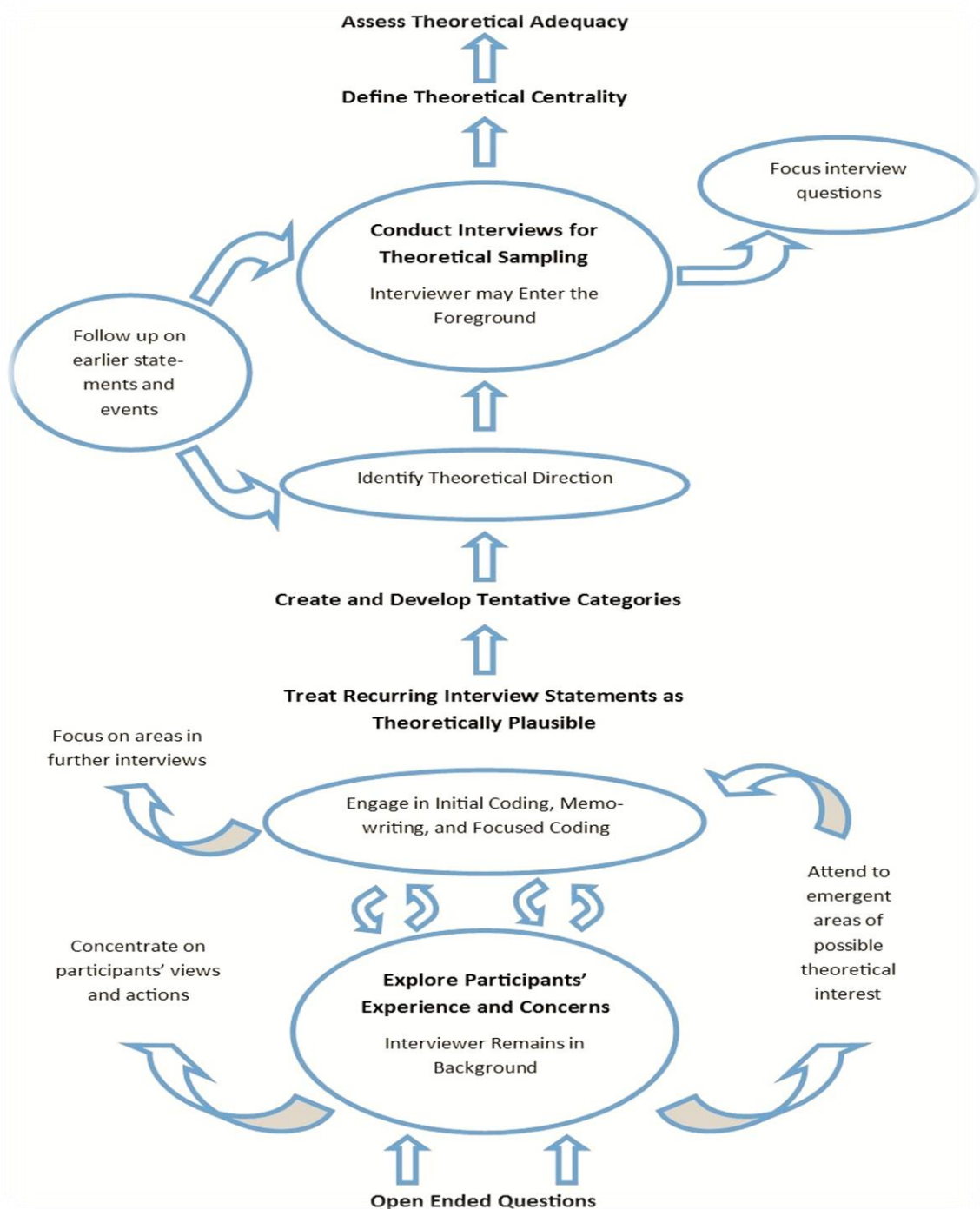


Advanced data analysis continued by theoretically sampling literature (see the integrative literature search details in Appendix 1). Borrowing language from extant theories helped to explain these significant social processes in the

substantive theory. Theory integration cumulated into the storyline which was the extended theoretical memo technique previously discussed on page 69.

The iterative process of interviewing alongside concurrent data analysis, leading to theoretical coding and *theoretical sufficiency*, is summarised in Figure 9.

Figure 9 – Interviewing with concurrent data analysis (Charmaz 2014, 88)



### 4.3 Ethical considerations

The researcher followed the University of Brighton's research ethics and governance procedures including completion of a risk assessment and governance checklist. See confirmation of authorisation to conduct the study for the initial Tier 1 stage in Appendix 9 and the secondary Tier 2 stage in Appendix 10. Verification of the University approval to conduct the study was also sent to the BACCN board who then advertised the recruitment information on their social media sites and as a website news item (see Appendix 2 and Appendix 11). The BACCN advertised the recruitment information online, but the researcher did not use social media platforms to contact potential participants directly, and she did not include any of her own personal social media information in the advertising content.

An addition to the University's Tier 2 research proposal was also approved as a chairs action and confirmed through email correspondence (see Appendix 12). The amendment involved ethical approval to enrol people who volunteered to be a participant after hearing about the study, but not from one of the previously stated recruitment strategies. This was accepted as ethically sound to enrol a participant who unexpectedly volunteered for the study under these conditions:

- If the participant meets the inclusion and exclusion criteria (see Table 6 page 46).
- If the participant fits the type of sampling being undertaken at that point of the study (purposive sampling at the beginning of the study and theoretical sampling as the researcher became theoretically sensitive).
- If the participant freely and independently volunteers from hearing about the study in some way but not from the researcher actively recruiting (e.g. at conferences or at meetings).

People who expressed an interest in volunteering for the study were emailed back (see Appendix 3) asking them to review the inclusion and exclusion criteria and participant information sheet (see Appendix 5) before completing the consent form (see Appendix 13). Participants were given at least 24 hours between volunteering for the study and the interview to allow sufficient time to consider all



aspects of the research. Consent was also verbally 'refreshed' before starting the interview and follow-up contact. The participant information sheet indicated follow-up contact through a second interview would only be requested if clarification about the interview findings was needed and was another voluntary, opt-in option.

Once the researcher had transcribed the interview, a copy of this transcription was sent to the participant as an email attachment. See Appendix 3 for the email sent to participants one day after the interview to thank them for their time and the email for sending out the transcribed interview as a typed attachment. Participants were informed they had ten days to reply if they had any comments or concerns with the transcribed interview data. Participants were also told it would be assumed that if they did not respond, consent had been given to use the transcribed interview data for the study.

The participant information sheet emphasised participating in the study was entirely voluntary, and consent could be withdrawn at any point. However, by taking a constructivist grounded theory approach, the researcher analysed the data throughout the data collection period including during the interview itself. If a participant withdrew after an interview had started, it would have been impossible to take away the data collected and analysed which had occurred up until that point (the researcher would not be able to 'un-hear' something a participant had already said during this simultaneous process of data collection and analysis). There was also co-construction of the meaning of the data between the researcher and the participant (Charmaz 2014). The data collected and interpreted to the point of withdrawal would, therefore, need to be considered as part of the study and integrated into the building theory. This was clearly stated in the participant information sheet and rechecked when consent was verbally 'refreshed' at the beginning of the interview. In doing so, the researcher was fully transparent about the implications for withdrawing consent after an interview had started and ensured their consent was truly informed. Out of the total sample of eleven participants, five people did not reply for a second interview, but no participants formally requested to withdraw from the research.

Interviews were audio-recorded on a digital audio recorder and transcribed as soon as possible after the interview. After completing the transcription of each interview, the recorded interview was deleted from the audio recorder. As outlined in Table 8 on page 50, a designated participant number was assigned to each person in the sample to anonymise the data after recording and transcribing. The participant's contact details, the list allocating each person with a participant number and the consent forms were kept separately from the rest of the research documents on a password protected USB stick and backed up on a second password protected USB stick. The participant information sheet made it clear that all interview data would be anonymous and participant names and contact details left out when reporting of the research findings. Personal identification data was kept locked before electronically disposing of sensitively and securely.

All files related to the study were password protected and stored on the University of Brighton's SharePoint (only the researcher holds this password). As an extra back-up in case of University server failure, the files were saved on two password protected USB sticks which were kept in a locked office drawer when not in use. A spare audio recorder was available during all interviews in case of failure of the primary audio recorder. The laptop used for the study also had a firewall, was password-protected and locked when not in use. Participant privacy was, therefore, maintained because the researcher ensured she complied with the *Data Protection Act 1998* and the University of Brighton policies for data protection and research ethics and governance.

#### **4.4 Methodological rigour**

This chapter will finish by considering how the researcher promoted methodological rigour in the study. Lincoln and Guba's (1985) seminal text entitled *Naturalist Inquiry* suggested methodological rigour in qualitative research comes from establishing trustworthiness based upon the following: credibility,

dependability, confirmability and transferability<sup>19</sup>. Birks and Mills (2015) proposed a more contemporary account of quality grounded theory research to include three main features: researcher expertise, methodological congruence and procedural precision. These three elements will now be integrated with the relevant principles of Lincoln and Guba's (1985) trustworthiness model to evaluate how methodological rigour was maintained holistically. Further practical guidance on applying Lincoln and Guba's trustworthiness criteria came from Anney (2014), Morse (2015) and Petty, Thomson and Stew (2012).

#### 4.4.1 Researcher expertise

For any research project to be successful, the researcher requires the knowledge, skills and professional attributes as are necessary for the specific type of research being attempted (Birks and Mills 2015). As a doctoral student, the researcher undertook educational activities to develop competence and confidence in the entire research process. In addition to formal professional development, the researcher was continually reading and accessing online resources related to constructivist grounded theory. The Researcher Development Framework (Vitae 2017) was used in a self-directed manner to plan and monitor researcher development including the following domains: knowledge and intellectual abilities; personal effectiveness; research governance and organisation; and engagement, influence and impact. As already noted, the researcher was also a clinical nurse and educator for critical care with an interest in sustainability. This background provided her with critical care and sustainability in healthcare expertise although reflexivity was used to manage pre-existing knowledge and potential bias carefully (see Section 4.4.2.1).

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<sup>19</sup> Credibility = findings can be trusted and believable as genuinely coming from the participants. Dependability = consistent research design; transparent and auditable process; variations made clear. Confirmability = findings result from the data collected and theory from the data analysis without being biased by the researcher. Transferability = degree to which findings from this research can be used in other contexts and settings (Lincoln and Guba 1985).

### 4.4.2 Methodological congruence

The second component of Birks and Mills (2015, 36) model for evaluating rigour in grounded theory research is that of methodological congruence which they state “occurs when there is accordance between your personal philosophic position, the stated aims of your research and the methodological approach you employ to achieve these aims.” Chapter 3 as the methodology chapter explained the philosophical positioning of the researcher and the methods outlined in Chapter 4 have been congruent with a constructivist grounded theory approach. The researcher enhanced the credibility of the study in being authentic to constructivist grounded theory through reflexivity, member checking, participant involvement and peer review. Transferability was made possible by ensuring the background context of the study was clearly explained and by using thick description in presenting the findings. These components related to credibility and transferability are now explained in more detail.

#### 4.4.2.1 Reflexivity

Reflexivity is defined by Birks and Mills (2015, 52) as “systematically developing insight into your work as a researcher to guide your future actions.” Reflexivity, within grounded theory research, involves showing how decisions were made and how the researcher’s own assumptions and personal interests were managed (Doyle 2013; Engward and Davis 2015; Finlay and Gough 2003; Gentles et al., 2014; Jootun, McGhee and Marland 2009; Markey, Tilki and Taylor 2014; McBrien 2008; McGhee, Marland and Atkinson 2007; Pezalla, Pettigrew and Miller-Day 2012). Critically evaluating reflective journal writing and memoing heightens the reflexivity through a process of attentive, transparent, analytical thinking (Birks and Mills 2015). The original classic grounded theory discouraged reflexivity because Glaser (2001, 47) referred to it as “paralyzing, self-destructive and stifling productivity.” In later writing, Glaser (2002b) clarified he did not reject researchers having self-insight, but he emphasised constant comparison analysis was more important than reflexivity for conceptualising to ‘discover’ theory. By using a symbolic interactionist framework, Straussian grounded theory introduced reflective journal writing for researchers to be aware of the extent of their own biases and to learn from their decisions (Corbin and Strauss 2015). Reflexivity is

explicitly encouraged in constructivist grounded theory because of the role of the researcher in co-constructing meaning with participants (Charmaz 2014).

By following a constructivist grounded theory approach, the researcher, therefore, embraced reflexivity with the acknowledgement that her background in critical care and sustainability positively contributed to theoretical sensitivity. The researcher's previous experience and personal views were reflexively managed to prevent bias from unduly influencing the research (Engward and Davis 2015; Gentles et al., 2014). Reflexivity occurred during memoing (see Box 1 on page 64 and Box 14 on page 89), while maintaining a reflective research journal and during meetings with supervisors (see Appendix 4).

#### Box 14 – Memo: reflexivity example

##### **Analytical memo: Sustainability at home vs work**

During the interview and after I first transcribed the interview, I thought P04 was quite interested and active with sustainability. But I re-read the transcript today trying and suddenly realised a question I didn't ask before: why didn't P04 discuss sustainability in clinical practice if she's very concerned about fossil fuels and tries to address green issues in her home life? In making this comment about P04 valuing sustainability as important but not acting upon this in clinical practice, I'm not saying this is a bad thing or criticising her. It just sprung out at me while trying to view the data from a different perspective and while considering the possible influence of my own experiences and assumptions.

#### 4.4.2.2 Member checking

In Guba and Lincoln's (1985) model of trustworthiness in qualitative research, member checking was endorsed to enhance credibility. According to Holloway and Galvin (2017, 311), member checking aims to receive "*feedback of participants, their reaction to the data and findings and their response to the researcher's interpretation of the data which are obtained from them as individuals*". Member checking, for this study, started with restating, summarising and paraphrasing for clarification within the initial interviews themselves. For instance, Table 18 presents examples of how the researcher 'checked in' with participants during the first interviews. The exploratory probes, previously discussed on page 53 and fully listed in the interview agenda of Appendix 6 (page

273), aided this type of direct member checking which occurred during the interview time.

Table 18 – Immediate member checking within interviews

Clarification statements and questions from the researcher to participants:
<ul style="list-style-type: none"> <li>• Earlier you said two things concern you: knowledge and the other one was waste. Could you elaborate on that?</li> <li>• From what you are saying, it sounds like those are national policies?</li> <li>• Going back to what you said about effective treatment planning, there would be different types of ward rounds depending on who was on that day or the consultant preference?</li> <li>• In terms of sustainability of people's practice, or how their practice relates to sustainability, you've emphasised knowledge, education, waste, teamwork and collaboration. Are there any other aspects of critical care practice that you think could be influencing sustainability or are influenced by sustainability?</li> <li>• So, from what you're saying, as a clinical nurse, you separate your waste and recycling at the bed-space and at that point it's somebody else who then comes in and takes away the recycling as well as the rubbish waste?</li> <li>• Do you mean surveillance by registered nurses?</li> <li>• Could you clarify what you meant by pharmaceutical waste?</li> <li>• Could you elaborate on what you mean by planning in terms of who is making the planning and when that planning would occur?</li> </ul>
<p>This is not an exhaustive list but a selection of examples of immediate member checking within the first interviews.</p>

A more extensive form of member checking involves asking participants to review transcribed data or interpretations of that data to confirm whether or not there is an accurate representation of their own perspectives (Cho 2017). This type of member checking occurred following each interview by emailing the typed transcripts to participants with a request to send any comments, corrections or additions back to the researcher. The email informed participants if they did not reply within ten days, the researcher would assume the participant had no feedback about interview data which would be anonymised and used for the study. (see Appendix 3). None of the participants replied with any feedback about the first interview transcript, but this type of member checking offered the opportunity.

Finally, sending the participants a summary of the substantive theory and focused questions (Appendix 7) was similar to Birt et al.'s (2016) 'Synthesized Member Checking' (SMC) technique. SMC allows participants the option of engaging with the analysed data after their initial semi-structured interview. As explained in Section 4.2.2, a total of seven participants agreed to a second interview (the other four participants did not reply to request for the follow-up interview). The seven participants who did respond confirmed the substantive theory resonated with their own experiences and pragmatically worked in its application to sustainability in critical care practice. Should this not have been the case, the researcher would have had insight from member checking as to the direction of further data generation and analysis required to reach *theoretical sufficiency*.

Some qualitative researchers criticise member checking for potentially causing confusion and reducing credibility because participants may disagree with analysed excerpts of data, change their mind about important ideas or find interpretation difficult (Morse 2015; Sandelowski 1993). A recent literature review on member checking by Thomas (2017) also concluded member checking was not necessary for research which generates theory. Thomas' review indicated that any revisions suggested by the participants would not likely impact on theory development and the participant may view repeat contact with the researcher as intrusive. Similarly, Glaser (2007b) contested Guba and Lincoln's (1985) notion of credibility and claimed member checking was not appropriate for grounded theory research. Glaser's (2002a) issue with member checking stemmed from his view that participants may not fully understand the abstraction of ideas collected from a range of different people or data sources. Glaser's views against member checking reflected an objectivist viewpoint of 'discovering' theory aligned to positivist realism. This perspective was significantly different from the researcher's aim for theory 'co-construction' though which drew from relativism, constructivism, symbolic interactionism and pragmatism. Due to her philosophical positioning, the researcher concurred with Charmaz (2014) and Koelsch (2013) that member checking was a useful way to co-create subjective meaning with participants. Additionally, the researcher considered member checking as a way of sharing power and involving participants to enrich the co-construction of the theory.

According to Nagel et al. (2015, 375), member checking “*must be contextually appropriate and mindfully integrated into a constructivist grounded theory research design*”. Reflexivity, while planning and implementing member checking, ensured returning to participants remained congruent with constructivist grounded theory principles. For instance, there was an acceptance that participant subjectivities will not be static because the context and conditions of that particular time influence each point of contact (Koelsch 2013). Memoing also helped the researcher to be attentive to the potential limitations of member checking by reflecting on the implications of returning to participants after a long period of time between the initial interview and follow-up contact. For example, the memo in Box 15 showed that although the focus of resource issues for some participants changed in the follow-up interview, the underpinning process of satisficing continued as the central organising phenomenon, adding further evidence for *theoretical sufficiency*.

#### Box 15 – Satisficing remaining in follow-up contact

##### **Theoretical memo: Examples changed but satisficing remains**

I’ve noticed in the follow-up interviews with P01, P02, P07 and P11 and the email replies by P04 and P10 that there was much more focus on social well-being of staff compared to the data in their 1<sup>st</sup> interviews. Staff resilience and sustaining the workforce were in the data from the 1<sup>st</sup> interviews. And environmental sustainability was evident in the follow-up contact interviews/email responses. But overall, the participants seemed to talk much more about burnout of staff and less about environmental and financial sustainability in the follow-up. I can still see ‘satisficing’ underpinning all these examples in both 1<sup>st</sup> and 2<sup>nd</sup> interviews though. It’s just that the examples they gave were more frequently about social resources the 2<sup>nd</sup> time in compared to all the examples about things like waste, lack of recycling, over-using gloves and aprons that they really focused on in the 1<sup>st</sup> interviews. The abstract idea of satisficing as a decision-making process remained the same in the social sustainability examples though. The ethical sense of responsibility toward using resources as efficiently as possible (stewarding) and many of the factors previously identified as properties in the bounded rationality category were also evident in the follow-up contact data.

No significant problems arose from member checking (e.g. disagreement with the researcher or significant transition away from previous ideas). Consequently, member checking was viewed as a positive aspect of the research design



because it enhanced the constructivist approach, facilitated *theoretical sufficiency* and strengthened the credibility of the study.

#### 4.4.2.3 Participant, patient and public involvement

During the planning of the research study proposal, participant involvement included showing the planned interview agenda and participant information sheet to two critical care nurses, three general nurses and a layperson for feedback. While planning the research design, service users (former critical care patients and family members) were considered as possible participants. In anticipation of theoretical sampling being unknown at the start of a grounded theory study, the inclusion criteria were broad enough to include service users should the data analysis have indicated this to be needed. The researcher received approval while planning the research from the ICUsteps organisation (national service user support group for critical care) to potentially advertise for participants through their website. However, this was ruled out as the study progressed because theoretical sampling of service users did not occur from the data analysis.

Another way the researcher considered public engagement while planning the research was to look for any service user perspective on sustainability in critical care practice during the introductory literature search. Although this was not a comprehensive literature search at the outset of the study, the initial literature review did not reveal any specific service user perspective in relation to the research topic. The email reply from the ICUsteps Trustee did state the following though: *"I think your research sounds interesting and currently relevant"* (see Appendix 14). In addition, this Trustee offered to contact the ICUsteps Board to request formal approval to advertise the recruitment information through their website and other forms of communication. Despite the researcher not needing to follow up on that offer, the email correspondence provided a member of the public's view that sustainability in critical care practice was a valid and important topic worthy of researching.

#### 4.4.2.4 Peer review

The research design, implementation and findings received ongoing peer review throughout the study with systems in place as part of the researcher's regular activities as a doctoral student. This support included 6-8 weekly meetings with supervisors and annual progression review meetings with Doctoral College leads. Within both types of meetings, senior researchers observed the research implementation and a summary of findings to date. Audio recordings, notes and action plans from these meetings also added to the audit trail of evidence about decision-making taken for data generation, data analysis and theory building.

An update of the research was formally presented each year at the Doctoral College annual student conference with feedback received by research students, supervisors and guests. Further peer review throughout the research timeframe came from the University's Grounded Theory Special Interest Group and Sustainability Special Interest Group meetings. Towards the end of theoretical integration, the substantive theory was presented to these University groups and at the Doctoral College conference. The conference audience and meeting members confirmed the substantive theory had fit, grab and relevance (Glaser 1978), despite not necessarily having a background in critical care practice. Similar positive feedback about the substantive theory also came from the researcher's students and critical care colleagues in higher education and clinical settings when she presented the substantive theory upon completion of the study.

#### 4.4.2.5 Transferability

Transferability was enhanced from the thesis using thick description while explaining the study's background context, methodology, methods and findings. Transferability also came from including direct interview quotations from the participants and memoing from the researcher in the thesis document. This original data allows readers to evaluate themselves whether the basis of the grounded theory is applicable to critical care practice. Finally, transferability became increasingly evident as the researcher developed theoretical sensitivity. She began to see the features of *bounded rationality*, *stewarding* and *satisficing* within her observations of critical care clinical practice and education. As

previously mentioned, reflexivity while memoing was used to ensure these outside experiences were not unduly forcing the data. The more the theory building progressed, the more the researcher observed the major categories and central organising phenomenon in situations outside the context of the research study. See Box 16 on page 95 for a memo about finding transferability of the substantive theory to current and future clinical practice and teaching.

#### Box 16 – Memo: observing substantive theory outside the research

##### **Theoretical memo – Substantive theory seen in education and practice**

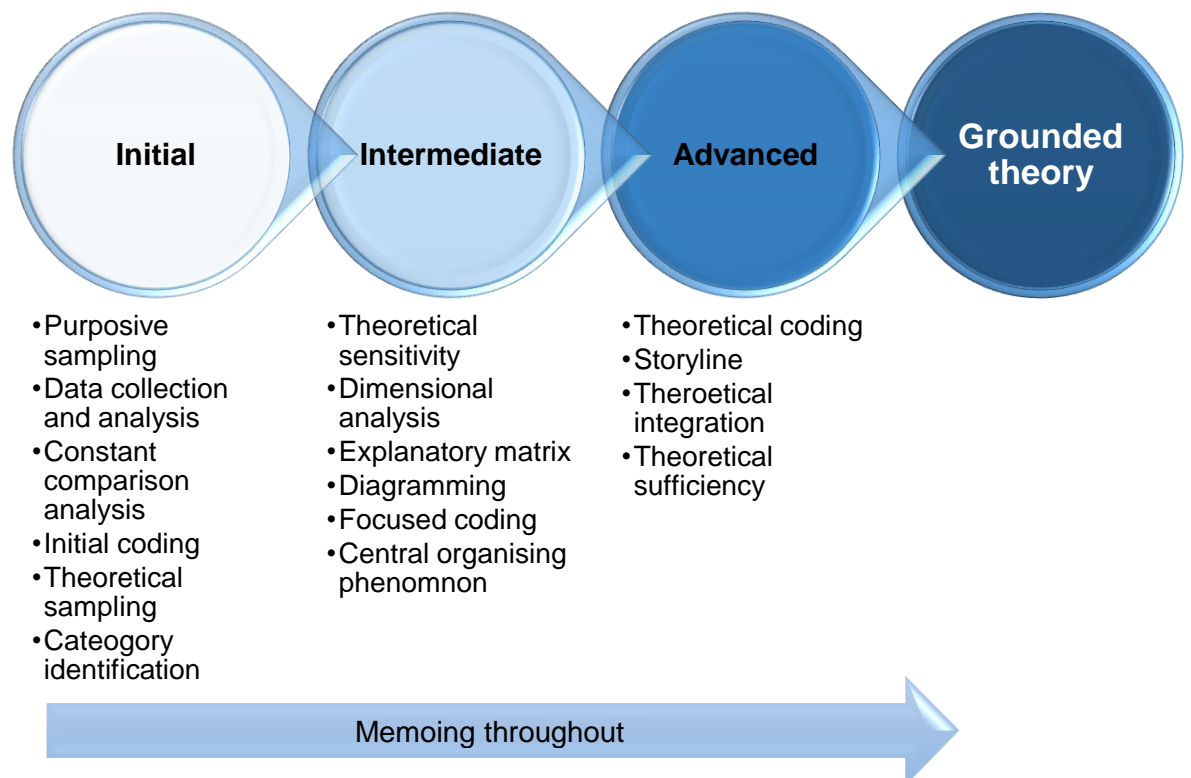
I was teaching today and overuse of antibiotics came up which immediately made me think of *stewarding*. Then a student raised the point that underusing antibiotics potentially leads to sepsis - there's that *aspiration threshold* again, using resources enough to meet the threshold of quality care but not too much to be wasteful or even harmful in misusing the resource. During my last 2 bank shifts, both patients were over-ventilated, over-sedated and junior nurses weren't confident to turn noradrenaline off – at the time I didn't think of it, but now can see influences of not taking initiatives to reduce resource use when interventions weren't needed. At the last ICU Pathway meeting, the practice educators were talking about Level 7 students using the quality improvement proposal assignment to develop new protocols - even though they didn't say the exact terms, there were elements of *satisficing* and *stewarding* in what they meant. Another example of seeing the theory is we're updating the curriculum right now and during our planning, I keep seeing how the theory would relate to both content and the way we teach critical care practice which is giving me more confidence that the theory will have value after I finish the research.

#### 4.4.3 Procedural precision

The notion of procedural precision was emphasised by Birks and Mills (2015, 36) who stated: “*careful attention to the rigorous application of grounded theory methods is critical if you wish to develop theory that will be judged as a quality product.*” Chapter 4 explained how the core aspects of grounded theory research were rigorously carried out for the study. The fundamental grounded theory methods contributing to the dependability of the study included: delaying a comprehensive literature review to ensure the data drove the theory development, *theoretical sampling*, *theoretical sensitivity*, concurrent data collection and analysis, coding and memoing. Dependability also came from reporting the entire research process in the thesis and correctly following ethics and governance requirements. Confirmability was achieved through an audit trail of research

activities, memoing throughout the study and secure keeping of all data which could be observed by an external person if need be. The procedure of conducting this constructivist grounded research study is recapped in Figure 10 on page 96 to provide an overview of the research methods for further confirmability.

Figure 10 – Research methods used



## 4.5 Summary

This chapter presented the research design methods used for sampling, data generation and data analysis, which were underpinned by a constructivist grounded theory approach. Semi-structured, in-depth interviews with practitioners in critical care were the primary source of data. The analysis process included constructive grounded theory coding and the additional analytical techniques of dimensional analysis, conditional/consequential explanatory matrix and storyline as an extended theoretical memo. Ethical considerations and implications for

methodological rigour concluded this chapter with the research findings following in Chapter 5.

## Chapter 5 Findings

### 5.1 Introduction

Chapter 5 consolidates the research data of significant findings about the meaning of sustainability in critical care practice and the influencing social processes. Excerpts from interview transcripts are used to illustrate and ground the substantive explanatory theory which emerged from the findings. Quotations were selected based on relevance, frequency and idiosyncrasy to show significance and variation in the data. The verbatim text is the participants' own words subject to minor editing to remove hesitation or repetition. For example, editing removed the following speech items from the interview transcripts: um, ah, so, you know and repetitive words or phrases. If a phrase or sentence was taken out, full stops were used to indicate a gap in the verbatim text. Square brackets [ ] identified new words inserted to add clarity or flow. Care was taken to preserve as much of the verbatim text as possible to keep the quotations close to the participant's voice. After editing, checks were made to ensure the original meaning remained and the interpreted data still represented the ideas presented by the participant (Morse 2018). See Table 19 for an example of an edited quotation.

Table 19 – Example of edited quotation

Verbatim original text	Edited text but preserving meaning
<p><i>"I remember looking after a patient in a side room who was ah who was barrier nursed. I remember one day having to throw out after the patient was moved out, having to throw out a most <u>ridiculous</u> amount of new ah unused resources. And it <u>absolutely</u>, it just made my blood boil. So I remember putting signs on the side room doors you know if we're barrier nursing please stock minimally. Um, you know the sort of in the room to avoid as much waste. I remember talking to somebody about that and I remember another nurse um I think</i></p>	<p><i>"I remember looking after a patient in a side room who was <del>ah who was</del> barrier nursed. <del>I remember one day having to throw out</del> After the patient was moved out, I had to throw out the most ridiculous amount of new ah unused resources. And that absolutely, <del>it just</del> made my blood boil. <del>So</del> [Afterwards] I remember putting signs up <del>on the side room doors you know if we're barrier nursing please</del> to stock minimally in a [barrier]—Um, <del>you know the sort of in the</del> room to avoid <del>as so much</del> waste. <del>I remember talking to somebody about that and I</del></i></p>

*afterwards on the unit who introduced recycling to the unit as well and us talking about it. And probably they are the only two. Oh, I remember a 3<sup>rd</sup> time actually after the incident with having to throw out all the rubbish, I remember talking to one of the uh 1 of the people who work on the unit about maybe putting costing of how much equipment costs or the resources that we use so that people won't nurses won't just without thinking take stuff off shelves. Actually, hopefully thinking if there's a price next to them, do I actually need to use this. We started talking about how we can limit people's use. But there's nothing ingrained in the system at all. It's all very loose conversations." P01-Int1*

~~*remember another nurse um I think afterwards on the unit who introduced recycling to the unit as well and us talking about it. And probably they are the only two. Oh, I remember a 3<sup>rd</sup> time actually after the [After this] incident with having to throw out all the rubbish, I remember talked to one of the uh 1 of the people who work on the unit [the technician and another nurse who introduced recycling to the unit] about maybe displaying how much equipment costs and the resources that we use so that people won't nurses won't just without thinking take stuff off shelves. Actually, hopefully [without questioning if its] thinking if there's a price next to them, do I actually needed to use this. We started talking about how we can limit people's use. But there's nothing ingrained in the system at all. It's all very loose conversations." P01-Int1*~~

A selection of memos served as a further source of data for the inductive-deductive reasoning cycles. They also confirm the researcher went back to the data to ground theoretical insights throughout data analysis and theory generation. Literature is sign-posted in a footnote if it was used as a conceptual lever to illuminate further analytical insight and to cross-reference to further discussion in the next chapter. The presentation of the findings is framed according to the emergent substantive theory to show how the central organising phenomenon and other major categories developed into the theory.

## 5.2 Meaning of sustainability

### 5.2.1 Financial sustainability

Every participant (P01-P11) discussed financial resources during their interviews showing they all associated the meaning of sustainability with economic aspects of critical care practice. Sustaining the finances required for critical care practice

appeared to be a significant component of how these participants defined and found meaning with sustainability:

***Financial sustainability** in the future is to make sure we've got the resources coming in so that we [the critical care service] are **earning** and money [spent] is coming back to us [reimbursed to the Unit/ Directorate]. (P10-Int1)*

When asked about the source of resource issues, P07 replied:

*Money. Most of the care environment are service initiatives around **cost** and patient outcomes... policy issues around prevention of patients going to intensive care because it's so **expensive**. (P07-Int1)*

Seven people (P01, P04-P07, P09, P10) raised concerns about the financial affordability of critical care practice. They highlighted large amounts of money are required to care for critically ill patients which creates difficulties during the current period of fiscal austerity and budget cuts:

*The Trust wants **to balance the books** financially and critical care seems like a bottomless pit of spending...yet they don't address the reasons why we overspend and that's often because it's a **knock-on effect** of the rest of the Trust. There are patients who need to go to nursing homes but are not moved on which leaves a back-log in AandE and other departments including critical care. The Trust seems to not be directing their energies at that and just want us [in critical care] to restrict what we're doing. (P10-Int1)*

The discussion above by P10 expressed her concern about critical care units being financially over-spent due to the *knock-on effect* from what happens in other areas of the hospital and NHS. P10 identified critical care financial resource issues were influenced by other departments and wider health and social care services, showing she has made links between different systems<sup>20</sup> involved with critical care practice. P05 also discussed *the knock-on effect* when asked to elaborate on the types of targets critical care units are required to meet:

*You get **fined** for **delayed discharges**...If you can't get a patient out of the ward, how can you get a patient out of ITU and another patient out of AMU into ITU. It's a **vicious circle**. People are being placed in the wrong place of the hospital because they're trying to stop breaching their AandE targets. (P05-Int1)*

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<sup>20</sup> A system is something which is composed of different parts with overlapping or connecting relationships influencing each other through feedback loops (Cabrera and Cabrera 2015).



Similarly, P05 recognised the impact that delayed discharges in other departments had on the critical care unit due to the financial penalties of discharge targets not being met<sup>21</sup>. This rippling knock-on effect across hospital systems impeded patient flow<sup>22</sup> which numerous participants (P01, P05, P09, P10) highlighted significantly hindered financial sustainability:

*The health service will not be able to **sustain the financial cost** of having level 0 and level 1<sup>23</sup> patients in ICU. It is a **daily battle** to transfer these patients to suitable wards so that the **precious ICU resources** – financial, staffing, clinical supplies – are not spent on patients who no longer need that level of care and the beds are available for the level 2 and 3 pts who need admitting [to critical care]. (P10-Int2)*

Discussion about difficulties with patient flow reflected the participants' observations about resources not being used in an optimal way which leads to unnecessary waste:

*Quite often we admit patients to intensive care who don't have to be there and then we don't use resources in the **right way**. Also, if you can't discharge your wardable patient, it's very expensive [for critical care] so **flow is one big issue** and it's not about environment but other costs for the NHS. You have wardable patients for 2 or 3 days and sometimes longer but there's no ward beds or they can't be discharged home. (P09-Int1)*

*We often have patients ready for ward level care but there are no ward beds available. They may wait [in critical care] for 24 hours before finding a ward bed which is a **waste of resources**. Being in that [critical care] bed blocks it for someone else to come in and takes up nursing time and attention. (P10-Int1)*

Some participants (P05, P07, P10) were particularly concerned about their critical care unit's ability to sustain the financial resources required for an ageing

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<sup>21</sup> Over the past 5 years in England, Wales and Northern Ireland, there were 64.2% delayed discharges from critical care (patients should leave the critical care unit within 4 hours from the point of the doctor discharging them) - 46.3% of patients had a delay between 4 and 24 hours and 17.9% for > 24 hours (Gilligan 2017).

<sup>22</sup> Patient flow refers to the movement of patients into a critical care unit through admissions and out of the department from discharge, transfer or death (Mathews and Long 2015).

<sup>23</sup> Level 0 and 1 patients should receive care in a hospital ward.

population with increased complex co-morbidities and societal expectations to live longer<sup>24</sup>:

*The main thing that comes to mind is **the huge amount of money** it costs to provide critical care and whether that can be sustained for the **future** with an **ageing population**. (P10-Int1)*

*When I started in intensive care in 1986, the patient was less likely to survive which was an accepted outcome whereas now **dying** is no longer acceptable. How sustainable is intensive care with that **demand on the service**? People are **living longer** with more healthcare input and more chronic disease. (P07-Int1)*

P05 questioned whether there are adequate resources to provide care both during the acute stage of critical illness and throughout the long-term rehabilitation phase, especially for older patients:

*The **long-term effects** of being on critical care is only now coming into the forefront ... [including] the cost of critical care whether within the acute stage [or recovery time]. For example, the **long-term effects** of putting an 85-year old person through critical care who is then going to rehab and long-term care. (P05-Int1)*

Several participants (P01-P04, P07-P09, P11) made suggestions for how to decrease excessive or inefficient use of financial resources. For example, only using clinical products when absolutely needed to reduce unnecessary waste:

*Hospitals are under **big pressure** to get their **finances down** and **save money** and obviously if we're not using and **wasting** so many products, we can save money for the hospital. (P08-Int1)*

Displaying the cost of supplies in the critical care unit was another strategy to save money (P01, P02, P04, P05, P08, P09). Participants felt staff members would think twice before opening a package or using a resource that may not be required if they were aware of how much an individual items costs<sup>25</sup>:

*We **publicise** how much things do cost. It makes **you take a step back** and think do I really need that, do I really need to open*

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<sup>24</sup> Current critical care practice has reduced financial resources allocated while dealing with increased demand for critical care services (Batchelor 2013; Thorniley 2013). The Limits to Growth theory recognised the exponential financial and population growth of the world is problematic due to the finite availability of resources (Bardi 2011; Meadows 1999; Meadows et al., 1992; Meadows, Randers and Meadows 2005; Meadows and Wright 2009; Meadows and Meadows 2016; Meadows et al., 1972).

<sup>25</sup> A practitioner deciding whether to use a piece of equipment or not is an example of single-agent decision-making (one person identifying a decision choice from available options).

*that piece of equipment or that packaging because once it's open, I have to use it. (P04-Int1)*

The previous quotation implied that practitioners could consider alternative options if something was quite expensive or not necessary. Without explicit information about the purchased price of clinical supplies, staff not directly involved in procuring physical resources for the critical care unit, would not know the cost of each item<sup>26</sup>. Reducing unnecessary physical and financial waste by displaying details of the cost of physical resources and increasing awareness of the monetary value of clinical supplies was also raised by P01:

*I was looking after a patient in a side room who was barrier nursed<sup>27</sup>. After the patient was moved out, I had to **throw out** the most ridiculous amount of new, **unused resources** and that absolutely **made my blood boil**. I put signs up to stock minimally in a barrier room and talked to the technician and another nurse who introduced **recycling** to the unit about **displaying** how much equipment **costs** so that people won't just take stuff off shelves without [questioning if its] needed. (P01-Int1)*

P01 had sought advice and interacted with the critical care technician and another nurse interested in recycling. P01's collaborative actions with colleagues aimed to help others reduce excessive use of resources by raising awareness about the financial cost of individual items. In addition to keeping stock in clinical areas to a minimum, four participants (P01-P04) discussed waste reduction from designating responsibility for monitoring expiry dates to support assistants:

*I try to get people to keep things tidy to more easily find equipment and expiry dates and to rotate stock to **not waste** things by them going out of date. That's a bug bear of mine, throwing away unused things including packaging. That has gotten better since we've had support assistants who [look after] stock by **checking, rotating, cleaning and tidying**. (P03-Int1)*

The impact of expiry dates was also raised by 2 participants (P01, P03) while discussing reducing unnecessary waste by extending the useable time allowed for a clinical item:

<sup>26</sup> Some participants (P02-P04, P09-P11) discussed procurement of clinical supplies, notably P04 because ordering products is his responsibility as a technician. The SDU (2014b, 2016) has guidance on sustainable healthcare procurement.

<sup>27</sup> Barrier nursing places the patient in an isolation room and follows full infection prevention and control precautions for transmittable microbes. Disposal of clinical supplies happens on patient discharge, even if packages are unopened and the physical resources are unused.

*One of the educators did a Masters project looking at intravenous cannula use and infection rates in cannulas beyond 72 hours. She didn't find any **evidence** for that amount of time and she managed to **extend the lifespan** of cannulas in the hospital. (P01-Int1)*

### 5.2.2 Environmental sustainability

Eight participants (P01-P04, P07-P09, P11) drew attention to environmental topics and physical resources in the natural ecosphere when discussing what sustainability meant for them. For example:

*Sustainability to me draws up images of the environment. (P01-Int1)*

*I think sustainability is being able to source materials that can be replaced or replenished without having an effect on the environment. (P03-Int1)*

Of the 3 participants who did not raise environmental resources as a topic while discussing sustainability, 2 were physiotherapists (P05, P06) and 1 was a nursing practice educator. For the 8 participants who referred to environmental sustainability, their professional role did not appear to be significant in influencing this perspective.

Participants had concerns about the use of physical resources in critical care practice regarding the potential impact of wasteful practices on the ecosphere. For instance, there was inefficiency with energy use in the form of light, heat or power (P01-P04, P07-P09), water (P02, P08, P09, P11) and the hospital building (P02, P04, P09):

*We're in a very **energy intense** environment in terms of electricity, power, water which we are going to use a lot. One of the things we can do is think about are we using that as efficiently as we can and are we wasteful of stuff. Even very simple things like leaving lights on all the time and having heat on all the time. (P02-Int1)*

Participants also connected environmental sustainability with staff transport which reduced greenhouse gas emissions and promoted staff well-being through exercise (P02, P08, P09):

*They provide a bus between hospitals and encourage cycling...There's a lunch walk for 20 minutes. I feel like it helps because if you're **healthy**, you work and feel better. (P08-Int1)*

Some participants referred to environmentally sustainable practices in their home life (P01, P02, P04, P07-P09, P11). For example, P08 explained how she recycled at home, aimed to use minimal water and energy and rode her bicycle as much as possible. She also observed environmentally sustainable practices at work in her critical care unit:

*The Trust is involved with things to **improve the environment** like saving water, getting new batteries, preventing leakage and recycling. (P08-Int1)*

Other participants (P01, P02, P07, P09, P11), however, found it difficult to be environmentally friendly within the critical care setting which left them with feelings of personal frustration. Personal views about ideal resource usage in critical care (they felt this should be sustainable) conflicted with their perception of actual practice (not sustainable). P01 and P09 discussed feelings of anger, frustration and guilt due to physical waste<sup>28</sup> created by themselves and others:

*I see **waste** all day every day and it drives me absolutely insane from not switching off lights and computers to just the phenomenal amount of [physical] waste. Especially plastic waste that doesn't get **recycled**. A lot of it gets **burned** and I don't know for sure whether they use the energy from the burned waste. (P01-Int1)*

*I chose nursing and thought it was a great way to do good things and help people while making a living but at the same time it can feel so **wasteful**. I feel **guilty** for **wasting resources** both financially and environmentally which was **worrying** me quite a lot. (P09-Int1)*

P01 and P09 were pulled in two opposing directions because their values about using resources responsibly conflicted with the reality of wasteful (unsustainable)

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<sup>28</sup> Waste is legally defined as “any substance or object which the holder discards or intends or is required to discard” (DEFRA 2012, 6). There are different types of physical waste requiring waste management including municipal waste (includes household, commercial and demolition), hazardous (includes industrial), biomedical (includes clinical) and special hazardous (includes radioactive, explosive and electronic) with guidance on classifying and managing physical waste provided by the Department of Health (2013) and the Environment Agency (2015). Minogue and Wells (2016) have reviewed literature related to waste which they categorise as general waste, clinical waste, service delivery and care, infrastructure and carbon emissions.

actions of clinical practice. Personal tension<sup>29</sup> arose from competing priorities and struggling to use resources in a way in which they deemed was appropriate. The personal conflict contributed to their decision to leave roles based in the critical care unit (P01 became a critical care outreach nurse, and P09 continued to work bank<sup>30</sup> nursing while completing a Masters level environmental studies course to pursue a career change into environmental sciences):

*One of the reasons why I left intensive care was because I couldn't bear to see the waste. It wasn't just the physical waste but also the waste of **unnecessary treatment** which I felt was **inappropriate treatment**. I believe that's not sustainable. (P01-Int1)*

*I was disappointed with nursing and healthcare and how much it was consuming resources and how in practice we don't see we are making our own base crumble in the NHS and society. It is a dilemma about fairness in the **bigger picture**. In one country, we maintain people to be alive with consuming lots of resources and for the same money you could do so much more somewhere else in another country. (P09-Int1)*

Participants recognised critical care practice generates a large amount of physical waste which then needs to be managed<sup>31</sup> :

*We have **recycling** bins next to each bed-space which is amazing how much waste we produce every day in an intensive care unit. (P08-Int1)*

See Box 17 for a memo about distinguishing what the participants viewed as avoidable physical waste from the inevitable physical waste produced from consuming clinical supplies in critical care practice.

#### Box 17 – Memo: necessary and unnecessary waste

##### **Analytical memo: physical waste**

Waste has been discussed from a variety of perspectives including creating waste (with some participants showing feelings of frustration and anger from the huge amounts of waste created in the critical care environment), managing waste (recycling, incineration, autoclaving) and actively reducing waste (preventative

<sup>29</sup> This type of personal tension relates to cognitive dissonance where the mental stress occurs from someone having beliefs which are contradictory or if actions conflict with the person's values (Cooper 2012a, 2012b; Festinger 1962).

<sup>30</sup> The staff bank is a pool of temporary staff members who are not on permanent contracts.

<sup>31</sup> The resource cycle illustrates the circular way resources are produced, consumed and recycled, all of which affect the ecosphere of the Earth (Schroeder et al., 2012).

care, education, efficient practice, using creativity and experience to tailor treatment and trouble-shoot to provide care which is as ‘necessary’ as possible). Infection control precautions has been frequently identified as a significant source of waste with staff overusing gloves and aprons when it is not necessary. I’ve just realised I’ve been writing ‘necessary’ and ‘unnecessary’ in relation to physical waste. There will never be zero waste in critical care but participants felt necessary physical waste could be dealt with in a more sustainable manner either reusing or recycling it or at the very least, disposing of it in the least environmentally damaging way possible. Also, participants discussed how products could use less packaging and be reused and emphasised efficient, targeted care with only necessary interventions produces less ‘necessary waste’.

Different ways of managing preventable physical waste, which the participants related to sustainability, included disposing, incinerating, recycling and reusing:

*There is the blue **recycling** bin for plastic and paper and a green bin for cardboard waste which is recycled but everything else as far as I know is **incinerated**. There’s a lot of **confusion** about what waste can go to landfill and what can be incinerated. (P01-Int1)*

Although the current practice of any of the participants, did not value physical waste as a resource, two participants (P04, P09) identified how energy recovery could potentially occur from incinerating clinical waste:

*Clinical waste is **incinerated** but that could **produce fuel** [energy]. (P04-Int1)*

Food waste and toxic cleaning materials were other environmental topics related discussed by P04:

*There must be masses of **food waste** in organisations like this. We use a lot of **toxic cleaning materials** and whether that will have a repercussion in the future, I don’t know in terms of **resistance** and implications for staff and patients. (P04-Int1)*

Waste created from single-use, disposable items, as compared to clinical products which can be autoclaved and reused, was mentioned by six participants (P02, P03, P07-P09, P11) although P09 questioned the environmental and financial impact of cleaning items for re-use:

*In the past, we used the **auto-clave**, but more products are becoming **disposable** now. The cleaning process uses resources as well and you don’t know whether it’s **cheaper** to throw a really soiled sheet away into the bin or to send to the laundry. **Reusing** can also be quite expensive. (P09-Int1)*

*We are seeing more **single-use items** where things used to be **reprocessed** quite often. They've moved away from that due to infection control issues. It's a lot more of a **throw-away culture** now. (P03-Int1)*

Two other participants (P07, P08) also felt there was a *throw-away culture* in the NHS with a link to infection prevention and control initiatives:

*There is definitely more of a **throw-away culture** now, far more than it used to be. (P08-Int1)*

*It just seems like we have a **throw-away nation** and I think it's all about controlling the infection. (P07-Int1)*

Similarly, P03 highlighted how practitioners in critical care were accustomed to throwing things away, even for items meant to be cleaned and reused. He provided an example, sharing his view that a *throw-away culture* led to the disposal of reusable packs rather than sending them to the sterile services department for reprocessing:

*We had a **reusable** pack for chest drains which was supposed to be reprocessed but it got to the point where there was none on the shelf. SSD<sup>32</sup> said if the packs are not there to be **reprocessed**, they must be getting chucked away. I had a meeting with the consultants and the matron about the pack contents and cost which worked out cheaper to get a single-use pack. Also, if people are used to **throwing things away**, you aren't going to waste throwing out a reusable pack again. (P03-Int1)*

The participants (P01-P03, P07-P11) frequently cited infection prevention and control measures significantly contributing to physical waste in critical care. Excessive overstocking of isolation rooms has already been identified as wasteful (see page 152). However, some necessary waste will result from isolation rooms and the general use of personal protective equipment (gloves, masks and aprons) to prevent hospital-associated infections in patients and staff:

*There's a huge **risk of infection** in critical care so everything has to be replaced and it seems like the bins fill up at an enormous rate. I don't remember it being like that when I started [nursing in critical care]. (P07-Int1)*

Excessive waste from the unnecessary use of gloves and aprons created personal tension for P01 who discussed competing priorities between the infection prevention policy and her personal beliefs based on values and experience:

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<sup>32</sup> SSD = sterile services department



*It's a little bit like 'use by' and 'best before' dates. You know when you can get away with something through **experience**...The turn-around of equipment, gloves and aprons, it's about making more **autonomous but experienced decisions**. We have **policies** so that we all behave in the same way and it's **safeguarding**. But sometimes you have to be more **resourceful** and go outside the box to be **creative** with policy. (P01-Int2)*

Some practitioners (P01-P04, P07-P09, P11) intentionally tried to reduce physical waste and promote recycling in attempts to improve environmental sustainability, although this was difficult due to infection prevention policy:

*I've been trying to promote **recycling** and **prevent wasting** resources. For patients in isolation, you have to throw everything away after the patient has been discharged which has a great impact on the environment but also financially it's really **expensive** for the NHS. (P09-Int1)*

P09 explained how a network of people interested in recycling exists in his critical care unit:

*I have got to know people who are up for **recycling** and we **formed links**. You start to know who is up for sustainability and who is up for saving resources in general. Those people tend to **stick together** and talk about those topics. (P09-Int1)*

The quote above showed how communication and social interaction helped to support recycling for waste management in critical care practice. Further findings about communication as a non-technical skill come in Section 5.3.4 and about social influence and interaction influencing sustainability in critical care practice in Section 5.4.

### 5.2.3 Social sustainability

Social resources were discussed by all participants in some way, either explicitly or indirectly about the psychosocial aspects of patients, families and staff members. For P02, sustainability went beyond sustaining money and resolving ecological issues to involve the interlinking of people and physical resources:

*There's 2 bits of sustainability - there's the **non-human** bit that's all the stuff you use and then there's the **human** part of that. Those 2 obviously intertwine because the humans are in the stuff and the humans are using the stuff. (P02-Int1)*

P01 highlighted her view that sustainability included being able to sustain social aspects of care in addition to environmental and financial resources:

*Sustainability is social as much as environmental and financial.  
(P01-Int1)*

P07 observed how critical care practice involved numerous investigations aimed at physical health problems but neglected to address the source of patients' social needs:

*My greatest concern is, before I see the patient, they have all the bloods, Xrays and diagnostics, but they never needed those in the first place. What the patient needed was someone to talk to them, to hear their story and get to the root of the problem, which may actually be **social** rather than physical. (P07-Int1)*

P09 considered social sustainability to be using people from outside the critical care team as a resource, such as volunteers, visiting family and former patients. Where he worked, an ex-nurse volunteered as a receptionist and patients received advice and support from former patients:

***Social sustainability** is also very important by using social resources like **volunteers** and **visitors**. We have a retired nurse who comes in occasionally to answer the phone and act as a receptionist. Also, volunteers from health groups or **former patients** come to talk to other patients which **saves resources** at the same time as **helping** the volunteers to **recover** after critical illness. (P09-Int1)*

P05 discussed a variety of different ways her unit is proactive in trying to meet the psychological and social needs of patients and families:

*On our unit, we use **diaries**, daily plans, entertainment, communication sheets, early sedation holds and we do have the ability to get psychology involved. We also give [information for] **follow-up** [clinics] and **ICUsteps** which is all geared to reduce the **anxiety and stress** on the patient and family.<sup>33</sup> (P05-Int1)*

Social sustainability related to how some participants (P02, P05, P06, P10, P11) linked nurturing the needs of staff and the human factors of practice with maintaining the critical care team as a people resource:

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<sup>33</sup> Diaries provide patients with an account of their critical care stay in a language they can understand to help with their psychological recovery after discharge. Early sedation holds are daily pauses in the continuous administration of sedation medications to use the minimal amount of sedative drug possible which then reduces delirium and longer-term psychological problems. ICUsteps is a national intensive care support group for patients and families.

*Sustainability relates to **people**, how we treat staff, make them **feel valued** and how we **invest in staff**. (P02-Int1)*

There was a sense of disappointment and disheartenment in P06's recollection of not feeling respected and appreciated by the hospital for work done:

*You can become easily **disillusioned** [depending on] how much you feel you're valued. If your perception is that the Unit might close or change, it undermines the **value of the work** you're doing now and all the **effort and hard work** you put in. If the Trust don't recognise it, it's difficult to keep yourself **motivated** and **proactive**. (P06-Int1)*

With her view that "the real resource is the people" (P02-Int2), P02 agreed that valuing staff was essential for sustaining the critical care team:

*There's conflict between what is good for the service but what doesn't make people feel valued. If people feel [they are] given the **absolute minimum** required to work, that doesn't make them feel **personally satisfied**. We can only give you X amount, what else can we put in that won't take up more time or money to do that. What other things do we sacrifice to **meet our goals** for giving care. Some other things that people want to do [like education] for their personal needs and goals are going to get sacrificed and it's **balancing** that the whole time. (P02-Int2)*

The process of *goal-setting* emerged from this data which involved aspiring to achieve a minimum threshold line for the goal. However, meeting the criteria for one aim sacrificed other staff thresholds leaving staff with a lack of personal satisfaction. These concepts of *goal-setting*, *aspiration threshold*, *balancing different goals* and job satisfaction will surface again throughout the findings.

Attributes of practitioners towards sustaining themselves as a people resource included flexibility for adapting to change, coping with demanding work conditions and quickly recovering from stressful events in practice. See Table 20 on page 112 for data related to these characteristics. Box 18 on page 113 provides an accompanying memo about how this type of participant data related to the practitioner characteristics of agility, durability and resiliency.

Table 20 – Adapting, coping and recovering from stress

Sustainability is facilitate by practitioners who are:		
Adapting to change	Coping in critical care	Recovering from stress
<p><i>We're not always going to be able to work in exactly the same way because <b>times have changed</b> and <b>we need to move</b> and it isn't sustainable not to. (P02-Int1)</i></p> <p><i>Sustainability makes me think about staff training and <b>education</b>. We need to have <b>proper investment</b> to keep nursing and medical staff <b>up to date with current changes</b> because there's so much [change] going on. (P10-Int1)</i></p> <p><i>Can staff <b>sustain change</b> that's necessary to make the service sustainable. What are people <b>willing to give</b> for the service to continue to work. (P02-Int2)</i></p> <p><i>Our hospital has been through a <b>large amount of change</b> including 4 <b>reconfigurations</b> in 5 years and that level of <b>inconsistency</b> and change is <b>tiring</b>. (P06-Int1)</i></p>	<p><i>You're making sure the nurses are <b>not overwhelmed</b> and are managing in [a difficult] situation. (P06-Int1)</i></p> <p><i>Everybody [in the critical care team's] <b>skill, knowledge and time</b> are part of [the workforce]. As a <b>healthcare commodity</b>, we're losing that because people are getting <b>burnt out</b> and we're not sustaining our workforce. (P01-Int2)</i></p> <p><i>One of the frustrations which makes this job [as a practice educator] difficult is that resources for all staff is not guaranteed, they are <b>constantly changing</b>. Study leave is constantly shifting and <b>extra demands</b> are thrown in with it which makes it difficult to <b>plan long term</b>. (P10-Int1)</i></p>	<p><i>[Practitioners need the] <b>time and head space</b> to [start an intervention] without making a mistake. [Because it's the] <b>middle of the night</b> and I'm really <b>tired and stressed</b>, I'm going to have to get rid of that whole circuit and start again. (P01-Int1)</i></p> <p><i>[End-of-life care is] <b>expensive</b> in terms of <b>resources</b> and <b>emotion</b> and what we put people through. I'm not just talking about money here, it's the <b>emotional stress</b> that we put people through [including patient, family and critical care team]. (P01-Int1)</i></p> <p><i>My goal for sustainable staff is that I want them to be able to come to work, go home at the end of the shift <b>on time</b>, relax, <b>feel they've done a good job</b> and have as little stress as possible in a <b>stressful environment</b>. That's what makes people want to come to work. (P02-Int2)</i></p>

## Box 18 – Adapting (agility), coping (durability) and recovering (resiliency)

**Analytical memo: Emotional labour – adapting, coping and recovering**

I came across an online blog post about resiliency, durability and agility (Raford 2010) which reminded me of the data about characteristics within people that sustains them as people working in a stressful, ever-changing critical care setting. The blog used the fable about an oak tree and reed to differentiate resiliency from durability. Being strong like a tree appears at first glance to be positive to withstand pressure like from wind. But a tree lacks agility to be flexible or bounce back up, so fierce winds could cause the tree to break with roots pulled up. A reed bends to change shape in response to the wind and then springs back at end of a storm. Thinking about the oak and reed has prompted me to revisit the dimensional analysis grid for working practices which included these codes: adapting to change, being open to change, accepting change, engaging others to change, facilitating new ways of working, being flexible. There's also now additional data from the second interviews which emphasised practitioners need to continually adapt, cope and recover from the stressful critical care environment otherwise they get burnout from being tired, both physically and emotionally. I've done a new comparison grid of data from first and second interviews comparing adapting to change (column 1), coping in critical care (column 2) and recovering from stress (column 3) – I can now see the concepts of agility in column 1, durability in column 2 and resiliency in column 3. The data suggested all 3 of these attributes were important because they are used for different reasons in various contexts and situations for practitioners to sustain themselves as human beings working in a highly stressful and demanding setting. Within the data was also a sense that emotional labour is an important resource in itself.

Within Table 20 (page 112) and the memo in Box 18 were themes of emotional labour, burnout, fatigue, job dissatisfaction, staff retention and difficulties in coping with both physical and emotional stress. P02 suggested adequate investment was needed to maintain staff's physical and emotional energy for sustaining the critical care team as a workforce:

*Sustainability is not just environmental and tangible things we can hold, but [also includes] those things we can't quantify easily [like] time, knowledge, experience and people's **energy to sustain during a shift**. I think that's particularly [important for] **sustaining a workforce** [during] the struggles we now have with an under financed NHS. (P01-Int1)*

Practitioners feeling fulfilled and satisfied in their working roles within critical care practice was part of sustaining *people resources* to promote staff retention:

*We want to **retain the staff** here and **retention** is related to [practitioner] development that they get. It's not just the work environment and how happy they are within the team, it's how*

*they **feel they are developing** and what their employer gives them to increase their skills and **motivation** and **job satisfaction**. (P10-Int1)*

Similarly, P11 felt that part of her role as a Senior Sister in helping to keep the service sustainable was to motivate people within her team to stay working there:

*I have a big responsibility for staff development and making sure people **stay in their jobs** and are encouraged to be **motivated** in their job. **Education** is a big part of that. (P11-Int1)*

Promoting staff retention, by offering post-registration education about critical care technical knowledge and skills, was also explored by P10. This quote reflected her *forward-thinking* consideration of the impact current resource decisions have on long-term planning into the future:

*It would help if the Trust had **longer-term**, more **strategic plans** [for education] which they stayed committed to. The last two years, the chief executive agreed to give extra money to send more nurses on the ITU course as **a retention manoeuvre**. That worked fine, but there was no guarantee we would have the money for another year, so we couldn't **plan ahead**. (P10-Int1)*

P10 continued her reflection on the implications for resourcing continuing professional education of the critical care team which she felt helps to promote staff feel valued:

*Staff who have just started will have a prospect of getting on the ITU course because they will have some idea of what year that will be. We just can't make any promises to them in terms of **retaining staff** and staff feeling **they are valued** with a **career pathway** here. In their achievement reviews, they can make objectives, but we can't promise those objectives can be delivered because the Trust isn't prepared to **commit resources**. (P10-Int1)*

In the previous two quotations, P10 implied financial resources were needed to pay for a post-registration intensive care nursing course. Sponsoring nurses onto this type of University course, not only helped the nurses to develop technical knowledge and skills, but also fostered staff retention. Moreover, sponsoring education gave staff a sense of being invested in, making them feel valued. P10 went on to explain how she found it difficult to keep informed with current critical care practice due to the immense amount of new information continually published. She expressed *knowledge fatigue* in her attempts to stay up-to-date with both knowledge and time identified as resources in the data here:

*I find it difficult in terms of policies, protocols and practice [keeping up with the] vast amount of [new] information and studies are being done. There's such a **wealth of information** coming through...I can't keep up with the **Tsunami of research and evidence base** that is available. I just pick and choose the most important things and what's **current**. Time to review the policies and protocols [already] in practice often gets put to one side until someone has some **time** to sit down and tackle them.*

#### 5.2.4 Ambiguous or negative connotation of sustainability

Two people directly stated they were unclear on what sustainability meant for them within the context of critical care practice (P02, P05):

*I'm interested to see what you're going to be talking about because I **wasn't entirely sure** what sustainability in critical care is. (P05-Int1)*

*Sustainability is such an interesting topic but **there's so little I understand** about it. I sort of know in the ether, but I **can't define** it. It'll be interesting to see what your results are, what people talk to you about. I wonder if what you'll pick out is people saying sustainability is really important but I don't know what it is. (P02-Int1)*

The rest of the participants besides P02 and P05 offered some explanation for the meaning they found in the term sustainability as applied to critical care practice. However, there was variation as to whether this included all or some of the three domains of financial, environmental and social. Sustainability was not frequently talked about within the critical care unit itself, with only 2 participants (P01, P09) having observed sustainability directly discussed amongst critical care colleagues. Section 5.5.3 contains further data about if and how practitioners communicate sustainability in critical care practice.

P02 was the only participant who felt the term sustainability had a negative connotation for many individuals. For most of the interview, P02 discussed sustainability as being a positive and desirable thing while addressing recycling, reducing waste and saving money in how she practices as a nurse in critical care. Outside of work, P02 had also volunteered at a Peace and Environment Centre.

However, P02 observed colleagues who considered the concept of sustainability to be something which was adverse and unfavourable:

*For some people that idea of how you can work more sustainably instantly **puts people's hackles up** because they're thinking it's another way of saying, how can I make you **do more for less** rather than how can we do what we need to do effectively and make that more sustainable. (P02-Int1)*

This negative view of sustainability, which P02 identified some people in critical care have, was also discussed here:

*People spend 12 ½ hours **just getting through the day** so they don't have time for important things like talking to colleagues, debriefing, chatting to a patient or washing their hair. When you say let's talk about sustainability people say: "let's not! I would like to go home please!". If you say: "let's have a working group" but not give people work time to do that, people who are really engaged and passionate about it will do it. But the people you really need to engage are the **people who are ambivalent**. If it doesn't come from the very **top of your organisation** [with] a **willingness to allocate time** for sustainability, then people don't have a **willingness to give their time**. (P02-Int1)*

P02, therefore, considered sustainability to be something 'extra' over and above current practice routines and she also identified that some people are passionate about sustainability with an eagerness to champion it. Furthermore, P02 felt a sustainability working group would require a top-down, strategic approach with senior management allocating protected time for people. P09 recognised some colleagues did not prioritise sustainability from being too busy and not *seeing the bigger picture*:

*When people are busy and **under pressure**, they prioritise it on that way that sustainability is not important. I just do my job right here right now and I don't think about the **bigger picture**. I don't think about the effect of the environment. I just want to get this job done, hand over [the patient to the next shift] and go home. (P09-Int1).*

Likewise, P01 observed colleagues who were not interested in sustainability from a lack of time or because they suffered from burnout and were just trying to get through their clinical shift:

*Some people **just don't think about** [sustainability]. It's not in their **headspace** to think about it or they just **don't care** because they are **burnt out**. They are going through the motions of work and don't think about it. (P01-Int2)*



A cynical view of sustainability contrasted the rest of the participants who appeared to recognise the benefits of sustainability, as already explored in this chapter across financial, environmental and social domains.

### 5.2.5 Construction of sustainability

Throughout the findings presented thus far has been a theme that participants viewed sustainability in critical care practice as sustaining all types of required resources into the future. The longer-term, forward-thinking element was summarised by P02 when she said:

*[Sustainability] is not just about what we're doing today and tomorrow, it's about what we're doing in the **long term**. (P02-Int1)*

Several participants (P01-P04, P08, P09, P11) linked different types of sustainability together as influencing each other. For example, P07 as a critical care technician attended a Trust-wide bi-monthly product selection group meeting which had a presentation about new pulp products<sup>34</sup> made from bamboo with co-benefits for environmental and financial sustainability:

*The main reason the discussion about pulp came up was that boxes for products are very large and difficult to **store**. Pulp items can be stored in smaller boxes with **cost savings** for the Trust if they went over to this other company with pulp products. They mentioned bamboo as being more **environmentally sustainable**, but it wasn't the main pre-cursor for getting in. (P03-Int1)*

These quotations also indicated environmental and financial sustainability were impacting on each other and showed how participants connected saving money with preventing waste of physical resources:

*Maintaining sustainability will **improve the environment** and will also be part of the efforts for **saving money**. (P08-Int1)*

*I've been promoting **recycling** and trying to **prevent wasting** resources. For example, when you have patients in isolation, sometimes you throw everything away after the patient has been discharged. This has a great impact on the environment but also financially it's really **expensive** for the NHS. (P09-Int1)*

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<sup>34</sup> Pulp products used in critical care include disposable urinals, bedpans and bowls.

Recycling and waste prevention, therefore, had co-benefits for both environmental and financial sustainability. The examples about co-benefits, along with the *knock-on effect* seen in the data on page 100, showed a strong sense of interconnectedness between different types of resources. However, the quote above by P09 and previous data on page 108 revealed a clash of directives between healthcare policy (infection prevention and control policy) and sustainability initiatives (trying to reduce physical waste and subsequent financial cost). P01 also substantiated the competing priorities between preventing infection and practising sustainably at the same time:

*I know infection prevention is important and I know protecting patients is important. But I equally think it's important to **protect the resources** we have in an organisation that wastes millions of pounds of equipment, energy and staffing. (P01-Int1)*

Many of the quotations used in Section 5.2 directly stated the term 'resources'; or, the participants indirectly referred to sustaining the financial, environmental and social resources needed for critical care practice. Table 21 presents a sample from each participant as they discussed resource issues.

Table 21 – Resource issues in critical care practice

P01	<i>I suppose sustainability is about money as well, it's about handling <b>resources</b> in the right way. (P01-Int1)</i>
P02	<i>It comes down partly to my idea about what is sustainability because if it's in terms of <b>resources</b>, we have to think about simple things we can do not to waste resources like power, water, disposables. (P02-Int1)</i>
P03	<i>They say bamboo is a more sustainable <b>resource</b> to make pulp. (P03-Int1)</i>
P04	<i>Sustainability is having an environmental and social responsibility to reduce our footprint environmentally whether it's from emissions or waste management and looking at how we can take greater care of the <b>resources</b> we've got in the world. (P04-Int1)</i>
P05	<i>There isn't an infinite amount of <b>resources</b> so you do have to be quite versatile when you planning your day and planning your patient's day alongside them. (P05-Int1)</i>
P06	<i>I think there's the <b>resources</b> of people and equipment and those sort of tangible things. (P06-Int1)</i>

<b>P07</b>	<i>Nobody has asked questions about the amount of money per day that critical costs, it's not even questioned in terms of staffing and <b>resources</b>. (P07-Int1)</i>
<b>P08</b>	<i>I remember as a nursing student we used to make cotton balls from the big cotton roll so you just had to find <b>resources</b> and make those <b>resources</b> yourself but over here you've got the luxury to get a package of 5 rolls in 1 package and then if you use 1, you throw the rest away which is quite a waste. (P08-Int1)</i>
<b>P09</b>	<i>When I was studying biodiversity and ecology, I realised that things are not necessarily always going right and this opened my eyes in the critical care setting to see where we could save <b>resources</b> and what we could do in a more sustainable way. (P09-Int1)</i>
<b>P10</b>	<i><b>Resources</b> comes to mind when I think about sustainability, which is the biggest thing - can we carry on providing critical care for patients at the level that we're doing it with shrinking <b>resources</b> in the NHS? (P10-Int1)</i>
<b>P11</b>	<i>Other <b>resources</b> not available are in relation to waste, these are the sort of things when I think about sustainability in critical care. (P11-Int1)</i>

Figure 11 indicates the different types of resources mentioned across the interviews with all participants (P01-P11).

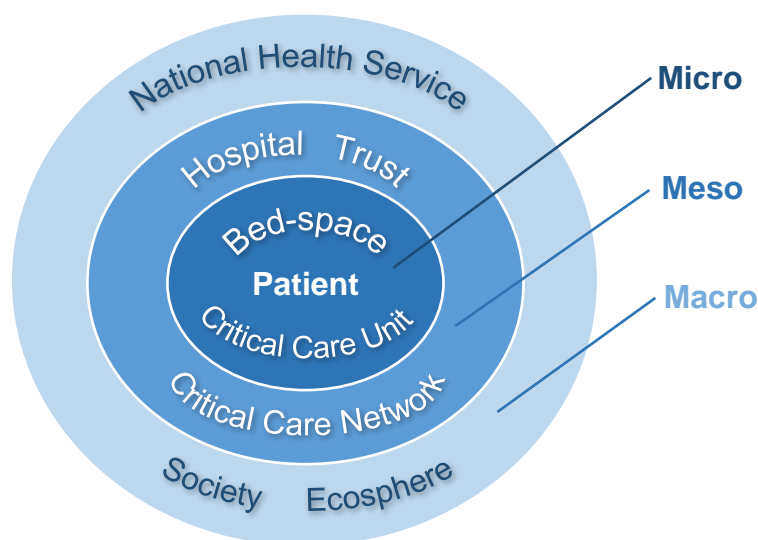
Figure 11 – Resources for critical care practice

<b>Physical resources</b>	• Energy (light, heat, electrical power), water, hospital building, transport
<b>Clinical supplies</b>	• Equipment, critical care therapy items, storage space for clinical supplies
<b>Finances</b>	• Money to support commissioned critical care services
<b>People</b>	• Patients and families, critical care team (physical well-being and emotional labour), volunteers
<b>Time</b>	• Time of critical care team to plan and deliver care to patients and families, time for sustainability
<b>Knowledge</b>	• Technical and non-technical knowledge of critical care and sustainability, informed practice, education

Participants also referred to maintaining the various resources for critical care practice to meet the patient's health needs as a holistic person who is composed

of physiological, psychological and social systems within. The data revealed how the critical care patient exists within other systems beginning with the physical bed-space that each patient occupies and critical care unit (intensive care and high dependency beds). There was then the hospital and trust hosting the critical care department and the local critical care network. From a broader perspective, resources were provided by and used within NHS England as an organisation, society which the NHS serves and the ecosphere<sup>35</sup>. This collection of systems related to critical care practice is illustrated in Figure 12.

Figure 12 – Systems within systems of critical care practice



Thus, the participants constructed sustainability in critical care practice as sustaining different types of resources within three domains of sustainability (financial, environmental and social) and across the micro, meso and macro systems involved in critical care practice. Emerging from the data presented throughout Section 5.2 was the primary concern of all participants (P01-P11) that current resource use within critical care practice is not sustainable for the future. The social processes involved with making sustainability a component of critical care practice will now be highlighted with further findings to help explain this main concern.

<sup>35</sup> The ecosphere as the Earth's collective ecosystem includes the following subsystems: biosphere (living organisms), geosphere (solid aspects), hydrosphere (water) and atmosphere (surrounding gases).

## 5.3 Using resources sustainably

### 5.3.1 Decision-making about resource use

The participants linked sustainability to maintaining resources for the future and discussed various aspects of decision-making related to resource use. As noted in the previous Section, participants had concerns about the current model of critical care practice not being sustainable which filtered into the examples given about their decision-making in practice. For example, P04 and P02 demonstrated the constraints felt while identifying the optimal choice for decisions:

*We may know what resources we need to nurse a patient in the **optimum way**, however, we may be prevented from doing that by management, usually because of financial / budgetary restraints. (P04-Int2)*

*We do not have control<sup>36</sup> over patient flow in the Trust so often we have little influence to make general managers follow what we view as the **right decision** regarding use of critical care resources. (P10-Int)'*

These previous excerpts reflected the practitioners' awareness of different choices for a decision with one option they viewed as the best. However, practitioners were not necessarily able to choose what they perceived as the *optimum way* or *right decision* choice due to constrictions outside of their control. In that type of situation, there was no deliberation<sup>37</sup> about how resources were used because the practitioners felt their actions were pre-determined from choices made by managers.

Multi-agent decision-making, with aims viewed differently by practitioners and managers, was comparable to *balancing different goals* in the data on page 111. P08 also reflected *goal-setting* while indicating safe, quality care was minimum criteria she aspired to achieve (*aspiration threshold* of the decision):

*My colleagues and I try to **do the best** for our patients. **Every patient is different** and we make sure we meet each patient's need. I educate and share my experience with less experienced colleagues and together we can deliver **quality care** for our patients. If in doubt, we seek help early to provide **safe care** and I*

<sup>36</sup> See also page 143 for further data about self-efficacy in the participants' perceived influence on resource decisions.

<sup>37</sup> Deliberating over decision options is part of Manski's (2017) decision-making model about *costly deliberation* which is compared to the data in the Discussion chapter on pages 172-174.

*use my **resources appropriately** as per each patient's clinical need. (P08-Int2)*

P08's goal in the previous excerpt incorporated the patient's individual clinical needs which allowed the resource choice to have a patient centred approach.<sup>38</sup> The criteria for what constitutes a decision goal can, therefore, include a patient perspective, although P02 recognised this could be challenging with reduced resources:

*There's very little money to spend. Decisions about how you spend money and how services are provided are moving further away from the people that are using them. We should have **person centred care** but the decisions about how you give care, where care is given and how much money there is, gets further away from the person which makes a lot of pressure. (P02-Int1)*

Individualised patient centred care, referred to by P07 as *patient presence*, involved practitioners taking personal responsibility to reduce unnecessary resource waste. *Patient presence* included a *less-is-more* approach, ensuring monitoring and interventions were only done when clinically indicated for that patient:

*The [bed-space] environment is managed to the point of exhaustion - the blood pressure falls, and you put this up; wean up wean down. [What we need is to] stand back and think about not having these interventions in the first place and be more around the patient to understand what's happening. [We need] increased **patient presence**. (P07-Int1)*

Another participant (P05) also shared examples of trying to be patient centred, but she was not able to achieve this due to a lack of financial and clinical equipment resources:

*Everybody would love to be **patient centred** but the world we live in is not **patient centred care** unfortunately. It's numbers, targets, money... people [need to be] made aware of what is involved with an ICU patient, what the cost is per day and the level of care they require. (P05-Int1)*

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<sup>38</sup> A person-centred/patient centred approach involves healthcare which is personalised, coordinated, enabling and delivered with dignity, compassion and respect (The Health Foundation 2016b).

P05 elaborated to explain her physiotherapy critical care practice was *equipment-centred care* rather than patient centred because of *making do* and *sufficing* with the equipment and time available:

*We make decisions as to whether a patient gets seen in the morning or afternoon depending on how many pairs of hands we've got. ... We have 1 tilt table for the whole hospital so that requires liaising with other teams which is to the detriment of the patient and to the benefit of the staff. The patient has to work around our availability and the availability of equipment. I don't think it's **patient centred care**, it's **equipment centred care** and that's not an ideal use of resources. (P05-Int1)*

Both P02 and P05 felt insufficient resources impeded patient centred care which led the decision outcomes to be equipment and staff focused instead. However, P05 spun her perspective of inadequate resources around to view this as something which could be positive:

*I come across as pessimistic and depressed by the whole thing but we've got to **use resources that we have well** [including] the **people resources**. [Staff] desperately want to do good and if everything was available all the time, you wouldn't have a challenge to trouble shoot and problem solve. I may sound pessimistic, but it makes you a better clinician and more determined to look after your patient **appropriately**. (P05-Int1)*

Participants wanted to be satisfied they used resources 'well' and 'appropriately' which was exemplified above in how a lack of equipment drove P05 to suffice with the best use of resources which were available. The reference to people resources also related to data on page 66 about sustaining the critical care team for social sustainability.

Much like including the views of patients in decision choices, P07 recognised the role that family expectations have in decision-making about resources:

*Patients didn't expect to live to be 100 years old 25 years ago whereas relatives expect the patient to live forever now. **Expectations of relatives** have changed, and they want everything and anything. (P07-Int1)*

Multiple people involved in a decision then contributed to establishing what the aim was for how resources were used. However, members of the critical care team, patients and families did not always have the same view while *balancing different*

goals. Variation amongst different people's aims was particularly evident with end-of-life decision-making:

*People need to make much more of effort around **planning end-of-life** rather than asking a relative for someone who is 89 and 90, what were their wishes are. The chances are that patient never knew what intensive care was and never thought through that they wouldn't die naturally. (P07-Int1)*

P07 went on to state the "reason why I left intensive care was end-of-life issues" (P07-Int1). P01 experienced similar difficulties negotiating and mutually agreeing on the goal for end-of-life care leading her to question the appropriateness of resource use in critical care for dying patients. In this example, P01 discussed the emotional strain experienced by patients, families and staff while *balancing different goals* for a dying patient:

*We can prevent **inappropriate admissions** if the patient is dying and all we're going to give them is an expensive death in intensive care. I don't [just] mean money, I mean expensive in terms of **emotion** and what we put people through. It's the **emotional stress** that we put [patients, families and staff] through [during end-of-life care]. (P01-Int1)*

The quotation above illustrated how emotion was a resource (including that of patients, family members and within the critical care team) which related to previous data on page 113 about emotional energy. P10 also discussed challenges faced while *balancing different goals* during multi-agent decision-making about resource use related to critical care admissions and end-of-life care:

*[There are] **inappropriate admissions** [to critical care] of patients who either could be managed effectively in an acute ward or who need palliative care<sup>39</sup> [not critical care]. Our Matrons and Consultants discuss these types of patients daily at Trust operational meetings, with the referring team and at mortality/morbidity meetings. (P10-Int2)*

Decision-making about resource use could then involve people from systems outside of the critical care unit, such as another hospital department referring the patient and strategic Trust-wide groups.

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<sup>39</sup> Palliative care is synonymous with end-of-life care (healthcare for patients who are dying).



### 5.3.2 Standardised approaches to care

An alternative type of decision goal was an externally set objective from a standardised approach to care. One kind of standard was a national target, as seen in the data on page 100 about goals related to discharge time from AandE and critical care<sup>40</sup>. *Target-driven care* brought standardised practice by all practitioners having the same decision aim. Consistent, uniform decision-making also came from goals based on clinical protocols and checklists (P01, P06, P07, P10):

*As the **evidence** becomes clearer, that helps our practice and helps to improve protocols to be **consistent** and **more sustainable**. (P10-Int1)*

*I'm a great advocate of **checklists** because when you see a patient or talk to somebody you can tick tick tick through a list. This avoids having to go back and forth **saving time** and can help us **work more sustainably**. (P01-Int1)*

Further positive outcomes from standardised *target-driven care* were noted by P06 who discussed how CQUIN targets provided an incentive to follow clinical guidelines from the National Institute for Health and Care Excellence (NICE):

*The **CQUIN targets** were linked to what was in the [NICE] guidelines. We reported in the unit meetings about the **audit** [of the CQUIN targets and guidelines], at conferences and a poster in the hospital. (P06-Int1)*

In the excerpt above, NICE set the *aspiration threshold* as to what constituted quality care and not an individual practitioner. Reporting audit findings at unit meetings demonstrated to managers (who could then pass on to commissioners), that they followed NICE guidelines and met CQUIN targets. P06's other examples of communicating audit findings at conferences and hospital posters celebrated performance excellence in a way for staff, patients and families to see. An additional benefit of the targets and guidelines was how they standardised language to facilitate shared communication amongst the critical care team:

*All the **same terminology** was used [while following the guideline] with a **consistent vocabulary** when we were trying to talk to*

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<sup>40</sup> Four hours is the national target for the maximum amount of time spent waiting in AandE (NHS England 2019) or remaining in a critical care unit before being discharged to a ward (Eddleston 2016).

*consultants rather than the [Band] 5s and 6s<sup>41</sup> getting lost in their explanations because they've not got as much **experience**. (P06-Int1)*

Following research recommendations was another standardised approach which four participants (P06, P07, P10, P11) linked to sustaining professional roles within the critical care team:

*For **sustainability**, there needs to be decent **guidelines** like from the Intensive Care Society. We also need recognition of the role of physiotherapy and have good **evidence** [from research] of what that is and the benefits. Unless you've got something that says we've got **value** that's nationally or internationally **recognised**, it's difficult to argue a case for being there in the first place and **sustaining the service**. (P06-Int1)*

P10 also felt maintaining research-informed knowledge and skills helped to justify the care patients received and the financial resources required to deliver that care:

*It's important to be **research-based** to deliver the **right patient management**. If we have the evidence for what we're doing, we can argue our case in terms of finances for care or how long it takes a patient to recover. For example, if we're going to give [a cheaper] therapy, it's going to take [the patient] several days to recover, whereas another [more expensive] therapy might only need 1 or 2 days. If you've got the evidence, you can argue for obtaining **extra resources** to **justify** why something is **more expensive**. (P10-Int1)*

The previous excerpt by P10 demonstrated *goal-setting* again which has been a running theme throughout the findings. The desired goal in P10's example was an *aspiration threshold* of speedy physiological recovery obtained from two possible therapies. The first therapy was financially cheaper, but it took longer to achieve the goal. Another treatment cost more money than the first, although it was beneficial in leading to faster patient recovery. P10 indicated practitioners deliberated on decision choices and selected the one which best fits the *aspiration threshold* criteria the practitioner aimed to fulfil. In this example, the *aspiration threshold* was the patient's physiological recovery, but P10 also had an awareness

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<sup>41</sup> Banding in the NHS follows the Agenda for Change payment progression scheme for healthcare professionals except for senior managers and doctors – Band 5 is the entry point for registered practitioners who would advance into a Band 6 after many years of experience, education and increased responsibility in practice (Health Education England 2018).

of each decision option's effectiveness (ability to provide the right patient management) and efficiency (financial cost and time required)<sup>42</sup>. Moreover, P10 indicated a more financially expensive option could be justified if research evidence showed other potential gains, such as faster recovery time.

Practitioners positively viewed some standardised approaches to practice<sup>43</sup> which improved efficiency (saving time and other resources), incentivised the provision of quality care and measured auditable outcomes. However, a quotation on page 122 noted how “*numbers, targets and money*” (P05-Int1) were the primary drivers for decision goals in practice which obstructed patient centred care. On page 122, P07 referred to blood pressure and weaning actions, and clarified protocols led these types of clinical interventions:

*Intensive care is more protocolised and everything is written up to performic levels. If such and such happens, can you do this.  
(P07-Int1)*

The memo in Box 19 explored the limitations and potentially unsustainable nature of some types of standardised care within critical care clinical practice.

#### Box 19 – Memo: standardised approaches to practice

##### **Analytical memo: standardised practice**

Standardised care involves practitioners following protocols, guidelines, care bundles, targets, policies, standard operating procedures – but do they help to save resources because care is more efficient and the effective from following the best available evidence? Or do they increase resource use because practitioners are following the protocol/guideline/care bundle and not deviating from it when necessary to suit each individual patient context. From my own experience observing my students and junior nurses in practice, I can see how novices often over-treat the patient by doing far more investigations and interventions than are needed simply because that's what the guideline or protocol or care bundle says to do (and not what the patient clinically needs). Junior staff lack the ability to see

<sup>42</sup> This is an example of *intra-alternative comparison* where the attributes 'within' each decision option are compared to other options, particularly about effectiveness and efficiency. *Intra-alternative comparison* is part of Stirling's *neo-satisficing* theory explored on pages 171-172 of the Discussion chapter.

<sup>43</sup> Standardised approaches to practice include: **policies** (must be followed and are normally strategic and hospital-wide e.g. uniform policy), **clinical guidelines** (large document with recommendations for an area of practice which can be local or national e.g. NICE guideline), **care bundles** (simple, standardised, evidence-based and auditable e.g. ventilator care bundle), **protocols** (pre-determined criteria are often used in flow chart fashion to aid clinical decision-making, e.g. insulin sliding scale protocol) and **checklists** (criteria tick sheet for a specific aspect of practice e.g. pre-transfer checklist). Care bundles, protocols and checklists help to bridge the gap between a lengthy guideline and practical, bed-side direction.

the bigger picture beyond the protocol and draw from experience with other patients to either consciously or instinctively know when to adapt or deviate away from the protocol/guideline/care bundle. However, there is a safety net that comes with protocolised care and a more standardised implementation of the evidence base so standardised practice could have advantages and disadvantages for sustainability depending on the standard. Many participants referred to infection prevention policy as particularly wasteful from overusing gloves and aprons and needing to throw out unused supplies on patient discharge.

A standardised approach to practice was paradoxical then and depended on the context to which it was applied. Infection prevention and control policy was the most frequent example given by participants for a type of standardised practice which they felt created unsustainable preventable waste (see also data on page 108). However, the previous examples on pages 125 and 126 demonstrated other types of standards which were beneficial for sustainability because they brought consistent practice and research-informed care. Throughout Section 5.3.2 were decisions about resource use where the *aspiration threshold* was not determined by a practitioner, but by a pre-determined external standard. Deliberation then occurred only if the practitioner decided whether to follow, abandon or adapt<sup>44</sup> a standard or not<sup>45</sup>, although the goal itself came from the standard.

### 5.3.3 Buffering resources

In section 5.3.1 (page 77), P08 indicated safe practice and quality care were the minimum criteria for what she aspired to achieve with her decision goals. P02 recognised the *aspiration threshold* of decisions should always include safety because clearly practitioners could not aim for unsafe practice. However, she felt that the aim of ‘just safe’ was not ‘good enough’:

*It's really difficult if [someone else's decision goal] threshold is lower [than yours]. Ultimately, the **minimum goal** has got to be safe but that's never going to be satisfactory. Nobody that I know is happy '**just** giving safe care. (P02-Int2)*

<sup>44</sup> Previous data by P01 on page 109 referred to being ‘creative’ with the application of policy and adapting practice to be resourceful.

<sup>45</sup> The data here relates to Manski's (2017) decision-making model about *costly deliberation* as explored further in the Discussion chapter on pages 172-174.

The example above again illustrated the ongoing theme of *balancing different goals* by showing how each person involved could translate the *aspiration threshold* differently. In other words, what one person perceived as ‘good enough’ could be different than colleagues, patients and family members. P02 felt personal satisfaction of staff (also seen in data from Section 5.2.3) was unachievable unless goals aspired for what was ‘good enough’ was more than being ‘just safe’:

*Safe is the lowest the threshold should ever go. A goal should always aim to be safe, but that won't **satisfy the staff**. There's got to be something else, there's got to be a **buffer zone**. (P02-Int2)*

From the perspective of P02, *buffering* implied using resources in a way which aimed for more than the bare minimum of safety for a higher level of quality leaving both staff and patients satisfied:

*It's not just **staff being satisfied** but also the **satisfaction of the patient**. [Patients] know if you are 'just' doing your job or if you're doing extra which is not quantifiable but they will know. That for me is like a **shock absorber** that helps [critical care practice] feel sustainable. If all you're doing is what is safe, it chips away at people's **resilience** because it's constantly uncomfortable. (P02-Int2).*

Emerging from the data here was the notion of ‘normative’ safety symbolising the foundation level of critical care practice. In addition to the bare minimum of the ‘normative’ base, P02 advocated for more ‘responsible’ and ‘sustainable’ practice from *buffering* and *doing extra* for staff and patient satisfaction. Resilience in the critical care team was another positive outcome, as already seen in the data previously presented in Table 20 on page 112. When asked to elaborate on sustainable practice being more than ‘just safe’ by having a *shock absorber* back-up system, P02 replied:

*With **just safe** practice, you've got nowhere to go. The problem is people think what's **just okay** is the super fancy stuff like the **icing on the cake**, but that's **just the cake**. The difficulty is when people not working in clinical practice say what we're trying to achieve is lower than that. That feels intrinsically not okay and feels **not okay for patients**. (P02-Int2)*

The excerpt above provided further evidence of *translational aspiration thresholds* where there was variation in the interpretation for what constituted ‘good enough’

practice within a clinical situation. Communicating and understanding different viewpoints was difficult during multi-agent decision-making which P02 likened to the analogy of holes not being lined up in a stack of Swiss cheese layers<sup>46</sup>:

*You know the Swiss cheese of bad things, you need the **Swiss cheese of goodness**. You need the holes to all to line up so that everyone sees the **same goal**. But people can't do that, we can't **line up**. One of the reasons is we don't have a **shared language** and people are too **entrenched in their positions**. The service is under **incredible strain**, society is under a lot of **angry tension**. There's so much background noise, people **can't concentrate** and ask what is it we want and how are we going to achieve it. How are we all going to **come together** with a **common vision** to all see the same thing from a different bit of the cheese. (P02-Int2)*

Further data about communication and teamwork in critical care practice comes in Section 5.3.4.

The *just-in-case practice* was another type of *buffering* seen in the data which some participants viewed as unsustainable. There was a high degree of uncertainty from the complexity and variation amongst patients with a life-threatening illness. This uncertainty fostered practitioners (P01, P04, P07-P11) to do actions *just-in-case*, not because there was a distinct need for the interventions at that time. P01 recognised she did more *just-in-case practice* as a junior nurse from the stress and fear of making a mistake while caring for critically ill patients:

*As a very **junior** nurse in critical care, it's that whole thing of trying to do the right thing, knowing you've got this person's **life in your hands**, knowing they're **vulnerable** and being very **frightened** of doing the **wrong thing**. **Gloves and apron** on, I've forgotten I've got to go and do this now, oh I made a mistake – aprons and gloves come off and on and off and on. There's a lot of **waste** from a **junior** nurse point of view who has **no experience** in critical care and **trying to do the right thing** makes you very **wasteful**. (P01-Int1)*

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<sup>46</sup> The Swiss cheese model of accident causation (Reason 2015) compares human systems to slices of Swiss cheese. If there is a flaw in one system (like a hole in 1 layer of cheese), then other systems can compensate (like the different layers of cheese). If flaws in all the systems line up (like light shining through the holes in every slice of cheese), then accidents and hazards occur from a weak defence overall. In Reason's application of the Swiss cheese model, the holes lining up is a negative thing. P02's use of the imagery was the opposite because she has applied the model to a context where the holes lining up for a shared goal was positive.

The previous quotation by P01 reflected how a practitioner's level of experience affected clinical decision-making. According to P01, novices were more likely to do multiple investigations and interventions while *trying to do the right thing* during *just-in-case practice*. The influence of confidence and level of experience comparing novices to experts<sup>47</sup> was further discussed by P01 here:

*It's the intervening that **you don't always need**. If you've got more **senior people** on duty, they're more **confident** at not having to open a CPAP<sup>48</sup> circuit or things like putting somebody on dialysis. I'm not saying people don't need haemofiltration<sup>49</sup>. But [we need] **time and head space** to do it without making a mistake and thinking it's the middle of the night and I'm really tired, stressed and I'm going to have to get rid of that whole circuit and start again. It's [important to have] **support** from your seniors and **education**. (P01-Int1)*

The type of education P01 referred to in the previous quotation was the informal learning that occurred from novices observing and receiving support from senior colleagues. She further explained how the experience helped to prevent the wasteful and unnecessary *just-in-case practice* from knowing when 'not' to intervene:

*Critical care can be quite a **tough environment** for **new nurses** to work in. It's not very forgiving if you're new. There's a lot of people and I think you're judged a lot. **Gentle coaching** [is needed] rather than being told you've done the wrong thing. If people are allowed to relax into their role, they've got more **headspace to think**. It's not formal education, it's being **coached** by somebody more senior at the bed-space next to you who's a **role model** who you could watch, learn from and realise you **don't have to always intervene**. (P01-Int1)*

The preceding two quotations also highlighted how practitioners need *time and headspace* to carefully deliberate on the optimal decision choice for clinical interventions to avoid wasting clinical supplies.

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<sup>47</sup> Benner's (2001) seminal novice to expert theory explained five stages that occur through experience over time: novice, advanced beginner, competent, proficient and expert. This theory developed out of Benner's research of critical care nursing practice and showed clinical judgements become more efficient and intuitive through expertise acquired from experience (Benner, Hughes and Sutphen 2008; Benner, Stannard and Hooper-Kyriakidis 2011; Benner, Tanner and Chesla 2009; Waxman and Telles 2009).

<sup>48</sup> CPAP is continuous positive airway pressure which is a therapy to improve oxygenation if oxygen delivery through a face mask fails.

<sup>49</sup> Haemofiltration and dialysis are both types of renal replacement therapy where blood circulates through a machine acting as an artificial kidney.

In addition to inexperienced novice practitioners, P08 linked risk aversion through *just-in-case* decision-making with excessive use of resources and misunderstandings from poor communication:

*During a busy shift or when working in an isolation room, we stock up on materials not necessarily required for the patient, but **just-in-case** we need it. Also, we are wasting time, resources and money by ordering unnecessary tests by **junior staff** due to **lack of experience** or **poor communication** among colleagues. (P08-Int2)*

Similarly, P04 mentioned regular, routine blood testing which she felt was unwarranted without a patient-specific rationale:

*We've [stopped doing routine] **unnecessary** blood tests. We used to order a [daily] **blanket blood test** [for all patients], but now we have to **justify** every specific test which is a better way of doing it. (P04-Int1)*

Excessive diagnostic testing was also mentioned by P07 who advocated for a *less-is-more* approach to clinical actions and suggested increased ongoing surveillance was superior:

*They talk about **more intervention** will have a better, faster outcome. But that's not the case, the **risk is higher**. [There's a] huge emphasis on diagnostic tests rather than surveillance. If we had greater level of surveillance, we'd **manage the risk** much better. (P07-Int1)*

When asked to elaborate, P07 explained surveillance was the continuous monitoring nurses give to only one level 3 patient. This observation enabled proactive prevention from early identification of deterioration in contrast to reactive management:

*It's down to **resources of staffing**. [There should be] one appropriately qualified nurse for [every] level 3 patient, rather than one nurse [caring for] two level 3 patients. You now have less observation and you're **managing the problem** rather than **preventing the problem**. (P07-Int1)*

*Buffering* thus came across as both positive and negative in Section 5.3.3 depending on the perspective taken. *Doing extra* and having a *shock absorber* implied the need for increased resources, although the resource investment was justified because it contributed to sustainability. However, another view of *buffering* led to avoidable waste from doing too much through unaffordable risk



averse *just-in-case* practice. The need to rationalise and agree on the *aspiration threshold* for decisions in practice was apparent in both approaches with ‘good enough’, being more than ‘just safe’, but not overly excessive.

### 5.3.4 Non-technical aspects of practice

The data presented up until this point alluded to non-technical knowledge and skills about the human factors of critical care practice, including teamwork, communication, situational awareness and time management. Further data will embellish how these, and other non-technical aspects of critical care practice, were significant to *goal-setting* for sustainable resource use.

Six participants (P02, P05-P07, P09, P10) talked about teamwork and working together with available resources:

*That always sticks in my mind how we were all relatively novice but we did a lot of **work together** and we pulled together as a team with what we had available. (P05-Int1)*

The quote above by P05 also showed *making do* and *sufficing* with whatever resources were available (see page 123 for other findings related to *making do*). Another significant aspect of teamwork for P07 was collaboration amongst team members which she felt was essential for sustainability:

*This is one of my things on sustainability, it's not one professional role being done in the NHS, it's about **acting together** as a team in a much more collaborative way. (P07-Int1)*

In addition to collaboration, negotiating with other members of the critical care team was another process evident while participants (P01, P04-P06) were communicating with people in their attempts to try and reduce unnecessary waste of resources:

*Talking to the doctors and negotiating with them about whether this drug is necessary. As you get more experienced you might be able to **negotiate** with the medical staff and question more to ask if what we're doing is necessary. (P01-Int1)*

Further examples of multi-agent communicating and negotiating care came from P05 as she liaised with other physiotherapists about when equipment resources can be used to plan her time around equipment availability (see page 123 for

additional data on *equipment-centred care*). When asked how insufficient resource issues affected her clinical practice, P05 replied:

*You don't work clinically. You end up being on the phone and sorting things out and advising other people to do this, that and the other. You're not actually **treating the person**, you're **working around the patient** and making begging phone calls to sort stuff out. (P05-Int1)*

Examples of communicating as a non-technical skill were told by P10 which she linked to teamwork:

***Team working** and good **communication** are absolutely crucial. The doctors might want you to try a drug or do an audit or look at a topic but if you don't **communicate** then not everybody is going to fill the **appropriate** research paperwork in because they don't know it's there or what it's for. If we're going to carry changes through, you need effective **communication** so everybody knows what's going on, understands and is convinced enough to make sure it's part of their practice. (P10-Int1)*

Situational awareness as a non-technical skill was made explicit by P06 and P09 who even directly used the terms 'situation' and 'aware' within their interview. When asked how her views and actions on sustainability may have changed since becoming a critical care physiotherapist, P06 replied:

*I think [being a critical care physiotherapist] makes you more aware of how important [critical care] is because the service needs to be **sustained**. The impact of not being **sustained** is very clear cut in comparison to other areas of our hospital because physiotherapy services have been cut by various **cost saving** exercises. It's evident that when you haven't got the staff you can't do that same [critical care] work. (P06-Int1)*

With the quotation above, P06 showed her situational awareness skills towards staffing resources and service needs of the critical care unit. She also demonstrated situational awareness about shift workload resource issues and team working from observing and interacting with colleagues:

*Today it was quiet. I was on the unit and a patient had opened his bowels and was intubated but getting quite distressed and restless in bed. The nurses were worried about him pulling his ETT<sup>50</sup> out, the HCA<sup>51</sup> was **busy** and there was **no one else free**. I could have just sat and wandered off but I didn't. It's not my role to help*

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<sup>50</sup> ETT = endotracheal tube

<sup>51</sup> HCA = healthcare assistant

*a patient turn for personal care but I had the time and ability to alleviate the **stress** and **agitation** of the situation. I had an awareness of my caseload being much less and had the time so I was happy **help**. (P06-Int1)*

While explaining how limitations with resources affect his critical care practice, P09 referred to situational awareness along with advocating practitioners to be *thinking more* which was similar to *thinking twice* found in data on pages 102 and 142:

*You [need] the **right mind set** and **motivation** and realise that [resource issues are] important and not to see it as a separate issue or think that it doesn't really affect me or our unit. When you are trying to deliver **good quality of care** and use all resources in a **sustainable** and **reasonable** way, often it's just common sense and being a bit more aware and to **think more**. (P09-Int1)*

P10 felt time management skills were essential to improve communication skills and to working more efficiently by preventing waste of the resource of time.

Experience also enabled efficiency:

*I review my jobs every month, I have **priority** jobs, medium urgent jobs and less urgent jobs. I have a **planner** which I work my way through so I know that I'm **achieving** those things because I tick them off on the list. I know the average amount of time it should take me because I've done them before. With **experience**, I manage to achieve things more quickly and **efficiently**. I've improved my IT skills to **communicate effectively and efficiently**.*

P09 was another participant who linked together effective communication with time management:

*If you try to [clearly and efficiently] **communicate** with people, you have to be assertive and active to try to get things going. How you manage your own **time** and **workload** is also about **sustainability**. (P09-Int)*

P01 specifically recommended mindfulness as a non-technical strategy to slow down the pace of practice<sup>52</sup> to allow for a more conscientious approach to making decisions about how resources are used in practice:

***Mindfulness** is thinking before you act and **slowing down** to think about what you're doing. **Mindfulness** is about being in the*

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<sup>52</sup> See page 152 for further data on slowing the pace of practice down to prevent mistakes and overusing resources from quick clinical judgements which need backtracking.

*here and now. And it's about thinking of the repercussions of what you're doing for the short and longer term. (P01-Int1)*

P01 also encouraged active reflection to learn from experiences for clinical aspects of care but also for collaborating with other critical care team members:

*Nurses don't have a lot of time to **reflect** after a shift and perhaps [it would be useful] if they are given time to **reflect** on what they're doing and **to build relationships** with the medical staff as well. (P01-Int1)*

There were aspects of reflexivity in the previous two quotations as well because of the forward-thinking elements of using the learning gained from past situations to guide new resource decisions. Another participant (P05), recognised the value of reflective practice while learning from colleagues and mentors with more experience:

*If [expert practitioners] are anything like me, they'll have had bad experiences and good experiences and **reflected and learned** from them.*

Group reflection, reflexivity, observing practice and discussing amongst people who are interested in sustainability were suggestions for how to make resource use more sustainable:

*[Sustainability would benefit from] **observation** of our practice and **dialogue** amongst ourselves. Also, having a group of people who are interested in [sustainability]. (P08-Int1)*

The participants, therefore, promoted mindfulness, reflection and reflexivity as ways of thoughtfully considering resources use within critical care practice. In doing so, conscious attention was taken to not rush into decisions in practice which they felt was a more sustainable way of working.

### 5.3.5 Being satisfied and sufficing with resources

Emerging from Section 5.3 was a central concept that for practitioners to use resources sustainably, an *aspiration threshold* goal was set to represent what was 'good enough' for decisions about resource use. Various options were deliberated on until the practitioner was satisfied that an efficient and resourceful plan

sufficiently met the aspiration goal. Therefore, the practitioner was 'satisfied' and 'sufficing' which related to *satisficing* as a decision-making process<sup>53</sup>.

The lack of *satisficing* was apparent in this example provided by P04 when asked in her second interview if the concept of *satisficing* resonated with her experiences:

**Satisficing** [is absent] *in how we do not match the acuity of our patients with the skill mix of our staff. Historically, we have had experienced, competent, nurses who could draw on their experiences to nurse patients effectively. In recent years, we have plugged the gap for a shortfall in this dwindling, experienced group of critical care nurses by employing more and more inexperienced nurses, together with support assistants and international nurses. These staff work hard and do their best, but it is papering over the cracks, hence frustrations that we are not satisficing. (P04-Int2)*

*Satisficing*, as a social process<sup>54</sup> involving multiple people, could also be applied to the system of critical care with P06 calling the *aspiration threshold* for sustaining the service a *critical line*:

*The guidelines coming in with recommendations for certain levels of quality of care along with reduced amounts of staff and cash available don't match. It will be interesting to see where it goes in terms of sustainability, where that critical line is of not being sustainable at certain points and certain levels of service." (P06-Int1)*

Similarly, P02 labelled *mission critical* as the threshold line for sustaining the service but she also recognised there are extra elements which could be done over and beyond 'just enough':

*We need to think about what's mission critical. What must we have to provide our service. What's kind of nice, the sort of fluffier stuff that's good for people's development but is not absolutely necessary for the service. And how we're going to provide that with the resources we have. (P02-Int2)*

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<sup>53</sup> The term *satisficing*, introduced by economist Herbert Simon (1955, 1957), is when a decision-maker considers different options until becoming satisfied that an *aspiration threshold* has been met, but sufficing with the minimum amount of resources necessary to reach that goal.

<sup>54</sup> For this study, *satisficing* was viewed as a significant social process at both an individual practitioner level and collective critical care unit level because it involved human interaction between members of the critical care team, patients and family members.

There was a sense in the data of needing to be efficient with minimal waste, but still providing quality care for patients within the limitations of available resources. P02's 'fluffier stuff' and cake analogy symbolised the *aspiration threshold* for practice could be raised higher than *just safety* (the base cake as 'normative practice') to 'flourishing' practice (included the icing). A range of examples throughout Section 5.3 demonstrated that increased *satisficing* enabled responsible and sustainable aspects of practice to build into flourishing care. Thus, sustainability in critical care practice was not a binary outcome of being present or not. Instead, *satisficing* facilitated a continuum of sustainability which included normative, responsible, sustainable and flourishing stages<sup>55</sup>. The satisficing and sustainability continuum depicted in Table 22 is cross-referenced to the findings to illustrate how each of these four stages was grounded in the data.

Table 22 – Satisficing and sustainability continuum in critical care practice

Satisficing within decision-making about how financial, social and environmental resources are used in critical care practice		
<b>Type of critical care practice</b>	Each row is achieved before the next with these 4 stages representing a continuum of increased satisficing leading to increased sustainability.	Data in study
<b>1. Normative</b>	<b>Do well</b> Safe, effective, patient centred and timely care which meets the physiological, psychological and social needs of critical care patients and their families.	Sections 5.33 and 5.3.5

<sup>55</sup> A satisficing and sustainability business model by Hoveskog et al. (2018) combined Dyllick and Muff's (2016) sustainability 3.0 stages with the concept of flourishing as an additional stage (Ehrenfeld and Hoffman 2013; Laszlo et al., 2012). The integrative literature search found this business literature after the first and second interviews had been completed. The principles of each stage of normative, responsible, sustainable and flourishing were confirmed within the data, as noted in Table 22, to ensure the business framework was not forced while borrowing language to explain the data of this study.

<p><b>2. Responsible</b></p>	<p><b>Do well <i>while</i> doing less harm</b> Efficient critical care with minimal negative impact on future use of financial, environmental and social resources; equitable care which meets the service demand; goal-concordant care which respects the patient's wish for receiving, limiting or withdrawing investigations and therapeutic treatments.</p>	<p>Sections 5.3.1, 5.3.2 and 5.3.5</p>
<p><b>3. Sustainable</b></p>	<p><b>Do well <i>and</i> do (some) good</b> Audit, research and education are undertaken; holistic well-being of critical care patients and families are supported throughout entirety of acute, recovery and rehabilitation stages; resource reserves are available for uncertainties with current patients and the potential increase in future service demand.</p>	<p>Sections 5.3.2, 5.3.4 and 5.3.5</p>
<p><b>4. Flourishing</b></p>	<p><b>Do good <i>to</i> do well – full sustainability</b> Durability, resiliency and agility are used appropriately; meta-cognitive strategies are used during decision-making including mindfulness, reflection, reflexivity and seeing the big picture; holistically fulfilled practitioners with maximal job satisfaction.</p>	<p>Sections 5.3.3, 5.3.4 and 5.35</p>

## 5.4 Influencing factors on resource decisions

Emerging from the data were various factors which impacted on practitioners' decision-making about resources used in critical care practice. Section 5.4 will consolidate the data and cross-reference to previous sections to reflect the most significant influences on how *satisficing* happened as a decision-making process.

Participants discussed social interaction and aspects of culture both in their home and work environments which had an impact on *goal-setting* while using resources in their critical care practice. See Table 23 for examples across the themes of childhood, generation differences, family and home life, interaction with work colleagues, media and living in other countries.

Table 23 – Social norms and culture examples

Themes	Interview transcript excerpts
<b>Childhood and nature connectedness</b>	<p>Sustainability and feeling connected to nature within childhood was recognised as there for some participants but was absent for others:</p> <p><i>My childhood <b>growing up on a farm</b> [was how I became interested in sustainability]. Everything had to be grown, made, sewed, passed on and used until it died a natural death. <b>Sustainability</b> was about survival and to live and eat. You grew your vegetables and raised your animals. It was a <b>natural cycling process</b> but then you looked after nature at the same time. (P07-Int1)</i></p> <p><i>I don't remember having those influences [about recycling and excess packaging] <b>growing up as a child</b>. I don't remember my parents ever talking about it whereas now they would. (P04-Int1)</i></p>
<b>Generation differences</b>	<p>Participants identified younger generations as being directly educated about sustainability, but there was also recognition people now live in a throw-away culture, and older generations undertook sustainability out of necessity:</p> <p><i>The younger generation has a different take [on sustainability]. In schools now, you get a lot more information about the impact of <b>waste on the planet</b> [but] the older generation didn't always have that. They've not had that sort of education really. (P11-Int1)</i></p> <p><i>We <b>abuse</b> the environment and <b>overuse natural resources</b>. We don't <b>recycle</b> enough now, we don't sew or knit enough. Everything comes quickly and <b>there isn't</b></i></p>



	<p><i><b>time</b> to [make things] sustainable and passed on. (P07-Int1)</i></p> <p><i>My parents were both born during the second world war and when they were children, everything was <b>rationed</b>. My parents are very careful about what they do and what they use. Everything is, <b>reused</b>. (P01-Int1)</i></p>
<p><b>Family and home life</b></p>	<p>Participants discussed how sustainability actions at home influenced their views, as well as having friends and family with a sustainability-related job:</p> <p><i>At home, we <b>recycle</b> and try <b>not to waste water</b> and I take those views into work.... you do [sustainability] at home as a <b>natural</b> kind of thing and that's really helped in the workplace because it's kind of rubbed off. (P11-Int1)</i></p> <p><i>I've got friends who <b>work in waste management</b> and my husband works in an <b>environmental background</b> so <b>exposure</b> from people has helped me to find my own <b>personal beliefs</b>. (P11-Int1)</i></p> <p>Having children was also recognised as impacting on their view that sustainability is vital for protecting resources for posterity, which also gave a sense of <i>looking forward</i> and <i>seeing the bigger picture</i>:</p> <p><i>Since I've had a <b>family</b>, I've started to look forward more and I wonder what my <b>children</b> will be doing in a lot of aspects of life. I'm interested to see how their lives will be different and you want it to be a <b>healthy living environment</b> for them and us. It makes you think more about it when you've got other than yourself to think about by <b>looking forward</b>. (P04-Int1)</i></p>
<p><b>Interaction with work colleagues and patients</b></p>	<p>Some participants recognised patients as well as colleagues from their local critical care unit and network significantly affected their views on resource use in practice:</p> <p><i>I've always had respect for [experienced mentors] who have <b>more knowledge</b> than me. They've been through it and they've had the <b>experiences</b>.... Somebody else who I</i></p>

	<p><i>always thank for getting me into ICU was a <b>patient</b>. (P05-Int1)</i></p> <p><i>The <b>critical care network</b> [has influenced my understanding of sustainability]. We put together physios from various places and meet together for <b>peer support</b> and projects that we work on across the county. We've talked about the <b>NICE guidelines</b> for critical care, how do we do implement that in a way that's <b>feasible</b> and <b>consistent</b> from the trauma centre to smaller cities. (P06-Int1)</i></p>
<p><b>Media</b></p>	<p>The media was seen to raise awareness of financial sustainability issues for participants and the public:</p> <p><i>You have constant [messages about sustainability] from the <b>media</b> who tell us how to improve our lifestyles by making it more <b>efficient</b> and <b>not wasting</b>. (P08-Int1)</i></p> <p><i>The <b>government</b> is focusing on doctors working more hours and weekends. It generates <b>media</b> and <b>public attention</b> that doctors not willing to work weekends is why the NHS is in a mess. We also have patients [from other countries] and staff ask who is paying for [to care for them]. We have an admin lady in the hospital who checks whether [international patients] are entitled to care. That gets discussed at work but it's also on the <b>media</b> a lot. (P10-Int1)</i></p>
<p><b>Living in other countries</b></p>	<p>Countries which some participants had worked in other than England included Finland, Ireland, Slovakia, Czech Republic and the United States:</p> <p><i>Over here you've got everything <b>single-use</b> but when I used to work in <b>Slovakia</b> or the <b>Czech Republic</b>, you didn't because things were <b>sterilised</b> and <b>reused</b>. You can see the difference where there is <b>no money</b> and you have to <b>sterilise</b> and <b>reuse again</b>. Over here, you <b>throw-away</b> and buy a new one. (P08-Int1)</i></p> <p><i>A patient [in the United States] needs to <b>pay for healthcare</b> so [as a nurse] you <b>think twice</b> about what they need. Some people didn't have money to pay so you <b>thought</b></i></p>

	<b>about what you would order and what supplies you would use. (P08-Int1)</b>
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The data presented in Table 23 provided a flavour for the social norms and culture influencing practitioners' values and beliefs which then had a secondary impact on the decision-making processes in their critical care practice. Some participants (P01, P02, P09, P11) directly discussed values and beliefs about resources use and the need to be clear on what those are:

*It would be helpful to have a **values and beliefs clarification** exercise about beliefs on sustainability, are we all in the same place and where do we want to go with it. I might have one set of beliefs and you might have another. If they're **not the same**, there's going to be a lot of **struggle**. (P02-Int1)*

The participants' beliefs about their power and capability to control the use of resources in critical care practice was discussed in different ways. Some participants had self-efficacy<sup>56</sup> towards their perceived ability to use resources sustainably as evident in championing sustainability and actively *leading by example* (P08, P11):

*We allocated a nurse to be a **champion** because she's **passionate** about **recycling** and things like that. She's quite a vocal person in the unit and **encourages people** to be involved in recycling. She **liaised** with waste management and ensured recycling was possible for us. (P11-Int1)*

*I **lead by example** and if I see people just throwing their rubbish in the wrong places, I educate people. (P11-Int1)*

Other participants (P01, P02) appeared to have a low self-efficacy for their capability and opportunity to have control over the resources they were using<sup>57</sup>.

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<sup>56</sup> Self-efficacy is "defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Such beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes" (Bandura 1994). Further literature related to self-efficacy include social cognitive theory (Bandura 1986; Lin and Hsu 2015; Font, Garay and Jones 2016) and locus of control theory (Lefcourt 2014).

<sup>57</sup> Spatial awareness is how close someone feels to the issue, and temporal awareness relates to time. Resource issues (be it finances, environmental or social) are either very close to the person's interest or the sustainability problems are so large the person feels distanced and not engaged. If someone perceives resource depletion as geographically separated or too far off into the future, it is more difficult to relate. Limits to Growth theory (Meadows, Randers and Meadows 2005;

For instance, P01 shared her own experiences and highlighted research studies she had read about nurses delivering care which they believed was futile and not necessary:

*There's been studies [showing] how nurses in intensive care often feel the care they're delivering **isn't the right thing** and is **inappropriate** for the patient they're looking after. (P01-Int1)*

Previous data about inappropriate admissions, delayed discharges and waste (pages 100, 101 and 152) also showed a perceived lack of control for the use of financial, physical and time resources in practice. P02 stated, “So little of what I do [in critical care practice] is controlled by me” (P02-Int1), and elaborated further about her self-efficacy beliefs as a nurse:

*Individually, you have **very little control** over **equipment, resources, time** and what you do. I have absolutely **no control** over **disposables** and I have **very little control** of logistical stuff [and procurement] because it's **centrally managed**. It becomes difficult when you think about what you're going to do in terms of sustainability. Actually, what can I do? I don't have any control over procurement. I don't have control over the way we use **resources** other than whether I choose to use them or not<sup>58</sup>. (P02-Int1)*

Energy use was another example given by P02's reflecting low self-efficacy and perceived lack of control over making decisions about resource use:

*You also have absolutely **no control** over the ambient **temperature**. It's either freezing cold or absolutely boiling hot to the point where everybody's sweltering. It would be more helpful if we had more control over [temperature and lights] then we might not use so much **energy**. There's vast areas of the hospital that are lit like an airport at 04:00 in the morning when there's nobody there. (P02-Int1)*

Similarly, P01 and P09 had personal tension from a perceived lack of capability and opportunity<sup>59</sup> to use resources sustainably (see page 106). In contrast, P02 did not show feelings of guilt about physical or environmental waste despite her perceived lack of opportunity to control procurement or the cost of clinical supplies.

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Meadows and Meadows 2016) considers spatial and temporal awareness, systems and feedback loops.

<sup>58</sup> This is another example of single-agent decision-making with practitioners deciding whether to use specific resources within their clinical practice.

<sup>59</sup> The COM-B model of behavioural change was referred to in sustainability healthcare literature with COM standing for capabilities, opportunities and motivation that informs behaviour (B) (Michie 2014; Michie, van Stralen and West 2011; Steinmo et al., 2016).

However, she consciously worked towards using resources responsibly when able to:

*Staff should feel they can use stuff safely and **appropriately** and to **do the right thing**<sup>60</sup> without being concerned because it **costs money**. Every now and again we get flyers saying an item costs £300 a time. I **don't control** that it costs £300 but it is **disposable**, so I use it, **chuck it away** and that's £300 gone. I'm not going to use something wantonly, but it is about encouraging staff if you're using a dressing, some of which are hideously expensive, to make sure you **use it appropriately** not just because you think it looks quite nice. (P02-Int1)*

The data presented throughout the Findings Chapter revealed other factors influencing decision-making about resource use in critical care practice. These included previous experience of the practitioner and colleagues; resource availability; uncertainty and high risk; and standardised approaches to practice. See Table 24 for further clarification and sign-posting to examples to substantiate they significantly influenced if and how *satisficing* occurred.

Table 24 – Other influencing factors on resource decisions

Influencing factor	Explanation	Examples of data
<b>Previous experience</b>	Participants drew from their own experience to inform the <i>aspiration threshold</i> as well as support other colleagues, particularly those with expertise and seniority.	Pages 127, 130, 132, 133 and 137
<b>Resource availability</b>	Insufficient resource availability promoted creativity, <i>making do</i> , troubleshooting, and <i>equipment centred care</i> while trying to maintain quality care and suffice with the resources at hand.	Pages 100, 107, 109, 121 and 123
<b>Uncertainty and high risk</b>	Critically ill patients are extremely vulnerable from severe, life-threatening conditions. Practitioners were risk averse while deciding on how resources are	Pages 130, 132 and 145

<sup>60</sup> Using resources “safely” and “appropriately” and “doing the right thing” relates to *stewarding* and responsible use of resources.

	used leading to <i>just-in-case</i> practice.	
<b>Standardised approaches to practice</b>	Policies, guidelines, care bundles and protocols influenced the <i>aspiration threshold</i> with the criteria set by the document followed.	Pages 107, 111, 127 and 128

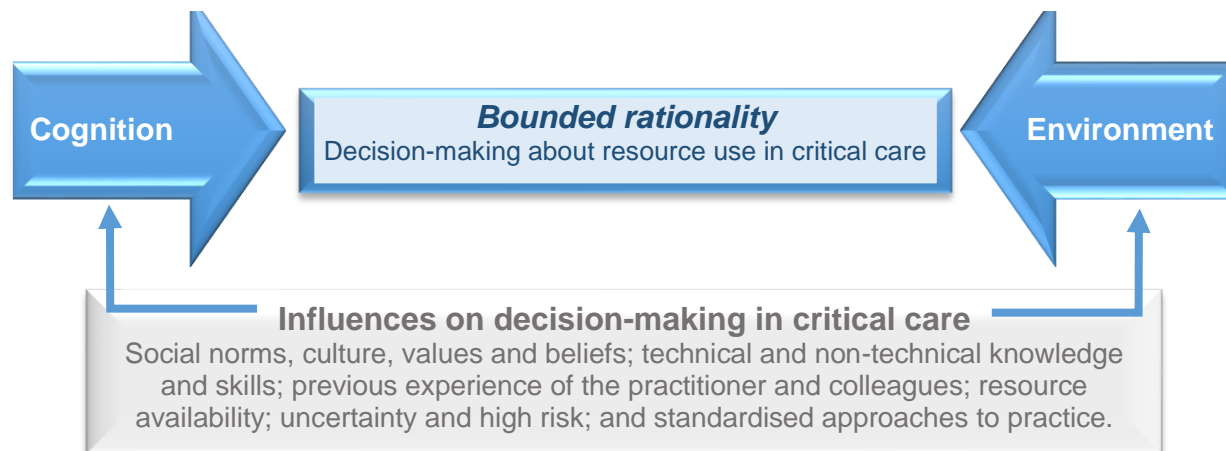
Section 5.4 summarised data about the factors influencing decisions related to resource use. Within Section 5.3, the specific decision-making process of *satisficing* emerged as the central social process leading to sustainability in critical care. The influencing factors, identified in Section 5.4, shaped the participants' views towards sustainability, which then influenced the *aspiration threshold* set during *goal-setting*. These influencing factors heightened people's awareness of sustainability issues, gave them values and beliefs about resource use and impacted on if, how and when to satisfice in practice.

The influences involved internal thinking (e.g. self-efficacy, personal values or knowledge and skills), came from the practitioner's external environment (e.g. childhood setting, living in other countries or being surrounded by experienced work colleagues), or a combination of both. For instance, a protocol existed externally within the environment, but the decision-making also depended on the practitioner's cognitive abilities. The rationality involved with decisions, therefore, affected cognitive and environmental aspects of the influencing factors. Emerging from this was the concept of *bounded rationality*<sup>61</sup> because the practitioner's rationality was bounded to cognition and featured in the surrounding environment. *Bounded rationality* was embedded in the *satisficing* process and was significant in representing the factors that shaped 'how' *satisficing* occurred in practice (see Figure 13 on page 147).

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<sup>61</sup> *Bounded rationality* was a component of Simon's (1955, 1957) satisficing theory as the cognitive and environmental aspects influencing a decision maker.

Figure 13 – Bounded rationality in critical care practice



## 5.5 Responsibility to use resources appropriately

There was overlap in the findings between data which showed ‘what’ happened with decision-making in practice where sustainability was the outcome (*satisficing*), ‘how’ these decisions were made (*bounded rationality*) and ‘why’ practitioners used resources in the way they discussed. Section 5.5 now fills in this final gap, for the ‘why’, drawing from data already presented along with further new data when needed.

Previous data in Sections 5.2, 5.3 and 5.4 acknowledged that critical care is a *resource-intensive service* requiring financial, environmental and social resources to function. All participants (P01-P11) referred to critical care as requiring a large amount of resources as summarised by P02 and P04 here:

[Critical care is] very **intense** on all levels. It’s very staff, equipment, disposables and energy intense. (P02-Int1)

Critical care is **resource-intensive** in terms of what we offer and do for a very small population, yet the resources we throw at that small population are immense. That’s why it stands out because even just for one person you’re caring for, from nursing to technical resources to drug therapies, the amount of resources we put in is massive. (P04-Int1)

Critical care was also referred to by participants as “*time-consuming*” and “*resource hungry*” (P02-Int2) reflecting how the critical care department required a significant amount of resources.

It was evident throughout Sections 5.2, 5.3 and 5.4 that there was an *imbalance in the supply and demand for resources* which impacted on practitioners’ ability to suffice and remain satisfied with the care they were giving. This imbalance was particularly exemplified on page 101 when P10 discussed the “*daily battle*” of resource imbalance and by P04 on page 121 about resource restraints. P02 reflected on this discrepancy between supply and demand for the three major types of resources:

[Critical care] *was a sustainable system but it’s bursting at the seams now. We’ve got to that **breaking point**. If you think about a 3-point weighing scale of finance, environment and people or social resources, it’s **unbalanced**. The balance is tipping, and the **system is breaking down**.* (P01-Int2)

Numerous other examples in the data of Sections 5.2, 5.3 and 5.4 showed that participants observed *excessive use of resources* and *waste issues* within their own and their colleagues’ practice. Similar to the data on page 130 about *just-in-case* practice, P01’s observations of *excessive use of resources* during an emergency<sup>62</sup> situation demonstrated thoughtless, unnecessary actions and a lack of patient centred care:

*In an emergency you **thoughtlessly** do things because you don’t have time, confidence or knowledge to process. In cardiac arrest or peri-arrest situations, I regularly saw needless use of resources because people were ripping open packets of stuff trying to pre-empt but **not thinking or communicating** with their colleagues. I think emergency situations are one very good example where **resources are needlessly used**.* (P01-Int2)

Two participants (P01 and P09) left permanent positions in the critical care unit because of their disappointment and struggles with *excessive use of resources* and *waste issues* (see page 106). P01 went on to explain her lack of job

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<sup>62</sup> The nature of life-threatening conditions for critically ill patients puts them at risk for clinical emergency situations such as the cardiac arrest example given by P01. A cardiac arrest is when the heart suddenly stops beating, and a respiratory arrest is the lack of breathing. The term peri-arrest indicates the time when a patient is in cardiac or respiratory arrest and is receiving cardiopulmonary resuscitation (CPR) interventions.



satisfaction while she was based in critical care which she attributed to unnecessary resource use and perceived waste:

*As practitioners, we go into a job to get **satisfaction** from it. That's very much tied up in our **identity** as human beings. If we're not satisfied with the work we do on a daily basis, it's not **sustainable**. (P01-Int2)*

Another *waste issue* was how some participants observed financially and environmentally costly practices related to segregating and disposing of clinical and non-clinical waste:

*People aren't putting the right [physical waste] in the right areas like [mixing] paper into the clinical waste. It should only be clinical waste that goes in there. Sometimes you get packaging coming in clinical waste and some non-clinical waste and it tends to [all] get put in the clinical burning waste [bin]. (P11-In1)*

In addition to wanting to improve the disposal of clinical and non-clinical waste, P11 also felt responsible for addressing the current *waste issue* with laryngoscope<sup>63</sup> batteries in her local unit:

*You use [laryngoscope] batteries quite a few times but you don't want the batteries to fail during the [next] intubation so it's a brand-new set each time. Then you've got hundreds of batteries that are lurking around. They are not old but what do you do with them. It just seems like a **terrible waste**. (P11-Int1)*

These four factors emerged then as the main drivers for why practitioners satisfied in critical care: *resource intensive service, an imbalance in the supply and demand for resources, excessive use of resources and waste issues*. The four contributing factors appeared to give participants a feeling of obligation and an altruistic sense of duty to use resources 'appropriately'. For them, appropriate resource use meant only consuming resources when necessary, preventing waste, and managing physical waste in a financially and environmentally sustainable manner. P04 expressed her feeling of responsibility to use resources sustainably here:

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<sup>63</sup> A laryngoscope is a piece of equipment used during intubation which is the placement of an endotracheal tube inside the trachea. An endotracheal tube connects the lungs to a mechanical ventilator machine for patients requiring intensive airway or respiratory support. A typical laryngoscope handle has 2 AA batteries to shine a light down the patient's throat during the intubation procedure.

*Sustainability is having an **environmental and social responsibility** to **reduce our footprint** whether it's from emissions or waste management. It's looking at how we can take **greater care of the resources** that we've got in the world. (P04-Int1)*

P02 demonstrated a sense of responsibility to use resources in a way that resulted in the best possible and most effective (high-quality) practice by asking “*how can we use the staff more effectively?*” (P02-Int1). Similarly, P11 stated:

*You want to make your unit the **best possible** place for your patient and for them to get effective treatment and care so that they can have that treatment and get out as **quickly as possible**. (P11-Int1)*

Preventing waste of resources could, therefore, come with ensuring admissions are appropriate and with more timely discharges from critical care. Preventing waste through *lean thinking*<sup>64</sup> was mentioned by P07 and P11 while referring to practice which gets the most effective operational use out of resources at the cheapest possible rate:

*In the critical care unit, they talk about cost cost cost and operationalisation of resources and management of service for the cheapest rate and at a flat level. **Lean approach** to management is very much the word. (P07-Int1)*

Previously on page 144, quotations by P02 reflected her feeling of a lack of individual control over energy use and procurement of clinical supplies. Further discussion by P022 about procuring resources indicated a lack of *lean thinking* because of money wasted from not including practitioners in procurement decision-making:

*I have **no control** over the sort of supplies that we might have. **Procurement's** done by the Trust [in a] **centralised** kind of way... We've had some **disposable equipment** sent to us in the last couple of months and we're all asking that's very bizarre, why has that appeared? What's the use for that? It looks like it's very **expensive** and it looks like it's stuff that we already had. P02-Int1*

When prompted to clarify more about this type of centralised procurement of physical clinical resources, P02 explained the waste created and the absence of

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<sup>64</sup> See Footnote 81 on page 203 for definition and references related to lean thinking.

*lean practice* with a specific example of an intravenous (IV) cannula insertion pack<sup>65</sup>:

*They've made little **packs** for insertions of an IV cannula that have loads of stuff that you wouldn't need for every cannula. You might only use 1 thing and then because it's all **single use**, we're either going to put the [unused] stuff somewhere for it hopefully to be used later or we're just going to **bin it**. P02-Int1*

P02 felt the insertion packs created more waste, and therefore hindered *lean thinking*, because of the number of unused supplies thrown away. She also recognised the critical care unit already kept the supplies for an IV cannula insertion which made her question the efficiency and effectiveness of procuring packs for individual procedures:

*Why would you make an [IV cannula insertion] **pack** when we have all that stuff individually? Once you've opened the packet and the swabs are exposed, if you don't use them quickly you can't use them. They'll just be sitting around gathering dust. We have loads of packets of gauze swabs in fives where you might only want 1. Then the rest of the stuff you will literally **waste**. While [the pack] has come from the IV team and that's what **they want us to use**, it is not helpful to us. P02-Int1*

The lack of self-efficacy in procurement decision-making was also evident in how P02 stated “*stuff we use just appears and then disappears*” (P02-Int) without, knowing the people who order clinical supplies:

*I don't know who “they” are because this equipment **just appears**. Nobody ever comes along, identifies themselves and says we have bought this bit of equipment that we want you to use. P02-Int1*

Not involving or communicating within the critical care team during procurement decisions impacted on whether practitioners felt clinical supplies were fit for purpose:

*There's very little **communication** [about **procuring** supplies]. We might say this isn't particularly useful for us or designed for the purpose but that is what the Trust has bought. For instance, we have a machine for monitoring blood glucose and all the people that it can't be used for is practically every patient we have. We've had about 6 or 7 bought which **cost a lot of money**. It's not actually **designed for the purpose** that we need it for, and yet*

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<sup>65</sup> An intravenous (IV) cannula is placed in a vein for practitioners to administer medications or fluid therapy directly into the bloodstream.

***we've had no say and that's just what the Trust decided. P02-Int1***

In further elaboration about the centralised procurement of blood glucose monitoring equipment, P02 linked the lack of *lean thinking* (efficiency and effectiveness) to unsustainable practice:

*It's not helpful if the equipment is **not designed for the purpose** of how it is being used [in critical care]. That [blood glucose monitoring] equipment is designed for an individual diabetic person to use in their own home. It's not designed to be used hundreds and hundreds of times a day by lots of different people. Within a couple of months, they're no longer working because they've been used so much. To me, that's **not sustainable** and seems like a **huge expense**. P02-Int1*

When prompted to explain what sustainable meant to her concerning procuring critical care supplies, P02 explained:

*Sustainable is something that **should last for a long time**. Everything gets wear and tear but should be **designed for the purpose** for which it's intended. It should be **robust** enough to last long enough that it fulfils its **useful purpose** and is **cost-effective** to use. P02-Int1*

P01 talked about her view that practitioners have a responsibility to work more effectively by slowing the pace<sup>66</sup> of practice down to be attentive to the resource of time and prevent waste from rushing<sup>67</sup> into incorrect judgements:

*We all have a responsibility to **take our time** with patients and with each other. It's about finding a different, more **respectful** way of working with each other.... The faster pace we move at, the less time there is to reflect on our own behaviour and our own practice. If we're given more time, we'll **work slower** but make **less errors** with judgement and perhaps use **less resources** and less equipment. (P01-Int1)*

Earlier in Section 5.3.1, patient centred care surfaced as important in responsible practice, which is also evident in the excerpt above. P01 provided an example of

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<sup>66</sup> Slowing down practice relates to the slow healthcare movement (Lusiani et al., 2015; Sellman 2014) to ensure resources are used the first time responsibly and are not 'too little' or 'too much'. See Footnote 70 on page 153 about the Goldilocks principle, and other related national initiatives are the Choosing Wisely UK (2017) and Getting it Right First Time (GIRFT) (2018a) campaigns.

<sup>67</sup> Rushing into a clinical judgement too soon and missing a more optimal decision choice is called search satisficing (Croskerry 2013).

a situation when as an outreach nurse she advocated for a Level 1<sup>68</sup> patient on the ward to be admitted to critical care because he was at risk of deteriorating<sup>69</sup>:

*I came on the following morning to find not only that the patient had not needed any intensive care, but it created a **knock-on effect** for the rest of the hospital. It meant that another patient who had been very unwell was discharged at 03:00 in the morning to allow this new patient to be admitted. I got quite upset with myself for the decision I had made. (P01-Int1)*

After continuing to discuss this experience in more detail, P01 revealed her feelings of personal responsibility for how she used resources:

*I felt **personally responsible** for the decision [to admit the Level 1 patient to critical care] and then the **knock-on effect** that had. (P01-Int1)*

At another point in the interview, P01 shared her view that resources should not be avoided for patients just because they are limited in availability; instead, she perceived sustainability as using resources appropriately “*for the sake of sustainability*” (P01-Int1). Similarly, the data emphasised throughout that not enough resources (‘too little’) was unsustainable practice, yet excessively using ‘too much’ was also not sustainable. Appropriate resource use in critical care practice should be ‘just right’ to sufficiently meet the needs of patients, but not create waste from overusing resources<sup>70</sup>.

Underpinning data presented throughout Section 5.5 has been the practitioners’ ethical sense of duty towards taking personal responsibility for using resources appropriately. Emerging from the findings was thus the process of *stewarding* which represented the actions involved with stewardship<sup>71</sup>. P07 directly stated the term stewardship while specifically discussing antimicrobial stewardship:

*I look up the [lab] result and check it against the chart for antibiotic **stewardship**. As a Sister, you check the antibiotic sensitivity [of lab results]. (P07-Int1)*

<sup>68</sup> Level 1 patients have a scale of acuity which can be managed in ward settings.

<sup>69</sup> The interconnectivity of systems and *knock-on effect* are again evident here.

<sup>70</sup> The ‘Goldilocks principle’ has emerged here for healthcare which is not too little, not too much but just right (Rashid 2016).

<sup>71</sup> Stewardship is defined as an ethic about taking responsibility to conscientiously plan, manage and safeguard resources (Cirillo 2014).

The concept of stewarding was evident in the data throughout the resource cycle including the production of supplies (see page 104), procurement (see page 144), use of critical care supplies (Section 5.3) and disposing of waste (see page 105). Other data throughout the previous sections gave examples of reusing, recycling and recovering resources. Stewarding as an ethic to be responsible with resources was central to actions related to reducing waste (see Figure 14).

Figure 14 – Stewarding within the resource cycle in critical care practice

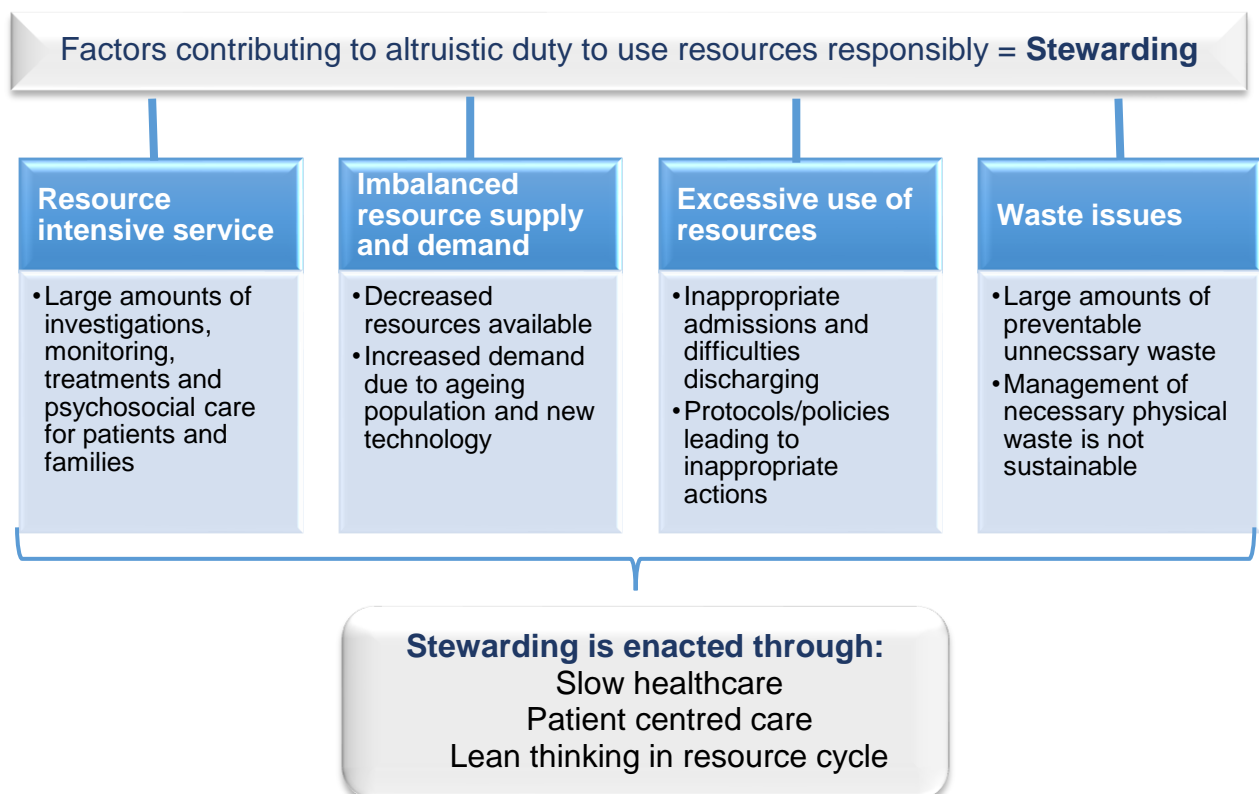


The concept of *stewarding*<sup>72</sup> was seen throughout the data from the way participants wanted to resolve their primary concern that resource use is currently unsustainable. *Stewarding*, as an altruistic ethical duty to use financial, environmental and social resources responsibly, brought together and organised the data related to resource use and responsibility as prosocial behaviour.

<sup>72</sup> In New Zealand, the Māori use the term *kaitiakitanga* to capture ethics related to stewardship and guardianship and a *kaitiaki* is a person who is a steward and guardian for the sea, sky and land (Kahui and Richards 2014). Spiller et al. (2011) applied the concept of *Kaitiakitanga* to business to foster environmental responsibility while profiting and prospering. "Through practicing *kaitiakitanga*, organizations can build businesses where wisdom is consciously created through reciprocal relationships. In this worldview of business, humans are stewards endowed with a mandate to use the agency of their *mana* (spiritual power, authority, and sovereignty) to create *mauri ora* (conscious well-being) for humans and ecosystems—and this commitment extends to organizations" (Spiller et al., 2011, 1).

Previously, *satisficing* emerged as the central social process leading to sustainability in critical care practice. *Stewarding* was then another significant process because it explained ‘why’ practitioners undertake actions like *satisficing* which resulted in sustainability becoming a component of critical care practice. Figure 15 is a summary illustration of the key factors contributing to stewarding and how practitioners enact stewarding in critical care practice.

Figure 15 - Stewarding in critical care practice

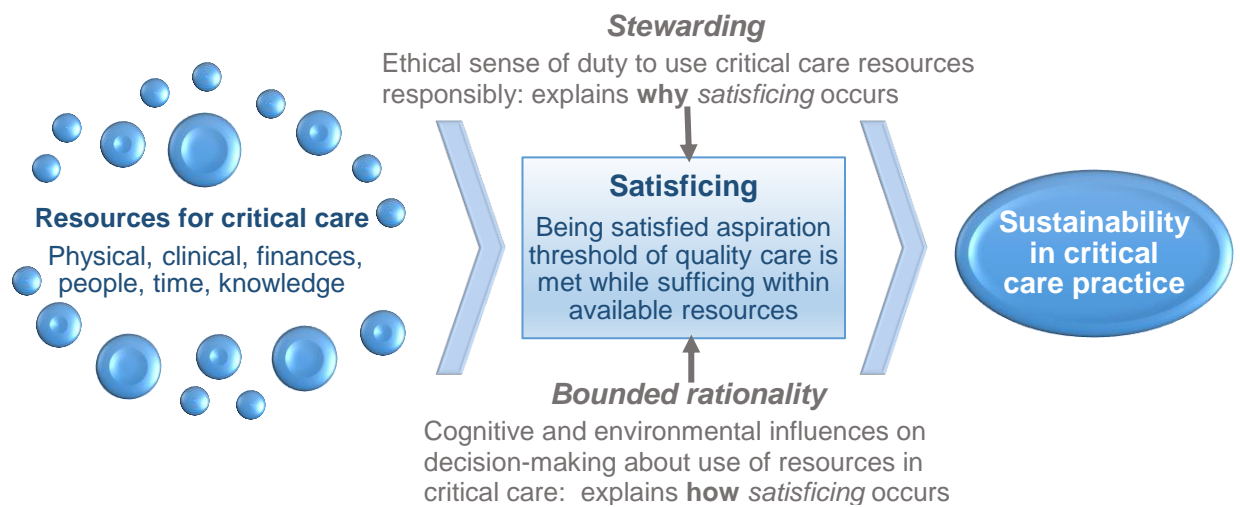


## 5.6 Summary

The Findings Chapter presented verbatim text from participants and researcher memos to reveal data generated from interviewing eleven practitioners working in critical care. The data showed how practitioners in critical care constructed the concept of sustainability. *Satisficing* also emerged as the central social process leading to sustainability in critical care practice. Data about influencing factors on resource decisions allowed *bounded rationality* to surface as an explanation for ‘how’ practitioners satisfice. Data about an altruistic ethical sense of responsibility

to use resources appropriately led to the concept of *stewarding* as a major category to explain 'why' practitioners satisfice. Although terminology was borrowed to articulate the substantive theory, the Findings Chapter has 'grounded' the theory in the data in keeping with constructivist grounded theory methods. Figure 16 illustrates an overview of the substantive theory about sustainability in critical care practice.

Figure 16 –Theory of sustainability in critical care practice





## Chapter 6 Discussion

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### 6.1 Introduction

The previous chapter presented the findings from interviewing the participants about their perspectives on sustainability in critical care practice. Emerging from the data was a possible explanation for how practitioners in critical care construct the concept of sustainability, as well as the social processes involved in sustainability becoming a part of critical care practice. Chapter 6 will now synthesise the analysis of this explanation into a new substantive theory which illuminated what sustainability meant to practitioners working in critical care and explained how *satisficing* was a core, central process required for critical care practice to be sustainable. The theory also integrated two other significant concepts, namely *bounded rationality* and *stewarding*. The explanatory substantive theory will cross-reference the findings in Chapter 5 to demonstrate it was grounded in the data and show sufficient evidence to defend this new theory.

Previously, Chapter 2 offered a review of the literature about sustainability in critical care practice, but with the intention of demonstrating a gap in the knowledge base to justify the need for the research. The overview of literature in Chapter 2 laid the scene for the study, showed how theoretical sensitivity was initially developed and led to the formulation of the research questions. Chapter 6 continues with a more detailed and focused exploration of theoretically sampled literature to situate the new theory amongst existing literature about sustainability, *satisficing*, *stewarding* and *bounded rationality*. Debating the significance of the theory within the context of established literature refines the concept of sustainability to critical care practice and explains a new understanding of relevant social processes. Chapter 6 will, therefore, rationalise how the substantive theory produced from this research study contributes to new knowledge.

## 6.2 The substantive theory

Sustainability of critical care practice means being able to sustain the resources needed for critical care practice indefinitely, into the future, including physical resources, clinical supplies, finances, people, time and knowledge. Financial sustainability occurs when the money available for critical care is sufficient to sustain critical care services economically, and environmental sustainability involves using equipment and clinical supplies in a way which has a minimal ecological impact. Social sustainability occurs when resource use meets the social needs of patients, families and staff. Social sustainability involves the human factors aspects of critical care practice and includes fostering agility, durability and resiliency in the critical care team as a 'people resource'. Job fulfilment can then prevent staff burnout.

Some practitioners in critical care show an awareness of all three domains of sustainability (financial, environmental and social), while others find meaning in only one or two types. The three areas of sustainability are interlinked and interdependent across the range of systems within and around critical care practice. These systems include the patient (physiological, psychological and social self), the people and equipment within each bed-space, the critical care staff, the critical care unit itself, the hospital and Trust, the NHS as an organisation, society which the NHS serves and the ecosphere. Different contexts and situations also influence practitioners' views on which type of sustainability should be focused on at any given time, with competing interests arising because achieving sustainability in one domain may cause another to be unsustainable. The concept of sustainability can be perceived to have a negative connotation for some people, and others are unclear on what sustainability means to them in relation to critical care practice. The main concern practitioners in critical care have concerning sustainability is that current resource use is not sustainable for the future.

The sustainability of critical care practice depends on decisions about if, when and how resources are used across the various micro, meso and macro systems of practice. The complexity of critical illness and current clinical guidelines, protocols

and policies lead to large amounts of resources utilised from the numerous investigations, monitoring and treatments for each critically ill patient. Resource use in one system can also have broader implications across other micro, meso and macro systems of critical care practice. Therefore, a holistic approach, recognising the inter-connectedness of relevant systems, is required to achieve sustainability.

The term *satisficing* (satisfy + suffice) refers to a reasoning approach where a decision maker sets an aim, but it is not feasible to try out every single action which could be done to reach that goal (Simon 1997a). In '*satisficing*', various actions are performed until the person making the decision is satisfied that the *aspiration level* for the aim was sufficiently achieved, and no further efforts are needed. As a social process leading to sustainability in critical care practice, *satisficing* explains how decision-making about resources involves being satisfied criteria for quality critical care have been met while sufficing with available resources. Increased *satisficing*, while making decisions about financial, social and environmental resources, will strengthen the level of sustainability within critical care practice. Satisficing developed within normative, responsible and sustainable stages helps to achieve full sustainability as *flourishing* critical care.

The current context of critical care units prevents practitioners from being satisfied they are sufficiently reaching a *good enough* standard of quality care while making decisions about using resources. The lack of *satisficing* then causes practitioners to experience personal tension, frustration and concern about staying within the limits of financial, environmental and social resources into the future. Further issues also come from difficulties in reaching a consensus on what the *aspiration threshold* is for resource decisions because of *translational* and differing views. The criteria for quality care within the *aspiration threshold* is then negotiated within shared, multi-agent decision-making. The extent of *satisficing* moves along a continuum, depending on the level of certainty, risk and deliberation cost of exploring other choice options.

A decision maker's cognition and environment influence the reasoning process, and it is this *bounded rationality* which explains how *satisficing* occurs (Simon

1997b). A variety of contexts and conditions shape cognitive functioning and the environment within critical care. The pertinent factors impacting on resource decisions in critical care practice include:

- Social norms, culture, values and beliefs.
- Technical and non-technical knowledge and skills.
- Previous experience of the practitioner and colleagues.
- Resource availability.
- Uncertainty and high risk
- Standardised approaches to practice.

This explanatory theory about sustainability in critical care practice centres around *satisficing*, but another significantly contributing social process is that of *stewarding*. As an ethic, stewardship is taking responsibility to conscientiously plan, manage and safeguard resources and *stewarding* represents the actions involved in conducting stewardship (Cirillo 2014). *Stewarding* surfaces in the altruistic sense of duty practitioners in critical care have to use resources responsibly driven by these contributing factors:

- Critical care being a resource intensive service.
- Imbalanced supply and demand of resources.
- Excessive use of resources.
- Waste issues.

The process of *stewarding* in critical care includes: 1) *patient centred care* by respecting the patient as a holistic person during decision-making; 2) *lean thinking* to avoid excessive waste of resources throughout the resource cycle of procurement, consumption, recycling and physical waste management; and, 3) *slow healthcare* by taking time to ensure resources are used appropriately following the Goldilocks principle of 'just enough'. This ethical sense of responsibility brings practitioners to suffice with available resources, feel satisfied with the achievement of quality care and ensure resources do not deplete for the future. Thus, the process of *stewarding* explains why practitioners enact *satisficing* while promoting sustainability in critical care practice.

In summary, sustainability becomes a part of critical care practice if financial, environmental and social resource use is *good enough* to meet an *aspiration threshold* of quality care, but stays within the limits of available resources. *Satisficing* (being satisfied and sufficing) is the central social process leading to sustainability in critical care practice with *bounded rationality* capturing the influencing factors on how *satisficing* occurs and *stewarding* explaining why *satisficing* happens. Increased *satisficing* strengthens the level of sustainability from normative, responsible and sustainable stages into flourishing critical care. Practitioners feel full sustainability through flourishing practice is not achieved at present because *satisficing* is lacking in decisions about financial, environmental and social resources across the micro, meso and macro systems of critical care.

### 6.3 Situating the theory – sustainability

The substantive theory is now contrasted with existing literature to reveal how this new theory challenges, contributes to and extends current knowledge. The critical evaluation to situate the substantive theory amongst extant literature begins with the definition of sustainability in critical care practice, and the meaning people working in critical care have for financial, environmental and social sustainability. Sustaining the critical care team is then discussed followed by an analysis of the relevance of systems theory literature.



### 6.3.1 Sustainability in critical care definition

The participants' construction of sustainability in critical care practice, based on maintaining financial, environmental and social resources into the future, mirrored the seminal sustainability definition from the *Brundtland Report* (World Commission on Environment and Development 1987). Parallels also existed with the well-established *triple bottom line* business framework which promoted environmental responsibility and social consciousness as co-benefits alongside fiscal profits (Elkington 1999; Savitz 2013). Sustainability, as an accumulation of these three properties, was therefore not a unique explanation. The substantive theory was then another example of sustainability as a synthesis of financial, environmental and social components, but it was novel in its application to the context of critical care. As already identified in Chapter 2, the introductory literature search did not find a definition of sustainability in critical care practice. The integrative literature search conducted towards the end of the research confirmed the absence of a published definition. The substantive theory thereby addressed this gap in the literature base by making an original contribution of new knowledge in presenting a definition of sustainability in critical care practice.

### 6.3.2 Sustaining the critical care team

This section will now focus on sustaining the critical care team as the 'people resource' required for the delivery of critical care practice. Much like patients and families, staff members are human beings with physical, psychological and social aspects of their working lives. Participants viewed job satisfaction as a prerequisite for sustaining the people within a critical care team, with different types of staff fulfilment seen in the findings on page 114. There is some commonality here with Maslow's Hierarchy of Needs (Maslow and Frager 1987), which is a scale of human needs ranging from physiological to self-actualisation. However, the participants did not rate different sorts of job satisfaction on a scale, and not all aspects of Maslow's theory related to the data.

The data from this study (pages 110-111) matched the literature's recognition that burnout occurred if the human needs of the critical care team were not met, leading to workforce shortages from poor staff retention (pages 113 and 114). The

literature defined burnout as emotional exhaustion, depersonalisation, cynicism and perceived lack of personal accomplishment (Alharbi et al., 2016; Dyrbye et al., 2017; Guntupalli et al., 2014; Malaquin et al., 2017; Mion et al., 2017). The literature also linked burnout with compassion fatigue and moral distress, which in turn brought low morale and post-traumatic stress disorder of staff (Henrich et al., 2016; Henrich et al., 2017; Sacco et al., 2015; Mealer 2017). Further adverse outcomes, which the literature associated with a lack of job fulfilment in critical care, included: poor quality care, increased medical errors and near-misses, reduced satisfaction of patients and families and higher financial cost (Breau and Réaume 2014; Dodek et al., 2016; Dyo, Kalowes and Devries 2016; Dyrbye et al., 2017; Guntupalli et al., 2014; Moss and Good 2016; Stalpers et al., 2017). Finally, both the data and literature indicated potential causes of burnout in critical care were staffing issues, difficulties with patient flow (admissions and discharges), poor end-of-life care, ethical dilemmas about withholding or withdrawing treatment and perceived excessive care (Choe, Kang and Park 2015; Kompanje, Piers and Benoit 2013; Lusignani et al., 2016; Piers et al., 2011; Piers et al., 2014).

Strategies to prevent burnout by promoting the retention of fulfilled practitioners were also similar between the data (pages 114, 124 and 135) and the literature. These strategies included professional development opportunities (Goldsworthy 2015), mindfulness (Gracia-Gracia and Oliván-Blázquez 2017; Pattison 2017), supportive end-of-life care (Wilde, Worster and Oxman 2016) and maintaining a positive work-life balance (Pattison 2017; Wong and Olusanya 2017). Similar to the concept of 'flourishing' practice in this study's data, Jackson's (2015) grounded theory about burnout and resilience in critical care nursing revealed 'thriving' nurses loved their jobs and passionately engaged in their roles (Jackson et al., 2018). The substantive theory thus added to the growing body of literature about the importance of fostering job fulfilment in critical care. One notable, unique difference though was how the substantive theory recommended *satisficing* (see Section 6.4) within topics affecting staff well-being to help sustain *people resources* within critical care teams. Another difference was how this research study was not solely focused on retaining fulfilled staff members, which was just one aspect emerging as a significant theme related to sustainability.

In addition to job fulfilment, sustaining the critical care team required practitioners to have the capacity to work in highly stressful, dynamic and demanding situations. The findings on page 112 noted the personal attributes that helped practitioners to sustain themselves as the 'people resource' within such a challenging workplace. These personal qualities included the ability to move quickly, adapt to change and transform (agility). They also needed strength and hardiness to tolerate and endure mental, emotional and physical pressure (durability). Finally, practitioners had to bounce back and recover from stressful situations (resiliency). The term 'durability' was absent in the literature concerning sustaining healthcare practitioners. Although 'agility' and 'resiliency' were both recognised by Pipe et al. (2012) as promoting coping and enhancing well-being in general, the critical care literature did not connect these two concepts. What was more extensive in the extant literature was 'resiliency' on its own in general healthcare (Hart et al., 2016; McCann et al., 2013), as well as emotional resiliency specific to critical care (Arrogante and Aparicio-Zaldivar 2017; Chapman 2013; Jackson 2015; Scholes 2013). There were no publications about all three concepts which brought further originality to the substantive theory. 'Agility', 'durability' and 'resiliency' can seem contradictory with an example being if someone had such strength in being durable, they may not be agile and flexible enough to allow for change. However, the data on page 112 suggested these practitioner attributes are needed for different things and would complement, rather than compete, with each other.

### 6.3.3 Systems and interconnectivity

The substantive theory highlighted the inter-related micro, meso and macro systems which emerged from the data, as illustrated in Figure 12 on page 120. A system can have an effect on other systems within or around it; therefore, a change in one has a ripple effect throughout the others and the meta-system as a whole (Dekkers 2017). General systems theory defines 'wholeness' as a collection of systems which are "*sets of elements standing in interrelation*" (von Bertalanffy 1969, 38). The inter-connectivity of systems is also expressed in Wall's (2002) 'waterbed theory' of linguistic complexity (Maser 2013; Randal, Sugalski and Tötsch 2004). The analogy of pushing down in one area of a waterbed causing another section to rise seems to be related to the *knock-on*



*effect* discussed by participants (pages 100, 118 and 153) where resource pressure in one system significantly impacted on another. The participants' demonstrated 'systems thinking' in their awareness of the *knock-on effect* and the relationships between financial, environmental and social resource use (page 117). 'Systems thinking', also known as 'joined-up thinking' or 'linking thinking', is emphasised by sustainability literature as necessary because of these strong inter-connections between different types of resources (Meadows and Wright 2009; Sterling et al., 2005; Sterling 2011).

The integrative literature search did not reveal a specific systems-based definition of critical care practice according to the sub-components presented in of the substantive theory. Nevertheless, a similar description underpinned by systems theory was found:

*"The ICU is a typical example of a complex adaptive system where collections of interacting components (genome, cells, organ systems, patient, family member, providers, hospitals) react to environments and other agents across different hierarchical level"* (Dong et al., 2012, 2).

The *Guidelines for the Provision of Intensive Care Services* (GPICS) also recognised systems internal to critical care practice in the UK and referred to external hospital and NHS healthcare systems (Faculty of Intensive Care Medicine and Intensive Care Society Joint Standards Committee 2016). The GPICS thereby implied the relevance of systems theory, but it did not explicitly map out the inter-connectivity of the micro, meso and macro systems illustrated in the thesis.

Literature was also found about systems of specific aspects of critical care practice. Examples included a microsystem model in neonatal intensive care unit (el Helou et al., 2017), systems biology in critical care nursing (Schallom, Thimmesch and Pierce 2011), family systems in critical care (Leon and Knapp 2008; Kean 2007), the variety of systems related to intensive care survivorship (Kean et al., 2017) and sepsis viewed from the perspective of complex systems theory (Mann-Salinas, Engebretson and Batchinsky 2013). Additionally, systems theory literature about other types of healthcare practice existed which was not specific to critical care (Gerst 2013; Jenko and Short 2016; Trbovich 2014; Stalter

et al., 2017). Thus, the substantive theory was not entirely new in using systems theory to describe the various layers in healthcare, but it did provide a fresh perspective on a systems-based model of critical care practice within NHS hospitals in England.

**Thesis Summary Point 1** consolidates the vital elements of this Section about the meaning of sustainability in critical care practice based on different types of resources and the significance of inter-connected systems.

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### **Thesis Summary Point 1 – Sustainability in critical care practice meaning**

Sustaining critical care practice includes maintaining the following resource types without impeding their future availability:

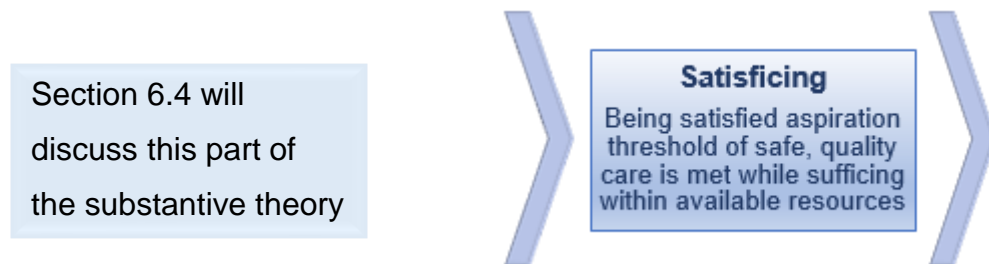
- Financial resources – economic funding of critical care services to adequately meet patient demand.
- Environmental resources – consumption of physical resources with minimal harm to the ecosphere.
- Social resources – holistic care provision including meeting the psychosocial needs of patients and families. Practitioners in critical care also achieve job fulfilment using resilience, durability and agility to prevent burnout, compassion fatigue and moral distress.

Sustainability is enhanced through joined-up thinking because there is a *knock-on effect* while using different types of resources across the inter-connected micro, meso and macro systems of critical care practice.

## **6.4 Situating the theory – *satisficing***

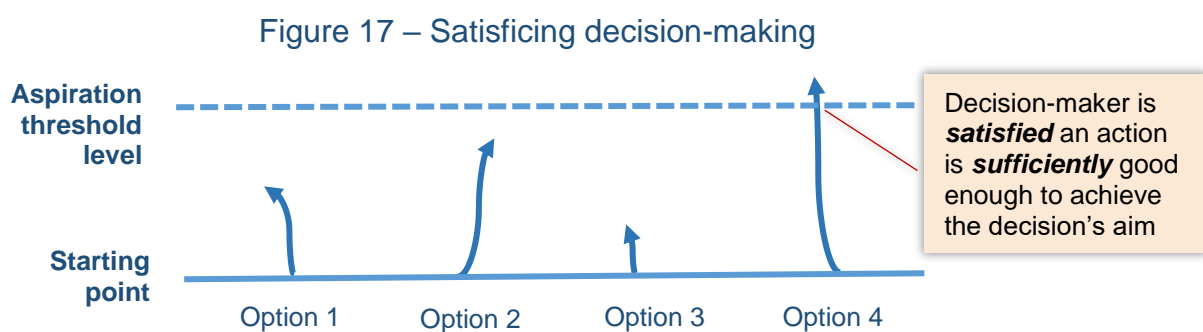
The previous section compared the definition of sustainability in critical care practice (as co-constructed by the participants of this study and the researcher) with existing sustainability literature as well with systems theory. Section 6.4 will now examine established publications about the concept of *satisficing*, which was the central organising phenomenon within the substantive theory about sustainability in critical care practice. *Satisficing* theory within extant literature from economic origins will first be discussed, along with other more recent

applications. An analysis of how *satisficing* enables sustainability follows, as well as discussion about *satisficing's* relationship with clinical reasoning and the specific relevance of *satisficing* applied to critical care practice.



### 6.4.1 Economic origins of satisficing and other applications

The concept of *satisficing* originated in economics literature from Simon (1955, 1957) who proposed the term as a portmanteau of to 'satisfy' and 'suffice'. Simon recognised decision makers in business satisfice while choosing an action that is good enough to reach the aspiration level of an aim. The *aspiration threshold* represents the minimum criteria to be fulfilled for the decision maker to feel satisfied the goal has sufficiently been attained (Stirling 2016). *Satisficing* is when the decision maker accepts the first action which is good enough to meet the *aspiration threshold* and concludes it is no longer necessary to take any further steps, as illustrated in Figure 17 (Simon 1990).



Options 1-3 did not reach the set *aspiration threshold* of what the decision-maker tried to achieve. Option 4 reached this goal and the decision maker then perceived no further deliberation was required to explore other alternatives. Figure 17 was adapted from Ronen, Pliskin and Pass (2006).

Simon (1990, 7) recognised *satisficing* occurs because memory is not infinite and internal and external factors constrain reasoning processes:

*“Human rational behaviour (and the rational behaviour of all physical symbol systems) is shaped by a scissors whose two blades are the structure of task environments and the computational capabilities of the actor.”*

Rationality is, therefore, bound to the decision maker’s cognition and the context of the setting and situation. *Bounded rationality*, as a concept, is intrinsically embedded as a feature of *satisficing*. It accounts for the limitations placed on the decision-making process including cognitive ability, time, available information, tractability and other influences from the surrounding environment (Simon 1997b). *Bounded rationality* was apparent in the data, with examples presented in Section 5.4 that showed significant influences on resource decisions which impacted on sustainability. Further comparison of the theory with literature specific to *aspiration threshold* will continue in Section 6.4.4 along with more a detailed discussion of *bounded rationality* related to social processes in Section 6.5.

The opposite of *satisficing* is ‘maximising’, which involves the decision maker undertaking an exhaustive consideration of all possible actions before choosing how to reach an *aspiration threshold* (Simon 1997a). In business, maximising may not be economically sound if there is a shortage of money, time and effort available to try out every possible action to meet the *aspiration threshold* goal or it is not feasible from being too complicated (Van Vliet 2017). *Satisficing*, in comparison to maximising, then offers a more efficient way of augmenting profits and may be required for complex business situations limited by time and capability (Crandall and Crandall 2014). The business literature discussed *satisficing* and maximising from the perspective of consumer decision-making (Broniarczyk and Griffin 2014; East et al., 2017; Gilovich, Kumar and Jampol 2015). Once an item meets the specifically desired criteria (e.g. quality, price, size or location), *satisficing* involves buying it without shopping any further, whereas someone maximising would review every possible item before purchasing (Weaver et al., 2015). Regardless of the context of the decision maker being a business person or a consumer, fundamentally there is a process of someone gathering information and determining if, when and how to act upon these cues. This type of reasoning

process emerged from the data of this study (Section 5.3.1) which is why terms and concepts from economic literature about *satisficing* articulated the substantive theory about sustainability in critical care practice.

*Satisficing* and maximising can both achieve the *aspiration threshold*; however, maximising requires more resources. Conversely, a *satisficing* approach potentially misses a more optimal result, and some people may view an *aspiration threshold* of 'just' satisfactory to be sub-optimal. The economics literature did not explicitly support *satisficing* as better or worse than maximising overall. Instead, it suggested some business decisions are more suited to a *satisficing* approach for increased efficiency and feasibility to improve profitability (Lussier 2015). Other very high-risk choices may serve better through maximising to ensure the most optimum result is found assuming there are sufficient resources for such a comprehensive tactic (Lussier 2015).

The data from this study related to the economics literature in how maximising and *satisficing* both occurred in critical care practice, each having a positive role depending on the circumstances. Risky business decisions do not deal with people's lives though, which is a significant difference with economics. The high-risk nature of critical illness with patient death as a possible outcome lends itself towards maximising, as seen with data about erring on the side through *just-in-case practice* (pages 130, 132 and 146). However, the data from this study also concurred with the business literature in that *satisficing* may be preferential and more sustainable compared to maximising for some types of decisions assuming the *aspiration threshold* of quality practice can be assured.

*Satisficing* came from the field of economics, although it has grown into the literature from a variety of other sectors. These included: artificial intelligence (Stirling 2003), game theory (de Almeida et al., 2016; Samuelson 2016), management (McCain 2015; Peters and Zelewski 2016; Tetrault Sirsly 2015), engineering (Gorod, Nguyen and Hallo 2017; Jones, Michelfelder and Nair 2017), disaster recovery (Ben-Haim 2012), internet searching (Mansourian and Ford 2007), philosophy (Byron 2004; Tucker 2017) and survey research (Singleton and Straits 2012). Publications across these different fields were evaluated for

commonality with the substantive theory and there appeared to be the same type of reasoning process according to Simon's (1957) *satisficing* principles with the main difference being the other literature was based in settings other than critical care. This study focused on the context of critical care practice; however, the core principle of sufficient satisfaction of an *aspiration threshold* was the same. The substantive theory, therefore, extended the *satisficing* literature base by providing another research-based new example of *satisficing* applied to a specific setting.

*Satisficing* as a concept was also extensively found in psychology publications, but this literature differed from the substantive theory because it viewed reasoning style as a personality trait impacting on a person's tendency to maximise or satisfice (Cheek and Schwartz 2016; Schwartz et al., 2002). The data from this study did not show people in critical care as psychologically being a 'satisficer' or 'maximiser' based upon their internal characteristics as was the focus in the psychology literature. Influencing factors for the propensity to maximise in critical care practice included the level of experience, the severity of patient acuity and ambiguity of the clinical situation. Another significant difference was how the psychology literature centred on individualistic consequences of a single decision maker. Example outcomes were personal levels of happiness, self-esteem, perfectionism, regret, life satisfaction, and mental well-being (Cheek and Schwartz 2016; Dalal et al., 2015; Hughes and Scholer 2017; Luan and Li 2017; Misuraca et al., 2015; Zhu, Dalal and Hwang 2017). In contrast to the psychology literature's focus on the individual decision maker, this critical care research viewed *satisficing* through a sociological lens that included multi-agent decision-making, and the impact decisions have on other people (patient, family, critical care team and society).

The limitations of the single person decision-making process in Simon's (1957) original theory, addressed in the more contemporary literature about *neo-satisficing*, explained the complex, multi-agent, social relationships involving collaboration, compromise and bargaining (Stirling 2013). *Neo-satisficing* was not meant to replace Simon's theory but was more intended to extend it into group

decision-making by integrating with elements of social choice theory<sup>73</sup> (Stirling and Felin 2016). Underpinning *neo-satisficing* is the recognition that what one person considers to be 'good enough' for a decision outcome may be different than somebody else (Stirling and Felin 2016). Thus, a decision involving multiple people is a non-linear process requiring group negotiation and shared agreement on the decision's *aspiration threshold* criteria for everybody to feel sufficiently satisfied. The data of this study included examples of single-agent decision-making (page 102) and multi-agent decision-making (page 121, 123 and 123). Thus, both Simon's (1957) *satisficing* and Stirling's (2013) *neo-satisficing* variation provided conceptual language to explain the data while formulating the substantive theory about sustainability in critical care practice.

*Neo-satisficing* also drew from the work of pragmatist philosophers William James<sup>74</sup> and Isaac Levi (1983) about the notion that believing something is true does not come from prior evidential proof, but from accepting what is most likely. A pragmatic approach to decision-making then does not focus on finding the optimal, absolute best decision (optimising) through *inter-alternative comparison* (decision options are contrasted against each other to select one perceived as the best). Instead, the aim is to prevent error by ruling out implausible decision choices and collectively accepting the decision option remaining which is 'good enough' for everyone involved to be sufficiently satisfied (Stirling 2016). Furthermore, there is *intra-alternative comparison* while evaluating the benefit (effectiveness) and resource cost (efficiency) of each decision option. *Neo-satisficing's* emphasis on *intra-alternative comparison* reflected the participants' concern with resource cost implications for their decisions. They provided examples of their efforts to be efficient while using financial, environmental and social resources in practice (see pages 102 and 103). Conserving resources appeared necessary for sustainability to happen, but decisions still needed to be effective in achieving quality care for patients and their families. Table 25 on page 172 compares the data about critical

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<sup>73</sup> Social choice theory is a collective rationality process where multiple people aggregate their personal opinions and preferred choices while collaborating on a group consensus on an outcome that is as best as possible for the social welfare of all involved (Arrow 2012).

<sup>74</sup> The *Will to Believe* was an essay first published by William James in 1896 (Dunham 2015).

care practice from this study with Stirling and Felin’s (2016) epistemological and practical perspectives of optimising (maximising) and *neo-satisficing*.

Table 25 – Optimising vs neo-satisficing

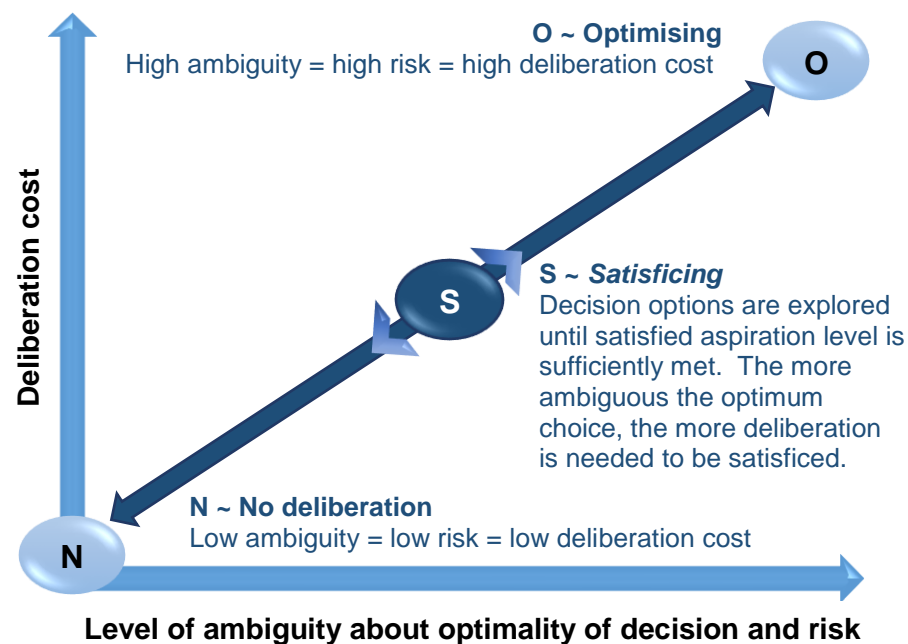
	Knowledge context	Practical context
<b>Optimising definition (Stirling and Felin 2016, 285)</b>	<i>“Demand the truth and nothing but the truth”</i>	<i>“Demand the best and nothing but the best”</i>
<b>Optimising in critical care practice</b>	Practitioners know the absolute true way to achieve effective, high-quality care for critically ill patients optimally.	Practitioners undertake numerous decision options through just-in-case practice while caring for critically ill patients.
<b>Neo-satisficing definition (Stirling and Felin 2016, 285)</b>	<i>“Acquire knowledge while avoiding error”</i>	<i>“Conserve resources while avoiding failure”</i>
<b>Neo-satisficing in critical care practice</b>	Errors are avoided in critical care practice by ruling out improbable decision choices until identifying the option which most likely sufficiently satisfies the mutually agreed aspiration threshold of quality care for that decision.	Intra-alternative comparison prevents failure in critical care practice by considering a decision option’s benefits (effectiveness in providing quality critical care) and efficiency (financial, environmental and social resource costs).

For this study, *satisficing* was used within the substantive theory as an umbrella term to include Simon’s (1957) original concept along with other extensions like *neo-satisficing*. Simon’s explanation of *satisficing* was vague, especially on how to establish and achieve the *aspiration threshold* which has led to various interpretations and applications (Hey, Permana and Rochanahastin 2017). Manski (2017, 155) stated *satisficing* is a “class of decision strategies that a person might use when seeking to optimize in a setting where deliberation is costly.” Although Simon (1957) did not formalise this idea of *costly deliberation*, Manski (2017) proposed it underpins Simon’s *satisficing* process because of the cost involved with considering each option before making a choice. The decision-making model



by Manski (2017) maintained the core principles of Simon's (1957) *satisficing* theory but built on it to provide further explanation about when to satisfice and the implications for *costly deliberation*. The researcher of this study developed Figure 18 (page 173) while comparing the data with Manski's (2017) decision-making model. Figure 18 illustrates how the amount of deliberation in critical care practice depends on how ambiguous and risky a decision choice is. The 'S' (*satisficing*) moved on a continuum, shifting from the 'N' (no deliberation) towards the 'O' (optimising) according to the amount of deliberation before choosing an action. The more ambiguous it was for the practitioner to know the optimal decision choice, the higher the risk which warranted increased deliberation. The practitioner then decided if and how to deliberate while simultaneously selecting a final action to satisfy the aspiration threshold sufficiently.

Figure 18 – Deliberation cost for optimal decision choice



'No deliberation' was seen in the data on pages 121 and 144 when practitioners felt they had no options during circumstances where decisions were pre-determined by management choices based on resource availability. Another example when practitioners did not deliberate was if a protocol, guideline, checklist, care bundle or policy made the decision, rather than identifying a choice

out of different possible options (page 128). There was no deliberation cost in these examples because the practitioner did not use effort or resources while comparing attributes of various decision options with each other. However, practitioners felt the aspiration threshold within some standards like infection prevention and control policy or the use of standards by inexperienced novices led to wasteful practice, which they viewed as unsustainable (pages 107, 108 and 128). A standardised approach to practice did involve a deliberation cost if the practitioner compared options while deciding to follow, reject or adapt the standard (pages 109 and 128).

The previous discussion on page 169 also recognised maximising (optimising) may be needed for some clinical decisions in critical care due to high risk in caring for critically ill patients. In regards to Figure 18 on page 173, this would be optimising (or *satisficing* leaning towards the optimising end of the *satisficing* spectrum) with higher deliberation costs from the numerous investigations and monitoring used to determine the best action. However, the participants of this study also felt that inappropriate *just-in-case* practice led to unsuitable optimising which they perceived as the wasteful and unsustainable use of resources (pages 130, 132 and 146). *Satisficing* as a process which helped sustainability to occur, therefore, involved practitioners deciding how to use resources within an action, as well as the deliberation costs resulting from comparing different action options. Sustainable use of resources in critical care practice comes from *satisficing* with the lowest possible amount of deliberation cost, but still achieving the *aspiration threshold* of quality care. In addition to the time, effort and money required to deliberate between various decision options, practitioners invested emotional labour while deciding on choices for end-of-life care (page 124).

The original *satisficing* definition by Simon (1957), along with the variations of *neo-satisficing* (Stirling 2013) and *costly deliberation* (Manski 2017), explained the central social process in the data. These theories also provided conceptual language to convey sustainability in critical care practice. The integrative literature search (see Appendix 1) did not find any publications integrating Simonian *satisficing*, *neo-satisficing* and *costly deliberation*. The substantive theory's use of *satisficing* encompassing all three of these concepts is then a unique approach

which further extends the *satisficing* literature. The thesis argues it is the integrative perspective of *satisficing*, drawing together Simon, Stirling and Manski's principles, which explains the central social process needed for sustainability in critical care practice, as expressed in Thesis Summary Point 2.

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### Thesis Summary Point 2 – *Satisficing*

*Satisficing* during decision-making about resources usage is the most significant social process leading to sustainability in critical care practice and is an integration of:

- *Simonian satisficing* – practitioner chooses the first action which is good enough to sufficiently fulfil the minimum *aspiration threshold* criteria of what represents quality care for that action.
- *Neo-satisficing* – adjustment of the *aspiration threshold* goal during collaborative multi-agent decision-making amongst the critical care team, patient and family; comparison of details within and between possible options; and decision-making with a focus on conserving resources in critical care practice.
- *Costly deliberation* – practitioner considers the deliberation cost while exploring possible actions for a decision: the higher the risk, the greater the amount of deliberation and associated cost (money, time and emotional labour).

#### 6.4.2 Satisficing and sustainability

Once data analysis revealed *satisficing* had emerged as the central organising phenomenon, the integrative literature search (see Appendix 1) identified publications specific to *satisficing* and sustainability. There were no publications from critical care or any other type of healthcare practice which directly linked together *satisficing* and sustainability as two inter-related concepts. The lack of established literature about *satisficing* being essential for promoting sustainability in critical care practice, therefore, indicated that this thesis is contributing new and original knowledge. *Satisficing*, as a concept on its own, was explicitly referred to in critical care publications and more extensively in general clinical reasoning literature (to be explored further in Section 6.4.3).

The literature linked *satisficing* to promoting sustainability across a variety of other non-critical care contexts with the data from this study compared to it for an analysis of similarities and differences. *Satisficing* and sustainability were frequent in business literature, which was not surprising, considering that *satisficing* theory stems from economic roots. This included literature about corporate social responsibility<sup>75</sup> (Aras and Crowther 2016; Hansen and Schaltegger 2016; Peters and Zelewski 2016; Tetrault Sirsly 2015; Trenado et al., 2014), business modelling (Hoveskog et al., 2018), business innovation (Adams et al., 2012) and business decision-making (Arvai, Campbell-Arvai and Steel 2012). Examples from other non-business domains connecting *satisficing* and sustainability together were literature about international climate change negotiations (Gsothbauer and den Bergh 2013), fisheries conservation (Hicks et al., 2012; Martinet et al., 2016), environmental problem-solving based on viability theory (De Lara, Martinet and Doyen 2015), landowner decision-making (Wagstaff 2015) and design (Cassim 2013). Prominent themes from the business and non-business literature cited in this paragraph are compared to the substantive theory in Table 26.

Table 26 – Satisficing and sustainability literature

Themes	Literature about satisficing and sustainability	Substantive theory
	Grey background to the text in this table shows where there are differences between the substantive theory and established literature about satisficing and sustainability to highlight how the substantive theory is unique and original.	
<b>Satisficing definition</b>	Draws from Simon's (1957) <i>satisficing</i> theory.	Draws from Simon's (1957) <i>satisficing</i> theory, neo- <i>satisficing</i> (Stirling 2016) and costly deliberation (Manski 2017).
<b>Sustainability definition</b>	Sustaining environmental, social and financial resources for various practices (e.g. business, fishing, farming, designing products) and the purpose depends on the	Sustaining environmental, social and financial resources for critical care practice with a purpose of promoting health and holistic well-being of critical care patients and their

<sup>75</sup> Corporate social responsibility is an ethic for businesses to be accountable to society and the environment through philanthropic activities, self-regulation of their societal and ecologic impact, sustainability initiatives, governance and corporate citizenship (Aluchna 2017)

	context. Level of sustainability exists along a continuum from normative practice to flourishing with an outside-in viewpoint and focus on value creation.	families. Level of sustainability exists along a continuum from normative practice to flourishing with an inside-out viewpoint from patient centred care.
<b>Aspiration level of decisions about resources</b>	Businesses aim for financial profit although there may be overlapping social and environmental drivers influencing decision goals. Criteria for the aspiration level of judgements within non-business domains relate to the context of each setting.	The primary purpose of critical care practice is not financially driven. The minimum criteria for the aspiration level of decisions about resources are satisfaction and sufficiency that quality critical care has been achieved.
<b>Risks and certainty during decision-making about resources</b>	Decision-making about resources is context specific which may or may not involve risk depending on the nature of the decision outcome and the level of certainty about whether a decision option satisfies or not. Examples of risk for an adverse decision outcome from different contexts include financial loss, depletion of natural resources and damage to the ecosystem and public health. A high degree of uncertainty exists when there is ambiguity about the ability of a decision option to satisfy.	Decision-making about resources in critical care practice involves risk which depends on the severity of patient acuity and amount of certainty about if the decision option sufficiently achieves quality care. A high degree of risk comes from critical care patients having life-threatening conditions and death being a potential patient outcome of a decision option. A high degree of uncertainty exists when there is ambiguity about the ability of a decision option to satisfy.
<b>Resource availability</b>	Resources are finite and current practice is depleting resources. Changes to resource use is required for sustainability to occur. <i>Satisficing</i> improves efficiency and reduces waste which safeguards resources for the future thereby fostering sustainability.	

The business literature also examined *satisficing* while challenging the traditional view of sustainability. For example, Aras and Crowther (2016) suggested the *Brundtland Report* (World Commission on Environment and Development 1987)

and *triple bottom line* thinking (Elkington 1999; Savitz 2013) do not go far enough and are misguided by focusing concern on the wrong issues. To respond, Aras and Crowther (2016, 109) have proposed a new business model which builds on the sequence of profit, success and sustainability before achieving *durability* which they claim is stronger and more robust than sustainability:

*“Durability must involve greater efficiency in the use of resources and greater equity in the distribution of the effects of corporate activity....efficiency needs to be redefined to prioritize the efficient use of environmental resources rather than the efficient use of financial resources, and equity requires as a minimum the satisficing of all stakeholders, and not merely the provision of returns to owners and investors.”*

Some aspects of Aras and Crowther’s (2016) definition of *durability* corresponded with the substantive theory including referring to resource efficiency and *satisficing* across multiple decision makers (likened to *neo-satisficing*). However, these two main principles of their *durability* model did not fully appear in the research data: 1) the emphasis on ‘greater efficiency’ (more than simply sustaining resources into the future) which generates resource to reinvest back into the business and society; and, 2) the equitable distribution of positive gains across everyone involved with the business activity. A notably dissimilar perspective of the *durability* model was evident in the data, but as an attribute within sustainability rather than something to be built on and surpassed. The substantive theory, therefore, applied *satisficing* and *durability* differently compared to Aras and Crowther’s (2016) despite sharing a small amount of commonality with the subtopic of *satisficing* in multi-agent decision-making. Furthermore, the concept of *durability* was used in the substantive theory as a personal attribute of people in the critical care team, whereas Aras and Crowther considered it for the business as a whole.

Dyllick and Muff (2016, 166) also discussed “*creating value for the common good*”, achieved by flipping the business view from being inside-out to outside-in and focusing on the needs of society first as indicated in their business sustainability typology:

- *Business-as-usual* – inside-out view; financial concerns only.

- *Business Sustainability 1.0* – inside-out view; move from just economic concerns to increased concern for financial, environmental and social issues.
- *Business Sustainability 2.0* – inside-out view; a broadened value of the business for more comprehensive concern for the *triple bottom line* of people, planet and profit.
- *Business Sustainability 3.0* – outside-in view starting with society's sustainability challenges; value creation is for the common good.

*Value creation* within *Business Sustainability 3.0* was comparable to the aim of *greater efficiency* in Aras and Crowther's (2016) *durability* model by extending business practice into new resource generation. Within the context of critical care, resource value from conducting the practice would need to be increased in some way, and that concept did not emerge from the data. Critical care units in the NHS are not intended to be profit-making, therefore, it would be inappropriate for them to try and generate financial resources as a by-product of caring for patients. Some participants were aware of energy recovery from incineration and autoclaving procedures, which indicated energy recovery has the potential for *value creation*; but, this was not something they had seen happen in their own practice in NHS England (page 107). Overall, *value creation* in *Business Sustainability 3.0* (Dyllick and Muff 2016) and *greater efficiency* from Aras and Crowther's (2016) *durability* definition were not comprehensively evident within the data. However, there were elements of the outside-in view which were analogous to participants *seeing the bigger picture* (pages 106,116 and 141) despite the participants generally being more inside-out in their practice from patient centred care (page 122). Having an awareness of meso and macro systems relevant to critical care, also allowed participants to evaluate how their practice impacted on broader financial, environmental and social sustainability issues.

A business sustainability model by Hoveskog et al. (2018, 3) developed "*enterprise goals aimed at satisficing various financial, social and environmental objectives.*" By emphasising *satisficing* as a significant process for sustainability, Hoveskog et al.'s (2018) adaption of Dyllick and Muff's (2016) classification system was much more relatable to the substantive theory (see Table 27 on page

180 for a summarised version). In Hoveskog et al.'s (2018) model, a business can become responsible and then sustainable through increased *satisficing* while meeting financial, environmental and social objectives. The final stage also draws in the definition of *flourishing* (Ehrenfeld and Hoffman 2013; Laszlo et al., 2012) to become *strongly sustainable* and *future-fit* (Kurucz et al., 2017; Upward and Jones 2016).

Table 27 – Satisficing for business sustainability

Satisficing within financial, social and environmental objectives		
This is a summary of Hoveskog et al.'s (2018) model of enterprise goals		
<b>Profit – normative</b>	Do well Profit prioritisation	Business-as-usual (Dyllick and Muff 2016)
<b>Responsible business</b>	Do well <i>while</i> doing less harm Corporate social responsibility	Business 1.0 and 2.0 (Dyllick and Muff 2016)
<b>Sustainable development</b>	Do well <i>and</i> do (some) good Eco-efficiency	Business 3.0 (Dyllick and Muff 2016)
<b>Flourishing</b>	Do good <i>to</i> do well Eco-effectiveness	Strongly sustainable and future-fit business (Kurucz et al., 2017; Upward and Jones 2016), flourishing (Laszlo et al., 2012)

To express the stages involved in developing full sustainability in critical care practice, the substantive theory borrowed terminology from Hoveskog et al.'s (2018) model of satisficing and business enterprise goals. This study's data related to Hoveskog et al.'s (2018) model because the process of satisficing facilitated practice to progress through a continuum's of normative, responsible, sustainable and *flourishing* stages. The Hoveskog model's principles resonated with the data enough to use as the conceptual architecture for building a continuum of *satisficing* and sustainability in critical care. However, the satisficing and sustainability continuum in the substantive theory was unique in the contextual details within each stage. There was no other literature found about the level of sustainability in critical care practice scaling up into *flourishing* through increased



*satisficing*. Something else which was entirely different between the substantive theory and Hoveskog et al.'s (2018) model, Dyllick and Muff's (2016) *Sustainability 3.0* and Aras and Crowther's (2016) *durability*, was how all three of those business approaches idealised an outside-in viewpoint. An outside-in tactic starts with the needs of the world and society (macro systems) and the surrounding meso systems which the business then aims to fulfil. In contrast, the participants of this study spoke about the opposite approach, because they intended to be patient centred with the patient's needs prioritised first and foremost. Sustainability in critical care practice thus took an inside-out perspective beginning with *satisficing* about resources related to direct patient care at the heart of the normative practice of micro systems. Full sustainability (progressing on to achieve responsible, sustainable and flourishing stages) then developed from increased *satisficing* across the meso and macro systems of critical care practice.

Literature about *satisficing* and sustainability with an outside-in viewpoint included conservation publications, although their primary goal was to sustain something for the good of society or the ecosphere (Gsothbauer and den Bergh 2013; Hicks et al., 2012; Martinet et al., 2016). It could be argued critical care practice also contributes back to society by enabling the health and well-being of patients with critical illness or injury and their families. There is also the potential, as indicated in the sustainable and flourishing types of critical care practice (see Table 22 on page 138), for the critical care team patients and families to participate in research, audit, education and public health initiatives benefiting from the expertise of stakeholders in critical care. Even if the environmental and social philanthropy of *Sustainability 3.0* and *flourishing* business motivate companies, sustainability brings financial gains from decreasing waste, increasing efficiency and advertising to others that the organisation is environmentally and socially responsible (Zokaei et al., 2013). Comparably, external recognition of the level of sustainability achieved in a critical care unit could also be beneficial if reporting resource use, and savings, to senior/executive managers in the hospital, other units within a network and national groups (e.g. to the Care Quality Commission).

**Thesis Summary Point 3** concludes Section 6.4.2 by encapsulating essential elements of how the substantive theory was novel and unique when situated

amongst literature about *satisficing* and sustainability. The discussion will continue with an evaluation of how the theory compares to publications regarding *satisficing* as a form of clinical reasoning in healthcare practice.

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### Thesis Summary Point 3 – Sustainability as a continuum

Sustainability in critical care practice exists along a continuum:

- The level of sustainability is strengthened through increased *satisficing* while making decisions about financial, environmental and social resources.
- Normative, responsible, sustainable and flourishing stages exist with each one building on the next to achieve *full sustainability*.
- An inside-out viewpoint begins with patient centred care and moves outwards while *satisficing* with resource use on the micro, meso and macro systems of critical care practice.

#### 6.4.3 Satisficing and clinical reasoning in critical care

Previously, Section 6.4.2 situated the new substantive theory produced from this research against general *satisficing* literature as well as that about both *satisficing* and sustainability. Section 6.4.2 established *satisficing* as a social process and discussed how *satisficing* within resource decision-making leads to sustainability. In the findings, people made decisions throughout the various systems of critical care practice, including micro systems (patient, family and critical care team), meso systems (other people within the hospital, Trust and critical care network) and macro systems (NHS and society at large). However, most of the examples given by the participants of this study related to clinical decisions about resources for direct patient care (micro systems). Some decision-making in the data focused on the procurement of supplies, staffing, waste management or decisions made by the technician whose role does not include direct patient care. The integrative literature search did not identify publications about *satisficing* and these types of decisions illustrating the originality of this study. Moreover, the literature search only found four articles from the past five years about practitioners in critical care *satisficing* within their clinical reasoning. Using an unlimited date period just revealed three other papers about *satisficing* in critical care which all still appeared

relevant. There was, however, an abundance of clinical reasoning research about patient-based judgements throughout all kinds of healthcare practice and that specific to critical care. By positioning the study's findings amongst extant literature about *satisficing* and clinical reasoning, some similarities will be seen. Salient differences will also be noticeable showing prominent ways the substantive theory uniquely contributes new knowledge about clinical reasoning in critical care.

Clinical reasoning was defined in the literature as a cognitive process where a healthcare practitioner collected patient information, judged these assessment cues and used critical thinking skills to make decisions for diagnosis or therapy (Alfaro-LeFevre 2017; Carvalho, Oliveira-Kumakura and Morais 2017). It would take a considerable amount of time and effort to assess a patient situation for every possible piece of clinical data and all potential diagnoses or actions. Heuristics are mental shortcuts which speed up the gathering of clinical assessment information and decision-making (Marewski and Gigerenzer 2012). *Satisficing*, known in the literature as a 'fast-and-frugal' heuristic, quickened the decision-making process by efficiently cutting down the amount of time and cognitive effort required (Hafenbrädl et al., 2016). Drawing on the definition of *satisficing* used within the substantive theory and already explained in Section 6.4.2, practitioners in critical care who satisficed during clinical reasoning set an aspiration level for the minimum criteria to be achieved for a patient's clinical circumstances. Clinical assessment information and deliberation of possible options for a decision about further investigations, diagnoses or therapeutic actions continued until a decision choice sufficiently satisfied the aspiration level criteria (Croskerry and Nimmo 2011).

This study's findings revealed how the context of clinical reasoning in critical care practice involved making judgements for patients who have life-threatening critical illness or injury. As such, participants referred to decision-making about using resources in their clinical practice as complicated, stressful, time-pressured and unclear at times regarding what the right decision to make is, especially from the perspective of novices (pages 127 and 130). Knowledge fatigue was another relevant factor with practitioners finding it challenging to keep up with the volume of new information, as well as the cognitive effort required to scrutinise its quality

(page 114). The literature supported this data about the difficulties practitioners in critical care face during clinical reasoning because, in addition to being highly complex, critical care is “*information intensive, time-sensitive, highly stressful, non-deterministic, interruption-laden, and life-critical*” (Payne and Patel 2014, 203).

The *Critical Care Heuristic and Bias Framework* explained clinical reasoning during the three main steps of caring for a critically ill patient: 1) immediate need assessment, 2) addressing the problem and 3) patient management (Payne and Patel 2014). This framework recognised that *search satisficing* was a negative consequence if cognitive bias led to ‘premature closure’ of the decision-making process and missed out a key choice. One way Payne and Patel’s (2014) framework differed from the substantive theory was how it only referred to *satisficing* during the second step of their framework, whereas the data from this research study demonstrated *satisficing* in decisions throughout critical care practice (Section 5.3). Another difference was how Payne and Patel (2014) did not emphasise the potential benefit of *satisficing* in critical care clinical reasoning as leading to sustainability. The data mainly suggested *satisficing* added feasibility and efficiency, although *search satisficing* surfaced in the findings on page 152. This data recognised rushing into choosing the first ‘reasonable’ option which was later found to be the wrong decision wasted time and physical resources. Inappropriate *search satisficing* related to *Type 1* thinking<sup>76</sup> for decisions made too quickly resulting in clinical errors while diagnosing and planning clinical actions (Bate et al., 2012; Cooper and Frain 2016). Therefore, despite the advantages of simplifying and speeding up the clinical decision-making process, *satisficing* had potential disadvantages, particularly with a high degree of uncertainty and if intuitive *Type 1* thinking created bias (Croskerry, Singhal and Mamede 2013).

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<sup>76</sup> *Type 1* thinking occurs subconsciously in a fast, automatic and emotional manner in contrast to *Type 2* which is slow, logical, analytical and takes purposeful effort (Evans and Stanovich 2013; Kahneman 2012). The *Type 1 and 2* dual process thinking model was well established in general clinical reasoning literature for any type of healthcare practice, particularly in relation to diagnostic reasoning (Bate et al., 2012; Croskerry 2013; Harolds 2016; Lambe et al., 2016; Marewski and Gigerenzer 2012; Norman et al., 2017; Thammasitboon and Cutrer 2013).

The clinical reasoning literature suggested *cognitive de-biasing* prevented incorrect investigations, diagnoses or therapeutic actions from *search satisficing* jumping to a decision too soon without considering better potential options (Croskerry and Nimmo 2011; Croskerry 2015). *Cognitive de-biasing*, drawing from a *mindware*<sup>77</sup> approach, used meta-cognition to identify biases from *Type 1* intuitive based heuristics and purposely shifted into more analytical *Type 2* thinking (Croskerry 2013). Daniel et al. (2017) also encouraged practitioners in emergency departments to use the simple phrase STOP, THINK, ACT to embed *mindware* into clinical practice. Similarly, the participants of this study promoted mindfulness to be more attentive about the long-term repercussions of resource use (page 136) and endorsed *slowing down practice* (page 152) to prevent waste from rushed judgements. Other meta-cognitive strategies in the findings were practitioners using reflection and reflexivity within their critical care practice (page 136) and *seeing the bigger picture* (pages 106, 116 and 141). The data concurred with Schubert et al.'s (2013) emergency care research that *seeing the big picture* gave practitioners a broader perspective of the complexity of a clinical situation and a more comprehensive range of potential causes of abnormalities to improve decision-making. Therefore, *mindfulness*, *reflection*, *reflexivity* and *seeing the big picture* were recommended in the substantive theory to enhance *satisficing* as a reasoning heuristic. Furthermore, meta-cognition encouraged openness to all possibilities while making diagnostic and therapeutic decisions which impacted on resource use in critical care. The way participants promoted meta-cognitive strategies endorsed the concept of *flourishing* within the substantive theory (Table 22 on page 138) and added to the clinical reasoning literature base.

Using meta-cognitive strategies to address bias in intuitive *Type 1* clinical reasoning was one way of managing the limitations of *satisficing*. *Satisficing* did

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<sup>77</sup> "What is *mindware*? It is whatever people can learn that helps them to solve problems, make decisions, understand difficult concepts, and perform other intellectually demanding tasks better. To draw an analogy with computers, *mindware* is software for the mind – the programs you run in your mind that enable you to do useful things with data stored in your memory. Or to make a more prosaic but equally apt analogy with cooking, *mindware* is like kitchenware, the equipment of the mind, the pots and pans, measuring spoons and spatulas, egg beaters and corkscrews that enable people to cook up something compelling out of the information at their disposal. Or to put it yet another way, *mindware* is whatever knowledge, understanding, and attitudes you have that support you in making the best use of your mind." (Perkins 1995, 13)

not always start as *Type 1* thinking though and could be consciously logical and analytical (*Type 2*) or could be somewhere in between (Custers 2013). An alternative theory to explain the middle ground is cognitive continuum theory (Hammond et al., 1987) which proposed thinking was not binary and existed along the spectrum connecting *Type 1* and *Type 2* thinking together. Hammond et al.'s (1987) cognitive continuum related to Figure 18 (page 173) about the ambiguity of a critical care situation and level of risk influencing if and how *satisficing* and deliberation occurred. The data suggested meta-cognitive strategies helped to determine the degree of *satisficing*, i.e. closer to the 'N' of minimal deliberation or nearer to the 'O' of more deliberation from optimising. For example, the participants showed meta-cognition while they considered the implications for co-morbidities (page 102), reflected on the amount of continuous monitoring information required for a decision (page 122) and offered insight into other people's views during multi-agent decision-making (pages 121-123).

Lighthall and Vazquez-Guillamet's (2015) paper about heuristics in critical care clinical reasoning did not link *satisficing* to sustainability but did suggest tactics to overcome the vulnerabilities of *satisficing*. These strategies included undergoing a secondary search once an option appears to satisfy (double checking the *aspiration threshold* although this comes with more deliberation costs) and following relevant standardised protocols. Conversely, the research for this thesis differed by indicating some policies, guidelines and protocols as detrimental to sustainability because they led to increased waste and unnecessary overuse of resources (pages 107, 108 and 128).

In both this study's data and an article by Leuthner (2014), *satisficing* helped practitioners in critical care to manage the constraints that uncertainty puts on clinical decision-making by accepting the limits of finite resources and choosing an aspiration goal which ethically represented the patient's best interest. *Satisficing* can be required during ethical reasoning because, as stated by Carter and Leuthner (2002, 7), "*medical facts do not provide decision makers with a crystal ball, but a fuzzy lens that simply allows for a best guess.*" However, Birchley (2014) recognised *satisficing* raised ethical, legal and professional concerns while deciding on limits for therapies causing pain and suffering or for care which may

be medically inappropriate but wanted by the family. Ethical issues also surfaced while *satisficing* during decisions about critical care admissions because limited finances forced rationing while not allocating resources to patients if critical care therapies are anticipated to be futile (Strosberg and Teres 2003). *Neo-satisficing*, to sufficiently satisfy all people involved in a clinical decision, became ethically challenging when practitioners, family or the patient held different views on what decision choice was in the patient's best interest. Fundamentally, *neo-satisficing* required all stakeholders who were making or affected by a decision to agree on the *aspiration threshold* which will be explored further in Section 6.4.4.

There was seemingly contradictory information from the literature about *satisficing* both helping and hindering decision-making in clinical practice. Based on the data from this study though, [Thesis Summary Point 7](#) argues in favour of using *satisficing* within clinical reasoning across the range of decisions made by members of the critical care team for direct patient care.

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#### **Thesis Summary Point 4 – Meta-cognitive strategies in clinical reasoning**

*Satisficing*, as a fast-and-frugal clinical reasoning heuristic, fosters sustainability in the micro systems of critical care practice by adding feasibility and efficiency to clinical decision-making about resource use for clinical care. *Satisficing's* potential weakness of cognitive bias is minimised through meta-cognitive strategies like *mindfulness*, *reflection*, *reflexivity* and *seeing the big picture* while making decisions about investigations, diagnoses and therapies for critical care patients.

#### **6.4.4 Aspiration threshold of quality in critical care**

The participants identified quality care as the ultimate *aspiration threshold* goal judgements made within critical care practice (pages 121 and 135). High-quality care as the underpinning aim for any decision is logical, ethical and understandable common sense. Otherwise, the opposite of poor quality care would be detrimental to patient health. Low value, poor quality and suboptimal critical care practice results from underusing, overusing and misusing resources (Stelfox et al., 2015). A question then arises as to precisely what quality is for

healthcare practice and specifically in critical care. For the participants of the study, quality critical care practice was consistent with the standardised definition in the literature of quality care being: safe, effective, patient centred, timely, efficient, and equitable (Chrusch and Martin 2016; Schumann 2017; The Health Foundation 2013). Therefore, practitioners must keep those six dimensions of quality care represented within the *aspiration threshold* while *satisficing* about how resources are used to sustain high-quality critical care practice.

Safe, effective, patient centred and timely were attributes of *normative* practice in the *satisficing* and sustainability continuum of the substantive theory (see Table 22 on page 138). The rationale for this was how participants referred to these four aspects of quality care as forming the bare minimum of what critical care practice is supposed to be (not causing harm, as therapeutically successful as possible, putting the needs of the patient first and delivered at the time when the patient needs the care). Sustainability then became strengthened into the *responsible* stage of the *satisficing* sustainability continuum (Table 22 on page 138) by ensuring efficient and equitable use of resources. A further aspect of *responsible* practice was enhancing patient centred care more to be goal-concordant. A framework for goal-concordant care (Turnbull and Hartog 2017) entails practitioners frequently assessing and responding to the patient's (or person acting on behalf of the patient) personal goals and views on treatment limitations to ensure responsible use of critical care resources. The other details of stage 3 (*sustainable*) and stage 4 (*flourishing*) of the *satisficing* and sustainability continuum related to wider implications on sustaining quality care for future patients, the critical care team and the surrounding environment. The substantive theory included the six dimensions of quality care established in the literature (safe, effective, patient centred, timely, efficient and equitable), but then extended the definition of quality critical care to include the elements of *responsible*, *sustainable* and *flourishing* practice listed in Table 22 (page 138). Achieving that quality thus requires practitioners to consider all four stages of the *satisficing* and sustainability continuum while establishing the *aspiration threshold* of individual decisions.



Interpretation of the components of quality care is a subjective process leading to different views of what quality is for that situation and, therefore, how the *aspiration threshold* is shaped. Negotiating the *aspiration threshold* during multi-agent decision-making has been raised already while discussing *neo-satisficing* (pages 170-172). Practitioners included other staff members, patients and family members in the decision-making process of clinical investigative and therapeutic options. Non-clinical decisions, such as for staffing, procurement and management also involved multiple stakeholders within and exterior to the critical care unit. The range of people involved depended on the type of decision, but examples provided were senior hospital managers, estates, porters, ward staff, a critical care team from another site within the same Trust and practitioners across the local Critical Care Network.

During multi-agent decision-making in critical care practice, agreement on what constitutes 'quality care' for the *aspiration threshold* can be difficult to negotiate due to differences with expectations, the perception of risk, previous experience, personal values and the role of the decision maker. Unconscious critical care patients, or those awake but unable to communicate, could not express their view on what the *aspiration threshold* should be for a decision. The next of kin or appointed deputy will then advocate their perception of the patient's best interest. The previous Section identified challenges from ethical dilemmas during clinical decisions about limiting treatments, withdrawing life-sustaining therapies and the provision of end-of-life care. Practitioners faced these dilemmas knowing resources for critical care are finite, or they perceived a lack of quality due to viewing some therapies as ineffective, inefficient or unethical from not being in the patient's best interest. Ethical tensions were particularly evident with some of the nurse participants of the study if their view of the patient's best interest and what quality care was for a patient differed from the doctors. Trapani's (2014) grounded theory about *dual agency* explained this because of how nurses experience moral distress from being professionally obliged to follow medical orders as an agent to the doctor while concurrently balancing agency to patients. Safeguarding the best interest of the patient becomes problematic for the nurse if following medical authority conflicts with respecting what the patient and family members view as quality care (Trapani, Scholes and Cassar 2016). Legalities in decision-making is

a further consideration because extreme disagreement between healthcare providers and family members (or an appointed guardian if no family is available) will result in the court overtaking decisions.

The participants of this study suggested that approval for what makes up quality care across the various systems of critical care practice also needs to be made at micro, meso and macro levels of decision-making. For example, decisions about clinical care, procurement of supplies, staffing and waste management (micro systems) required a mutually agreed *aspiration threshold* during shared decision-making within the critical care unit. For the meso systems (hospital, Trust and Critical Care network), *aspiration thresholds* were negotiated for decisions about admissions, discharges and the development of network-wide guidelines. The broader view of macro systems involved agreement by the government and the public on expectations for financial allocation to critical care and financial resource use in practice. Participants discussed the debate and disagreement between the NHS and the public about the expectations on where *aspiration thresholds* lie within grand decisions influencing the macro systems relevant to critical care practice.

There was a recurring theme in the data that competing priorities within multi-agent decision-making led to *translational aspiration thresholds*. The term translational was chosen to represent how decision makers interpreted their distinct perspective of quality care while articulating an aspiration threshold. Practitioners in critical care must, therefore, be open to various *translational aspiration thresholds* from other healthcare providers, the patient and the family during the *satisficing* process, and to incorporate these into practice. Early communication, cooperation, teamwork, transparency, integrity and regular family meetings were recommended in the literature to promote authentic collaboration with family members during shared decision-making (Clark 2016; Gruenewald et al., 2017; Kryworuchko et al., 2013; McLeod 2014; Olding et al., 2016; Sur and Angelos 2015; Watson 2016). The study's data also showed these types of suggestions in the participants' examples and in doing so, offered the literature base another piece of research about how non-technical skills and human factors are necessary during shared decision-making in critical care practice.

Furthermore, the substantive theory was novel in how it joined up these three elements of critical care practice:

1. Collaborative multi-agent decision-making to negotiate an agreed *aspiration threshold* of a decision.
2. Quality care represented in the *aspiration threshold* while *satisficing*.
3. Sustainability to be the end consequence of decisions about the use of resources.

This explanation of the relationships between multi-agent decision-making, *aspiration threshold*, quality care and sustainability, therefore, contributed new knowledge and understanding to critical care practice as summarised in Thesis Summary Point 5 .

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#### **Thesis Summary Point 5 – Aspiration threshold of quality in critical care**

There are *translational aspiration thresholds* within multi-agent decision-making about what defines quality for decisions related to critical care practice, and *full sustainability* requires:

- Collaboration amongst all people involved in a decision to mutually agree on the decision's *aspiration threshold* criteria.
- Having quality care represented in the *aspiration threshold* by incorporating elements of normative, responsible, sustainable and flourishing critical care practice where possible.
- Maintaining the patient's best interest while *satisficing* for resource decisions about providing, limiting or withdrawing critical care therapies.

## **6.5 Situating the theory – *bounded rationality***

The next section evaluates *bounded rationality* as another major category in the substantive theory. *Bounded rationality* was not a social process on its own; instead, it explained the cognitive and environmental factors impacting 'how' *satisficing* occurred. Some of the factors influencing *satisficing* were covered in this chapter already (resource availability in Section 6.3.1 and uncertainty and high risk in Section 6.4.1). Standardised approaches to practice will be discussed in the upcoming Section 6.6 while exploring the major category of *stewarding*. To fill

in the gaps, Section 6.5 will now situate the remaining influencing factors in the substantive theory amongst other literature (social norms, culture, values and beliefs; technical and non-technical knowledge and skills; and previous experience of the practitioner and colleagues).

Section 6.5 will discuss this part of the substantive theory



***Bounded rationality***

Cognitive and environmental influences on decision-making about use of resources in critical care: explains **how** *satisficing* occurs

Social norms, culture, values and beliefs emerged in the data as significant cognitive and environmental influences on the participants' views on resource use in critical care and how they made decision choices in practice. As detailed in Table 23 (page 140), specific examples which related to social norms, culture, values and beliefs included: childhood, nature connectedness, generation differences, family and home life, interaction with work colleagues and patients, media and living in other countries. These types of themes were seen in research by Barnato et al. (2012) about factors affecting normative decision-making in critical care. Piras et al. (2017) also demonstrated that social influence from senior and peer critical care colleagues significantly influenced hand hygiene behaviour. Similarly, Strachan et al. (2018) recognised that routine practices and personal attitudes and principles impacted on hospital nurses' decisions related to goals of care. Thus, extant literature already existed about social norms, culture, values and beliefs shaping decision-making and behaviours of healthcare practitioners, including those in critical care.

The thesis provided fresh insight and new examples though with findings related to satisficing as a social process and sustainability in critical care practice as an outcome. For instance, the integrative literature search did not find anything about nature connectedness leading to pro-environmental decision choices in critical care practice, as seen in other non-healthcare related publications (Beery, Jönsson and Elmberg 2015; Pereira and Forster 2015; Worthy 2013). Participants who discussed feeling connected to nature as influencing their views on

sustainability in critical care practice (page 140) exemplified deep ecology theory. The Norwegian philosopher Arne Næss (1973; 2010) introduced this theory as inspired by conservationists Rachel Carson (2002) and Aldo Leopold (2001). Deep ecology explained a respectful relationship with the physical Earth comes from not prioritising human activity as more important than the ecosphere as a whole (Devall and Sessions 2001). The data from this thesis (page 140) then added to the literature base critical care practice as a new context for deep ecology applied to human cognition and decision-making. This sense of nature connectedness with decision choices also related to systems theory which was discussed previously in Section 6.3.3.

Self-efficacy was another specific type of belief which surfaced from the thesis findings as influencing the bounded rationality of sustainability-related decision-making in critical care practice (pages 143, 144 and 151). Some participants felt a lack of control over procurement decisions (pages 144, 150 and 151) and while needing to follow policy, routine culture or local expectations (pages 127 and 128). Participants who believed they had a role in sustainability discussed how they made active decision choices aimed at improving the sustainable use of resources. A lack of self-efficacy occurred when participants felt they could not influence resource use in their critical care practice. Within these examples, the participants' perceptions about whether or not they could improve sustainability related to self-efficacy within Bandura's (2012) social cognitive theory. The thesis findings illustrated this point made by Bandura (2011, 36):

*“It is partly on the basis of efficacy beliefs that people choose what challenges to undertake, how much effort to expend in the endeavour, how long to persevere in the face of obstacles and failures, and whether failures are motivating or demoralizing.”*

Although there was motivation to use resources more sustainably, the lack of self-efficacy appeared to come from participants perceiving they were not capable or did not have the opportunity (page 144). Likewise in the literature, the COM-B model of behavioural change emphasised that capabilities (C), opportunities (O) and motivation (M) were all needed for new behaviour (B) to occur (Michie 2014; Michie, van Stralen and West 2011). Thus, the thesis research added further support to the literature base that critical care team members required self-

efficacy, capability, opportunity and motivation to make changes in practice which promoted sustainability.

Practitioner knowledge and skills were other significant influences on the bounded rationality of decision-making in critical care practice. Participants discussed technical, critical care knowledge and skills while considering the educational needs of staff and the resources required for continuing professional development (pages 111 and 114). Technical, business-like knowledge about the economic aspects of critical care practice emerged in the data concerning financial sustainability (Section 5.2.1). Some participants appeared to have a scientific, understanding of the 'greening' up of critical care, as seen in the data about environmental sustainability (Section 5.2.2). Ecological knowledge was particularly evident with one participant who was undertaking a Masters course about environmental studies while continuing to work as a bank critical care nurse (page 106). Some participants referred to learning about reducing, reusing and recycling during childhood or while living in other countries (Table 23 on page 140). Decisions practitioners made in practice were, therefore, informed by different types of technical knowledge and skills developed from critical care or sustainability education and their personal lives outside of work. The Royal College of Nursing (2018) recently reinforced that high quality, safe and effective healthcare required sufficient resources to be sustained to pay for continuing professional development of technical knowledge and skills. The findings from this thesis indicated the content of such education could include both the healthcare speciality (critical care) as well as knowledge on how to practice sustainably across financial, environmental and social dimensions of practice. It would be unrealistic for healthcare professionals to be experts in sustainable development. However, sustainability principles could be embedded into existing critical care education to help practitioners then draw from this knowledge while *satisficing* in practice.

Along with the technical aspects of practice, non-technical knowledge, skills and professional attributes emerged as influential factors on how practitioners made decisions about resource use. Non-technical features of critical care practice, seen in the data presented in Section 5.3.4, included human factors characteristics

such as teamwork, communication, situational awareness and time management. These types of non-technical knowledge and skills affected the participants' decision-making about resources, particularly in relation to goal setting while *satisficing* to work efficiently and effectively. Addressing human factors in patient safety and quality improvement initiatives have gained popularity across the healthcare sector in recent years (Clinical Human Factors Group 2016; Carayon 2016; Carayon et al., 2014). Literature about human factors specific to critical care also emphasised the importance of the types of non-technical skills found in the data of Section 5.3.4 (Doerhoff and Garrison 2015; Harder and Marc 2013). The findings from this thesis added new context to the literature base though by linking together human factors as a potential influence on how *satisficing* occurred in critical care practice.

Finally, the level of practitioner experience emerged throughout the study's findings as significantly influencing clinical decision-making in practice (pages 127, 130-133 and 137). The data suggested novices in critical care were less likely to satisfice because of their tendency to optimise while using a *just-in-case* approach (pages 130, 132 and 146). Weaver, Newman-Toker and Rosen (2012, 274) comparably recognised that expertise and experience influenced deliberation while satisficing during clinical reasoning:

*“Because they engage in deliberative practice, experts satisfice much more effectively compared to novices. Specifically, expert clinicians possess an adaptive clinical reasoning toolbox that contains a set of heuristics well matched to the information structure of their practice environment and patients, enabling rapid and effective decision-making.”*

As previously discussed on page 185, both the thesis findings from critical care (pages 127 and 141) and Schubert et al.'s (2013) emergency department research revealed experience improved the ability to satisfice by enabling practitioners to *see the bigger picture*. Years of experience exposed practitioners to a broader range of potential causes of abnormalities. Novices then satisficed less compared to experts because they could not use pattern recognition and the tacit knowledge obtained from experience as much. Prior discussion on pages 184-185 explained how experience as an influence within the practitioner's *bounded rationality* could be a disadvantage though if cognitive bias led to *search satisficing* (prematurely

rushing into an incorrect decision choice). The findings of this study resonated strongly with Benner's (2001) seminal novice-to-expert theory, which she developed from researching decision processes in critical care nurses. Including experience as an influencing factor within the *bounded rationality* aspect of the substantive theory also related to more contemporary critical care decision-making literature (Lighthall and Vazquez-Guillamet 2015; McCormack et al., 2014; Keshk, Qalawa and Aly 2018). Therefore, this research study contributed further qualitative data to the clinical reasoning literature about experience significantly influencing *satisficing* and the amount of investment practitioners put into deliberating over different decision options. Nevertheless, this thesis was new and original in how it linked together experience, *bounded rationality*, *satisficing* and sustainability in critical care practice.

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#### **Thesis Summary Point 6 – Bounded rationality in critical care practice**

*Bounded rationality* represents the cognitive and environmental factors impacting on a decision-making process and explains how *satisficing* occurs. Significant influencing factors on *satisficing* in critical care practice include:

- Social norms, culture, values and beliefs of the critical care team, patients and families.
- Technical and non-technical knowledge and skills of the critical care team.
- Previous experience of practitioners and surrounding colleagues.
- Resource availability for critical care including financial, environmental and social.
- Uncertainty and high risk while caring for critically ill patients
- Standardised approaches guiding critical care practice.

## **6.6 Situating the theory – stewarding**

This next section evaluates one of the other major categories in the substantive theory, the concept of *stewarding*. If *satisficing* was the central process leading to sustainability regarding 'what' happens, *stewarding* was then a related process explaining 'why' *satisficing* occurs. *Stewarding* as a concept will first be defined.



A comparison of *stewarding* within the substantive theory to other extant literature then follows, including stewardship literature related to general healthcare practice as well as that specific to critical care.

Section 6.6 will discuss this part of the substantive theory

### ***Stewarding***

Ethical sense of duty to use critical care resources responsibly: explains **why** *satisficing* occurs



The participants of this study appeared to have a clear ethical sense of duty to use resources responsibly in their critical care practice. A concept which encapsulated an ethic about responsible resource use was *stewarding*. The rationale for including *stewarding* as a major category in the substantive theory was it explained ‘why’ the central organising phenomenon of *satisficing* occurred. For this research, *stewarding* was viewed as a social process, due to an underpinning morality about using resources responsibly for the good of society and since social interactions take place during *stewarding*.

Stewardship, as a principle of sustainability, is defined by Sanders and Wood (2015, 4) as “*maintaining natural resources at sufficient quality and quantity to remain viable for use by future generations.*” There is a feeling of legacy here, with an ethical driver to use resources in a way which does not completely deplete or destroy the expectations and hope for the future use of resources. The *Stern Review*<sup>78</sup> (Stern 2007, 48) also echoes the concept of legacy:

*“The notion of ‘stewardship’ can be seen as a special form of sustainability. It points to particular aspects of the world, which should themselves be passed on in a state at least as good as that inherited from the previous generation.”*

There were two aspects of legacy in the data. The first related to the world in general, by ensuring resources are sufficiently available for all people in society indefinitely into the future. Legacy here was more to do with the ecological

<sup>78</sup> The *Stern Review* (Stern 2007) was a seminal report commissioned by the Government of the United Kingdom to evaluate the impact of global warming on the world economy.

footprint of critical care practice impacting on the Earth as a planet, which then subsequently influences environmental resources for future generations of all people. For example, participants discussed sourcing materials without depleting physical resources and delivering clinical practice with as minimal impact on the ecosphere as possible (Section 5.2.2). The second aspect of a *forward-thinking* legacy (Section 5.2.5) related to intentionally using resources responsibly in the present to sustain critical care as a service for future patients. *Stewarding*, as proposed in the substantive theory, thus added to the established literature-base about people feeling an ethical sense of duty to leave a promising legacy for the future use of resources.

The concepts of *stewarding*, sustainability and *satisficing* were brought together in the extant literature within a mathematical framework of viability theory (De Lara, Martinet and Doyen 2015), and applied to fishery management (Martinet et al., 2016). Within business literature, *stewarding* was part of corporate social responsibility (Abid et al., 2015; Moratis 2016; Rasche, Morsing and Moon 2017). Similarly, stewardship theory in business was when managers acted as responsible stewards as compared to agency theory about the prioritisation of self-interest (Belle 2017; Davis, Schoorman and Donaldson 1997; Glinkowska and Kaczmarek 2015). Stewardship was also a principle of responsible and sustainable tourism in the travel industry (Benckendorff and Lund-Durlacher 2013; Hanna 2015). The substantive theory reflected the same core principles of stewardship used within the literature cited above from other sectors but *stewarding* for this study was uniquely applied to the context of critical care. Additionally, the literature search did not find publications about *stewarding* explaining why *satisficing* occurred to achieve sustainability of critical care practice, which again highlighted the originality of the substantive theory.

Some publications found during the integrative literature search directly linked the concept of *stewarding* with the responsible use of resources in critical care practice or implied there was a connection. For instance, Turnbull (2015) provided a reflective account of ethical decision-making during a case of a 3-month-old baby waiting for a heart transplant. As a paediatric intensivist, Turnbull (2015, 7) labelled herself and others working in critical care as “*responsible stewards of a*

*limited resource*". Turnbull's sense of responsibility matched the participants' viewpoint who similarly felt the need to be stewards because of being aware of how costly and resource intensive critical care is. Grounded theory research by Breakey (2006) also identified 'optimising stewardship' as the central social process influencing how critical care nurses support patients and families during decisions about life-sustaining treatment. The substantive theory in this current study shared some common topics with Breakey's (2006) research, including the critical care setting, moral distress, end-of-life care, perception of futile treatment and *stewarding*. Nevertheless, the aims and focus of each piece of research were fundamentally different, confirming the substantive theory about sustainability in critical care was unique.

Another example of the stewarding findings resonating with the literature was about the participants' awareness of the imbalanced supply and demand for critical care resources from an ageing population and new technologies (Batchelor 2013). Some participants also linked excessive demand for critical care services with admissions or interventions which they felt patients did not want or need (page 101). The participants' reflections on what they felt was irresponsible resource use related to the APPROPRICUS study. This research was a one-day, cross-sectional survey about the perceived inappropriateness of care completed by 1651 critical care doctors and nurses in 82 European adult critical care units (Piers et al., 2011). On the day of the survey, 27% of respondents felt at least one patient at that time was receiving inappropriate care. The most common reason for this (65%) was disproportionate care, and in 89% of those cases, practitioners perceived care as excessive and unnecessary. The remaining 11% of the respondents stated disproportionate care was due to insufficient use of resources. Intention to leave their jobs came from the moral distress associated with perceived inappropriate care. A secondary analysis of the APPROPRICUS study revealed that nurses attributed the inappropriate care to poor communication amongst the critical care team whereas the doctors ascribed this to uncertainty in the patient prognosis (Piers et al., 2014). The APPROPRICUS trial results related to the following subtopics in the findings of the sustainability research: high prevalence of practitioners perceiving inappropriate care for critically ill patients (page 144), job dissatisfaction from observing the excessive use of resources

(page 106), the need for effective communication amongst the multi-disciplinary team (page 132) and the uncertainty involved with critical care decision-making (page 130). Despite sharing these themes with the thesis, APPROPRICUS provided quantitative, descriptive results. The qualitative, explanatory nature of *stewarding* and *satisficing* as social processes within the substantive theory then complemented the literature base to provide greater insight and a theoretical framework to address the issues described in quantitative studies like APPROPRICUS.

Antibiotic stewardship was directly discussed by one of the participants (see page 153) as a further application of the responsible use of resources in critical care practice. In addition to reducing unnecessary financial and environmental waste, stewardship reduced resistant strains of bacteria by only prescribing the antibiotic if there was a clinical need and ensuring the dosage and duration was appropriate (Luyt et al., 2014; Schouten and De Waele 2017). The literature discussed responsible use of other types of medications in critical care to reduce financial cost and prevent waste, such as vasopressor<sup>79</sup> stewardship (Koczmara et al., 2014) and diuretic<sup>80</sup> stewardship (Thomas et al., 2015). Regardless of the drug, both this study's data and the literature emphasised the point of medication stewardship was to use pharmaceutical resources responsibly. An appropriate amount and duration of a medication are required to be sufficiently therapeutic. However, stewardship principles can then prompt practitioners to stop the drug when it is no longer needed to prevent long-term harm to the patient, reduce unnecessary environmental and financial costs and curtail drug resistance from developing.

The concept of stewardship, emerging from the data in Section 6.6, displayed the current *less-is-more* trend found in the literature. *Less-is-more* healthcare moves away from complex and resource costly technologies to simplified, more reliable methods of quickly diagnosing significant abnormalities, rapidly initiating appropriate treatment and stopping therapy when appropriate (Riessen et al.,

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<sup>79</sup> A vasopressor drug treats low blood pressure and works by constricting the blood vessels.

<sup>80</sup> A diuretic drug, commonly called a 'water pill', increases the production of urine.

2017). Participants considered *less-is-more* critical care practice comes from increasing patient centred care to prevent excessive use of resources from over-diagnosing and over-treating. For instance, the findings on page 122 suggested critical care staff who primarily concentrated on technology and protocols have lost sight of what each patient needs individually, resulting in the irresponsible use of resources. In the literature, the ICU Liberation quality improvement initiative promoted this type of patient centred care by shifting “*focus from the monitors, beeps, and buzzers to a human connection*” in their use of clinical guidelines to ‘liberate patients’ from critical care (Ely 2017, 327). The data on page 148 also recognised how the patient’s biomedical needs became prominent in life-threatening clinical emergencies which then hindered patient centred care, caused excessive use of resources and left some practitioners with job dissatisfaction. According to Jakimowicz and Perry (2015), patient centred intensive care had bio-psycho-social challenges due to patients being critically ill; but, it improved patient and staff satisfaction from an enhanced patient experience and helped to retain the workforce.

Data about standardised approaches to practice (Section 5.3.2) paradoxically had both advantages and disadvantages. Findings on page 127 highlighted how targets, protocols, care bundles and clinical guidelines took away patient-centeredness and potentially wasted resources from the standard approach overtaking individualised clinical need. The literature similarly criticised standardised care if a goal was just for the sake of a protocol, rather than tailoring clinical resources according to actual patient need (Riessen et al., 2017). A specific example of ‘over-protocolisation’ in the critical care literature was with early goal-directed therapy (EGDT) for septic shock. Three large randomised control trials (ARISE Investigators and the Anzics Clinical Trials Group 2014; Mouncey et al., 2015; ProCESS Investigators 2014) and a meta-analysis (PRISM Investigators 2017) confirmed EGDT resulted in higher financial costs from increased resource use without any improvement in patient outcomes. These recent clinical trials and meta-analysis demonstrated the protocolised targets for septic shock care led to harmful ‘over-treatment’ and unjustified use of clinical resources (Delaney 2017). Intravenous fluid management was another aspect of practice recognised in the literature where protocols caused excessive use of

resources and worsened patient outcomes (Monnet, Marik and Teboul 2016; Vistisen and Juhl-Olsen 2017). Considering how the substantive theory used *goal-setting* within the concept of *satisficing* of the substantive theory, it could be that the problem with these examples of EGDT and fluid management was not the protocolisation process itself. Rather, the *aspiration thresholds* set within the clinical protocols may not have been suitable. The uncertainty and variation with critically ill patients seen in the data (page 130) led to *just-in-case practice* and made it difficult to have one protocol which suited all patients (page 127). Vincent (2016) suggested simple protocols have a role with specific, distinct aspects of practice, but are ineffective in providing 'globally acceptable' goals for complex critical care patients. Despite this, Vincent (2016) recognised protocols provide structure and safety for inexperienced practitioners, and easy to follow, reminder checklists can reduce the risk of human error for all staff. This study's participants also recommended checklists as a way of ensuring thoroughness and quality care (page 125). Another positive type of standardised approach to practice in the findings was when senior management and Clinical Commissioning Groups used quality indicators to measure a critical care unit's performance (page 125).

As stewards of clinical resources, the participants considered the implications a protocol, care bundle or guideline and evaluated if the most responsible use of resources was to follow, adapt or deviate from the standardised approach (page 127). *Stewarding* then involved balancing protocolised vs individualised care with a sense of responsibility to identify how the most appropriate use of resources for each clinical situation. Practitioners have some flexibility around the extent to which protocols, care bundles and guidelines are followed, but must adhere to clinical policies. A policy which the participants frequently referred to while discussing the excessive use of resources was infection prevention because they perceived personal protective equipment (PPE) as overused in critical care (page 108). Participants observed other practitioners interpreting the infection, prevention and control policy incorrectly, or they considered it to require practices that were not necessary. Overusing gloves and aprons and overstocking bed-space areas were particularly noted as inappropriate practices causing large amounts of unnecessary excessive waste (pages 107 and 128). There appeared to be personal tension and cognitive dissonance between wanting to use

resources responsibly and having to follow local expectations of infection, prevention and control measures which the participants felt did not lead to sustainability (pages 108 and 118). Cognitive dissonance is when mental stress occurs from contradictory beliefs or if actions are carried out which conflicts with personal values (Cooper 2012a).

Participant frustration also came from the *throw-away culture* of practice. Another related theme commonly brought up by participants was the poor segregation and disposal of physical waste within critical care practice. For example, recycling bins were not always available, and there was inappropriate incineration of non-clinical waste. For the participants of this study, their observation of the *excessive use of resources* and *physical waste issues* were drivers to encourage local clinical practice to be more responsible. The participants recommended *lean thinking*<sup>81</sup> as a strategy to promote responsible use of critical care supplies by removing excessive waste and only using resources when necessary. This research study, therefore, contributes to the growing body of literature about *lean thinking* in healthcare (Attwood-Charles and Babb 2017; Dannapfel, Poksinska and Thomas 2014; Graban 2012; Kasivisvanathan and Chekairi 2014; Radnor, Holweg and Waring 2012; Toussaint and Berry 2013). It also adds to the literature specifically focused on lean critical care practice (Cheshire and Mersey Critical Care Network 2012; Cohen et al., 2014; Kaur 2015; Vats et al., 2012).

*Stewarding*, as enacted through *lean thinking*, was evident in the data throughout the resource cycle in Figure 14 (page 154), including the need for more responsible procurement of critical care supplies. One participant recognised how centrally managed procurement hindered *leaning thinking* when it caused excessive physical and financial waste (pages 144, 150, 151). Excluding clinical practitioners from decision-making about which supplies to order also led to equipment which was not fit for purpose (page 152). The Royal College of

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<sup>81</sup> *Lean thinking* is based on the *Toyota Production System* of 5 key principles which aim to add value and reduce waste: identify customers and specify value; identify and map the stream, 3. Create flow by eliminating waste, 4. Respond to customer pull, 5. Pursue perfection. *Lean thinking* is rooted in the aim of ensuring resources are used responsibly by eliminating waste which is labelled as the Japanese words of muri (overburden – stress on employees), mura (unevenness – inconsistency) and muda (unnecessary resource use) (Lean Manufacturing Tools 2019).

Nursing (2015) is addressing the disconnect between the people 'using' supplies and those procuring through the *Small Changes, Big Differences* initiative which promotes nursing engagement within procurement decisions. In addition to procurement, *lean thinking* throughout the remainder of the resource cycle in Figure 14 (page 154) helped resource consumption, recycling and waste disposal to be more responsible by doing 'just enough' for what was necessary for that stage of the cycle, but at a minimum financial and environmental cost.

In the spirit of 'more does not always mean better', three medical journals have recently promoted responsible use of resources for all types of healthcare practice with these series: *Too Much Medicine* (BMJ), *Less is More* (JAMA Internal Medicine) and *Right Care* (Lancet) (Schwartz et al., 2017). Similarly, Choosing Wisely UK (2017) introduced a national campaign to promote more responsible care which is evidenced-based, not duplicated, harm free and truly necessary which were all themes seen in the data. The Faculty of Intensive Care Medicine (2016) has collaborated with the Choosing Wisely UK campaign with these specific recommendations for critical care practice:

- "Life support for patients at high risk for death or severely impaired functional recovery should not be offered. A discussion with patients and their families should focus on the goals of comfort care.
- Tests and investigations should only be done in response to answering a specific question rather than routinely.
- Blood transfusions should only be given when the haemoglobin is less than 70 g/L. Blood transfusions may occur above this level where the patient is haemodynamically unstable or actively bleeding.
- Patients who are mechanically ventilated may not need to be deeply sedated, and where possible daily trials to lighten sedation should be done".

Similar suggestions were made by participants who felt ethically obliged and responsible for preventing 'over-investigating' and 'over-treating' to safeguard resources and to reduce the financial and environmental cost of practice.

Choosing Wisely UK (2017) drew from the philosophy of *slow healthcare* which, like the *slow food* movement in the restaurant industry, encouraged taking the time to slow down for thoughtful, reflective, less-wasteful and more responsible practice



(Lusiani et al., 2015; Sellman 2014). Slowing down and having the headspace to think emerged in the data (page 131 and 152) making these recommendations from the Choosing Wisely UK campaign relevant to practitioners in critical care practice and showed that the substantive theory related to current national healthcare agendas. The data also substantiated how *stewarding* within *slow healthcare* drew parallels with the Goldilocks principle to provide quality care which was not too little or not too much, but 'just right' (Rashid 2016). The Getting It Right First Time (GIRFT) programme was another NHS initiative aimed at improving efficiencies and standardising high-quality care to improve productivity and patient outcomes (GIRFT 2018b). The pending GIRFT (2018a) rollout to critical care confirms the Department of Health intends to reduce unnecessary waste within critical care practice, confirming the substantive theory relates to current strategic NHS plans.

The substantive theory was based upon *stewarding* (wanting to use resources responsibly) initiating *satisficing* (efficiently reaching a suitable *aspiration threshold* for quality care). The consequence was then more sustainable practice that has eliminated inappropriate, excessive, wasteful and harmful care. The literature about responsible resource use in critical care provided credibility and reassurance that the concept of *stewarding* was an appropriate term to describe the ethical sense of responsibility practitioners had towards how resources are used in critical care. However, what was lacking in the literature was a theoretical explanation for why *satisficing* in critical care decision-making subsequently led to sustainability in critical care practice. The substantive theory, with its use of *stewarding* as a major category explaining why *satisficing* occurs, therefore has the potential to fill this gap in the literature.

Section 6.6 defined *stewarding*, explained how *stewarding* motivates practitioners to satisfice through various contributing factors and identified how *stewarding* is enacted as summarised in [Thesis Summary Point 7](#) and [Thesis Summary Point 8](#) on page 206.

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### Thesis Summary Point 7 – Contributing factors to stewarding

Stewardship is an ethic to use resources responsibly. *Stewarding*, as a social process, explains why practitioners in critical care are motivated to satisfice as a means for sustainability. Practitioners in critical care practice are prompted into *stewarding* from these contributing factors:

- Critical care being a very resource intensive service.
- Imbalance between supply and demand for critical care resources.
- Inappropriate care leading to excessive use of resources.
- Waste issues from large amounts of preventable unnecessary waste and poor management of necessary waste.

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### Thesis Summary Point 8 – Stewarding enacted in critical care practice

Practitioners in critical care enact *stewarding* through:

- *Patient centred care* – respecting the patient as a holistic person within *aspiration threshold* goals of clinical decisions.
- *Lean thinking* (eliminating unnecessary waste) throughout the *resource cycle* of critical care supplies (procurement, consumption, recycling and physical waste disposal).
- *Slow healthcare* – taking time to ensure the Goldilocks principle embeds decision-making to deliver care which is not too little or not too much but 'just right'.

## 6.7 Summary

As an exploratory discussion, Chapter 6 began with a summary of the substantive theory before proceeding to evaluate how the components of the theory compared to the extant literature. Situating the definition of sustainability in critical care practice, *satisficing*, *bounded rationality* and *stewarding* with other literature confirmed the originality of the research. In addition to how the study was unique, the discussion also highlighted themes and patterns shared between the substantive theory and other pre-existing publications. Thus, the analysis also extended some areas of the already established literature-base. The eight thesis summary points developed throughout Chapter 6 emphasised the most significant

ways the substantive theory contributes original knowledge. However, the theory emerged from the data of a relatively small, local sample size with a limited range of different types of practitioners, as already discussed on pages 49, 50 and 60. Further development of the theory through increased theoretical sufficiency is needed to fully develop the eight thesis summary points. Reflections and implications for the relevance of this new initial substantive theory about sustainability in critical care practice take place in the succeeding chapter.

## Chapter 7 Reflections and Implications

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### 7.1 Introduction

This chapter begins to draw the thesis to a close by evaluating the substantive theory according to Charmaz's (2014) criteria for quality in a grounded theory. There will also be a reflection on potential future contributions of the theory, including implications for critical care clinical practice, management, education and further research. Reflecting on these implications will highlight how the theory holds value for the critical care community by offering a theoretical framework for sustainability in critical care practice. In addition, there will be suggestions for how the theory could be 'tried out' and researched in other substantive areas of healthcare practice. The limitations of the study will be acknowledged, with suggestions made for how to address these limitations in the future. The chapter will end with concluding remarks which summarise the achievements of the study in relation to the initial aims.

### 7.2 Evaluation of the substantive theory

The previous discussion in Section 4.4 already explained the methodological rigour of the research 'process' integrating the components of trustworthiness in qualitative research (Lincoln and Guba 1985) with the features of grounded theory procedural precision (Birks and Mills 2015). Evaluation of the substantive theory as a robust, high-quality research 'product' is now considered in Table 28 on page 209 using Charmaz's (2014) criteria for a grounded theory (credibility, originality, resonance and usefulness). These criteria were chosen to ensure the evaluation of the substantive theory used a constructivist approach. Table 28 is also mapped against the thesis chapters to show key evidence of meeting the criteria. Further analysis of the implications of the substantive theory for different aspects of critical care will then follow.

Table 28 – Evaluation of the substantive theory

Criteria for a grounded theory	Criteria properties (Charmaz 2014) applied to the substantive theory and evidence of these properties in the thesis
<b>Credibility</b>	<ul style="list-style-type: none"> <li>• Methodology and methods were consistent, and the process of conducting grounded theory research was rigorous – Chapters 3 and 4.</li> <li>• Constant comparison analysis occurred from systematically comparing between observations and between categories – Chapter 4 and 5.</li> <li>• There were strong, logical connections made between data generated, analysis and argument defending the theory – Chapters 4, 5, and 6.</li> <li>• Amount of relevant data was adequate for theoretical sufficiency with transparency in how the theory emerged from the data and was not forced – Chapters 4 and 5</li> <li>• There was enough detail in the presentation of data and analysis for the thesis reader to form their own assessment of the concepts which emerged to create the theory – Chapters 5 and 6.</li> </ul> <p><b>Key evidence</b> – explicit methodological rigour (Chapters 3 and 4 with specific critique in Section 4.4 including memoing in 4.2.3.1 and reflexivity in Section 4.4.2.1); theoretical sufficiency apparent in the findings (Chapter 5); clear emergence of the central organising phenomenon and other major categories in the substantive theory (Chapter 5 and Section 6.2).</p>
<b>Originality</b>	<ul style="list-style-type: none"> <li>• Categories were fresh, novel and unique to offer new insight into sustainability in critical care practice – Chapters 1, 2 and 6.</li> <li>• The social and theoretical significance of the theory was explained – Chapter 6.</li> <li>• The grounded theory was positioned amongst extant literature to show how it expanded, refined and differed from established concepts and other theories – Chapter 6.</li> </ul> <p><b>Key evidence</b> – the topic was current and significant in addressing an established gap in the knowledge base (Chapters 1 and 2); literature search (Appendix 1) confirmed the substantive theory did not exist already; ways the theory</p>

	made an original contribution to new knowledge were made clear (Chapter 6).
<b>Resonance</b>	<ul style="list-style-type: none"> <li>• Meanings were co-constructed and made sense to the people involved with the circumstances of the subject area – Chapter 5 and 6.</li> <li>• Links were made between concepts, people and social processes when the data analysis indicated potential connections – Chapter 4 and 5.</li> <li>• Analysis leading to the theory offered practitioners in critical care deeper insights into their main concern about the research topic – Chapter 5 and 6.</li> </ul> <p><b>Key evidence</b> – co-construction of meaning was evident in interview transcripts and memos (Chapter 4 and 5); theoretical sampling (Section 4.2.1) and inductive-deductive cycles drove new data collection and analysis (Section 4.2.3); member checking showed the theory resonated with the participants’ perspectives and experiences (Section 4.4.2.2).</p>
<b>Usefulness</b>	<ul style="list-style-type: none"> <li>• Central organising phenomenon and major categories were abstract, generic social processes with functional application across critical care practice – Chapters 5 and 6.</li> <li>• The theory offered practical interpretations of the data that people can use within their working practice in critical care – Chapters 5 and 6.</li> <li>• The theory provided practical insight into improving sustainability in critical care practice – Chapter 6 and 7.</li> <li>• The theory could be ‘tried out’ and tested in other substantive areas – Chapter 7.</li> </ul> <p><b>Key evidence</b> – Memoing (examples provided throughout Chapter 4 and 5), member checking (Section 4.4.2.2) and peer review (Section 4.4.2.4) confirmed there was potential for the theory to have workable, pragmatic utility; inductive-deductive cycles of data analysis considered practical aspects of sustainability in critical care practice (Section 4.2.3); reflections on implications for the theory highlighted potential areas for theory to used and developed further (Section 7.2).</p>

### 7.2.1 Implications for clinical practice

A reflective evaluation of the potential use of the substantive theory identified various implications for sustainability in critical care clinical practice. Firstly, the concept of *satisficing* is built on the premise of decision-makers setting an *aspiration threshold* to be reached. Within the context of critical care, the delivery of high-quality critical care represents the threshold line practitioners aim for while making effective clinical decisions in practice. For each *aspiration threshold* across the range of clinical decisions, there needs to be a clear sense of indicators defining what that quality care is. Protocolised care may help with standardising such thresholds of minimum care required for quality care to occur. However, the findings of this study also indicated some policies, protocols and care bundles led to inappropriate overtreatment and misuse of resources. If practitioners use the substantive theory to guide their clinical practice, they can reflexively evaluate whether an *aspiration threshold* of a decision should follow a set standard, or if the goal is better determined on an individualised patient basis. Using the substantive theory in clinical practice thus requires practitioners to appreciate the role of an aspirational threshold, ultimately aiming for critical care to be delivered that is 'just right' for patients (not over-treating or under-treating).

Secondly, for practitioners in critical care to use the substantive theory in their daily clinical practice, they would need to be aware of the elements across the normative, responsible, sustainable and flourishing phases of the *satisficing* and sustainability continuum (Table 22 on page 138). Being conscious of these components does not necessarily mean practitioners are willing or able to apply the continuum to their actual practice though, which raises more implications and questions about sustaining sufficient resources for practitioners to enact the components across all four phases. Further exploration from the perspective of clinical practitioners, managers, educators and researchers, could build on this thesis to develop other projects aimed at testing the theory within clinical practice.

Thirdly, there are potential ethical, professional and legal issues for practitioners to contemplate while *satisficing* for sustainability involving a translational *aspiration threshold* and when there are competing priorities during multi-agent decision-

making. Managing ethical dilemmas and liaising with other people involved in a clinical decision requires practitioners to have strong non-technical human factors skills. Supporting practitioners to develop these types of skills is elaborated on in the implications for education discussion of Section 7.2.3.

### 7.2.2 Implications for management

In addition to considerations for clinical practice, there are also implications for the management and leadership aspects of running a critical care unit. In the current climate of economic austerity within the NHS, hospital and critical care managers are faced with challenging decisions about how to sustain the service with reduced financial resources (Watkins et al., 2017). An appreciation of *satisficing* within decisions about resource use could, therefore, help managers to strategically plan initiatives which ensure their critical care units have the normative, responsible, sustainable and flourishing attributes identified in Table 22 (page 138). Managers could also use the substantive theory to have a fuller understanding of the interconnectivity of different types of resources across the micro and macro systems of critical care practice. Other aspects of the findings and substantive theory which have implications for management decision-making include themes related to job satisfaction and staff burnout, waste management, infection prevention and resource-efficient practice through lean thinking.

### 7.2.3 Implications for education

Educating the critical care team includes the initial learning to start practising in critical care as well as continuing professional development throughout a career working in critical care. This ongoing education is necessary for practitioners to maintain competence and confidence in critical care skills. Sustainable critical care education provision has also been linked to staff retention and is essential for meeting commissioning requirements (Batchelor et al., 2017). One angle on the educational implications of the theory then is the potential to embed *satisficing* into decision-making about how resources are used to deliver education. In other



words, the substantive theory could be used to guide sustaining critical care education as an ongoing 'process'.

Another aspect is the possibility for educators to use the theory to frame the 'content' of critical care education. Teaching could include educating practitioners about the principles of *satisficing* within clinical reasoning based upon an *aspiration threshold* of quality care. As already noted in the implications for clinical practice, there needs to be clarity on what constitutes quality for the critical care topics included in the curriculum. This education includes technical knowledge and skills for each topic, along with non-technical attributes for involving others in decision-making and negotiating an *aspiration threshold*. Examples of significant non-technical human factors to learn for *satisficing* (including neo-*satisficing* and costly deliberation) are communication skills, teamwork, situational awareness, time management and ethical reasoning. Therefore, educators can use the theory based on *satisficing* to potentially strengthen both 'how' and 'what' they teach as a means for ultimately promoting flourishing critical care practice.

#### 7.2.4 Implications for future research

Critical care research planning could use a 'sustainability lens', similar to how Goodman and East (2014) encouraged educators to use a 'sustainability lens' during education curriculum development. The substantive theory offers a means for researchers to view their research planning through a 'sustainability lens'. The James Lind Alliance Priority Setting Partnership<sup>82</sup> identified three questions which intensive care patients, carers and clinicians felt were the most important topics for new research to address (Reay, Arulkumaran and Brett 2014). Each of these questions was reflected on to consider examples of how the substantive theory could be relevant while planning critical care research through a 'sustainability lens' (see Table 29 on page 214).

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<sup>82</sup> The James Lind Alliance (2018), funded by the NHS National Institute for Health Research, facilitate patients, carers and practitioners to decide collaboratively on research priorities about uncertainties in healthcare.

Table 29 – Substantive theory and intensive care research priorities

Top 3 priorities for new intensive care research from the James Lind Alliance (Reay, Arulkumaran and Brett 2014)	Example implications of the substantive theory for the research priority topics
<b>How can patients, who may benefit from intensive care, be identified early and admitted to the intensive care unit at the right time?</b>	The <i>satisficing</i> and sustainability continuum's <i>normative</i> stage in the theory includes providing safe, effective, patient centred and timely care (applicable to research about these elements while identifying and admitting patients to critical care). The <i>responsible</i> stage involves equitable care which meets service demand, and the <i>sustainable</i> stage requires resource reserves for a potential increase in patients (applicable to research about patient flow into the intensive care unit which requires sufficient beds and staffing). <i>Stewarding</i> , as used in the theory, promoted <i>slow healthcare</i> to be mindful of responsibly using resources (applicable to research about ensuring effective and efficient admissions through 'getting it right the first time' and by preventing inappropriate admissions).
<b>How can patients and their families be best supported as they start living at home again (e.g. health and social care services, intensive care support groups, long term follow-up)?</b>	The <i>satisficing</i> and sustainability continuum's <i>sustainable</i> stage includes supporting patients and families across acute, recovery and rehabilitation phases (applicable to research about physical and psychological needs of patients once discharged home from being critically ill).
<b>What is the best way to identify patients with, or at risk of delirium or agitation – how should the immediate and long-term effects of delirium or agitation be monitored and managed?</b>	The <i>satisficing</i> and sustainability continuum's <i>sustainable</i> stage includes audit, research and education which could be applied to the topic of delirium (auditing delirium assessments, research studies evaluating the most effective pharmacological and non-pharmacological interventions for delirium and education focusing on prevention of delirium).

This table presented a selection of possibilities if research planning were to draw insight from the substantive theory while using a ‘sustainability lens’ (Goodman and East 2014) to address the 3 top priorities in intensive care uncertainties. Further potential considerations of the theory within critical care research planning for any subject could include: how the research topic is affected by or can influence financial, environmental and social resources; how the research topic connects within and between the micro, meso and macro systems of critical care; and how the research topic relates to *flourishing* practice (e.g. fulfilled practitioners with maximal job satisfaction; possible long-term benefits from the research).

Further research could explore whether the theory maintains credibility, resonance and usefulness in substantive areas of healthcare practice outside of the context of critical care. For example, the theory could be tried out in different specialities and departments within hospital, pre-hospital, primary care, residential care, mental health, home healthcare and private services. If extending or adapting the theory still fits within a range of other areas and brings further abstraction of concepts, there could be the development of a formal theory about sustainability in healthcare practice. Building a formal theory was beyond the scope of a doctoral programme but is a possibility to consider for the future, especially in collaboration with other organisations.

Research about the sustainability of financial, environmental and social resources for healthcare practice has been emphasised as necessary by the SDU (2015b, 2017) and the King’s Fund (Ham et al., 2017; Naylor and Appleby 2012). The Department of Health’s (2017) ‘areas of interest’ for current research priorities included promoting sustainability by researching how to maximise effectiveness (including cost-effectiveness) and minimise waste. An extensive survey on the future of healthcare, commissioned by the NHS National Institute of Health Research, recommended imminent research on how to sustain safe, equitable and effective care (Corbett et al., 2017). The Health Foundation (2016a) also provides funding for and conducts its own research on the sustainability of healthcare-related topics, further substantiating the pertinence of this topic. As stated by Anita Charlesworth, the Director of Research and Economics at The Health Foundation, “*research into the efficiency and sustainability of our health and social*

*care services is of national importance, as the sector continues to work through a long period of constrained funding and uncertainty”* (DigitalHealth.London 2017).

### 7.3 Limitations of the study

The strengths of this study lie in how the research process maintained methodological rigour (Section 4.4) and the grounded theory as a research product had credibility, originality, resonance and usefulness (Table 28 on page 209). Limitations of the research already addressed included the potential disadvantages of recruiting through social media sites (Table 7 on page 47) and conducting interviews through an online video or telephone call (Table 10 on page 55). With debates remaining in the literature about constructivist grounded theory as an approach and member checking as a method, some people may critique a constructivist grounded theory approach and member checking as limitations. However, the researcher did not take this view and justified the positive features of constructivist grounded theory in Section 3.3.3 and member checking in Section 4.4.2.2. Furthermore, the researcher reflexively managed her assumptions, bias and previous experience to ensure they did not unduly influence the co-construction of meaning (see Section 4.4.2.1).

There were other limitations of this study which warrant consideration. Firstly, there may have been *self-selection bias* which is when only people who are very interested and generally positive about the research topic volunteer to be a participant (Robinson 2014). The sample did not include the direct voice of practitioners in critical care who disapprove of sustainability initiatives, although P02 discussed her observations of other colleagues who did not value sustainable practices (see Section 5.2.4). Additional research, building on the theory generated from this study (see Section 7.2.4), could address this limitation by exploring more about the perspective of people working in critical care who hold an unfavourable view of sustainability.

Secondly, the sample did not include members of the critical care team from every role or level of expertise. There were nurses, physiotherapists, a technician,

educators and a matron who all worked in adult critical care, but the sample did not include doctors, healthcare assistants, pharmacists or practitioners from paediatric or neonatal units. Likewise, the sample did not contain students or junior novices with the participant's years of experience working in critical care ranging from 7 to 28 years. Nevertheless, the data analysis did not indicate theoretically sampling any other types of practitioners was necessary, as previously noted in Section 4.2.3.5. Moreover, the intention of qualitative research and constructivist grounded theory is not to generalise the findings based on a large, representative sample (Charmaz 2014). Instead, this study aspired to generate a theory which could provide further insight and a deeper understanding of the topic of sustainability in critical care practice. Although there was an adequate level of abstraction of key concepts with enough data analysis to achieve an initial level of *theoretical sufficiency*, testing out the theory with other types of participants (especially medical doctors) in post-doctoral research could address the potential restrictions of the sample to enhance and further develop the theory. As justified on page 49, extending the sample was not feasible for this thesis though, because of the time limits of the doctoral programme and the 'messy reality' of research practice.

The thesis already considered other practical challenges with data collection on page 58, including how observation of actual clinical practice for theory verification needed to be ruled out for the doctoral study. With the research topic focused on critical care practice, direct observation in the clinical setting would have been ideal for ensuring application and significance to the daily reality of caring for critically ill patients and families in practice. The drawback of not viewing clinical practice in this study can be addressed through post-doctoral follow-up research, including applying for NHS ethics to observe direct practitioner decision-making related to *satisficing*, *bounded rationality* and *stewarding*.

A final potential limitation of this study was that the researcher was a novice grounded theorist. While undertaking the research, she was also learning skills in grounded theory research as systematically planned and evaluated with the Researcher Development Framework (Vitae 2017). The researcher reflexively considered this development while memoing, writing a research journal and

discussing the research with supervisors (see Section 4.4.2.1). Peer support and learning activities to strengthen researching skills came from engaging with the University Special Interest Groups for both sustainability and grounded theory (see Section 4.4.2.4). Undertaking grounded theory research for the first time, therefore, did not impede the researcher from conducting a rigorous study.

Due to the shortcomings of the study outlined in Section 7.3, the researcher acknowledges the substantive theory offers a preliminary explanation for sustainability in critical care practice with scope for further development. The theory does present new knowledge because there was a lack of published literature to answer the research questions. However, these claims for new knowledge are limited to the contexts and conditions of the data used for the study.

## 7.4 Summary

In conclusion, the aim at the outset of the research study was to generate a substantive explanatory theory about sustainability in critical care practice. This goal was justified because of the distinct lack of a research-based explanation for how practitioners in critical care practice constructed sustainability; and what the social processes were for sustainability to be a component of critical care practice. The thesis has explored the underpinning methodology and research methods used to address these two questions. The research findings were presented using a collection of interview transcripts and researcher memos. A detailed discussion analysed how the constructivist grounded theory, which emerged from this data, was positioned amongst other literature. Implications for potential applications and further developments of the substantive grounded theory were also reflected upon.

The common thread throughout the thesis was the main concern practitioners in critical care have about sustainability, namely that financial, environmental and social resources for critical care practice are currently used in a way which is not sustainable for the future. The thesis argued that *satisficing* is a significant social process which could facilitate sustainability in critical care to fulfil normative,

responsible, sustainable and flourishing practice. Other relevant concepts are *bounded rationality* and *stewarding*. Clinical practitioners, managers, educators and researchers can now use this theory to frame initiatives aimed at ensuring critical care practice remains sustainable. Continuing to use resources in an unsustainable manner not only puts future patients at risk but also pressurises practitioners in the immediate moment to question if, how and when to use resources while caring for their critically ill patients. Sustainable practice should be promoted to ensure quality critical care meets the holistic health needs of critically ill patients and their families and is delivered by teams with a strong sense of staff well-being and professional fulfilment.

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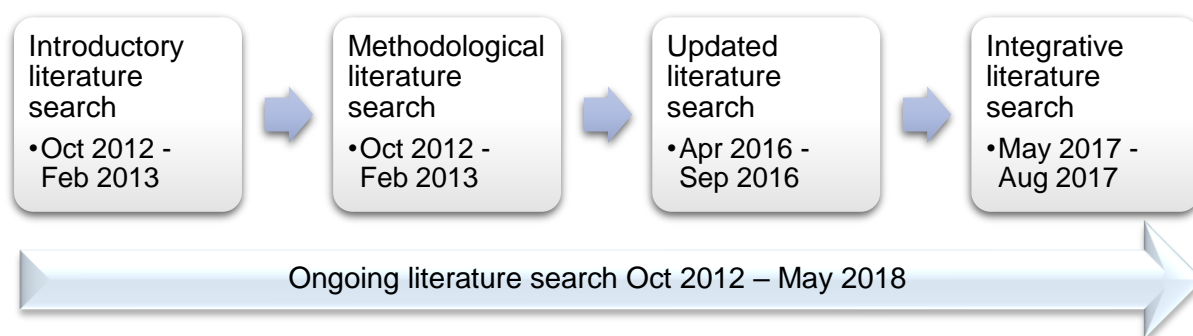
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## Appendix 1 Literature searching details



Criteria for publication choice		
Inclusion criteria	Exclusion criteria	Rationale
<b>Published <math>\leq</math> 5 years at time of search</b>	Published > 5 years at time of search	Publications > 5 years old may not reflect current healthcare practice in NHS
<b>Published in the English language</b>	Published in a language other than English	Translation would be required
<b>Literature about sustainability related to acute healthcare practice</b>	Literature about sustainability related to public health or environmental health	Literature must be applicable to critical care practice

### Ongoing literature search

**Type:** gathering of relevant literature throughout the research study timeframe from means other than an active search of literature databases

**Aims:**

- To remain up to date with current literature related to the research study
- To ensure relevant articles are found which are published since an active search of literature databases
- To gather and organise recently published literature in an efficient manner

**Actions:**

- Weekly email alert from EBSCOhost (CINAHL and MEDLINE databases) about new publications for: Sustainability AND (Intensive Care OR Critical Care)
- Weekly email topic alert from SciencDirect about new publications for: Critical Care
- Weekly RSS (Rich Site Summary) feed from ScienceDirect for new publications for: Sustainability AND (Intensive Care OR Critical Care)
- Saving and memoing on literature relevant for the study found from:
  - Literature noted in email alerts and online newsletters from the British Association of Critical Care Nurses, Intensive Care Society and European Society of Intensive Care Medicine

- Literature mentioned during conferences, study days and Special Interest Group meetings (sustainability and grounded theory groups)
- Exposure to literature from other means such as during discussion with students and colleagues working in critical care and via social media (Twitter and Facebook)
- Reviewing reference list of chosen publications for other literature

## Introductory literature search

**Type:** general, broad literature search about the research topic

**Aims:**

- To show gap in literature and justify need for the research
- To identify research questions for the research plan and ethics proposal
- To remain open minded during this initial exploration of literature ensuring research plan is not developed towards a pre-conceived direction
- To begin developing theoretical sensitivity towards the research topic
- To support writing of Chapters 1 and 2

**Key terms:** Sustainability, Sustainable, Sustainable Development, Carbon Footprint, Climate Change, Intensive Care, Critical Care, Nursing, Medicine, Physiotherapy, Acute Care

**Databases:** CINAHL Plus, British Nursing Index, PubMed, Science Direct, ProQuest, OVID, NHS Evidence, Cochrane Library, Wiley Online, JSTOR, Google Scholar, Google

The first initial search of just research articles revealed a lack of published research specific to sustainability and critical care practice. All types of publications were then considered including general articles, research articles, editorials, government documents, dissertations and grey literature.

## Methodological literature search

**Type:** focused literature search about the research methodology and methods

**Aims:**

- To increase knowledge and skill as a student researcher about planning and implementing a constructivist grounded theory study
- To articulate and justify the research plan for the initial ethics proposal including: research questions, philosophical positioning (ontology and epistemology), methodology, methods, data collection and data analysis
- To support writing of Chapters 3 and 4



**Key terms:** Grounded Theory, Constructivist Grounded Theory, Symbolic Interactionism, Kathy Charmaz, Memoing, Online Interview, Telephone Interview, Research Methods, Research Methodology

**Databases:** CINAHL Plus, PubMed, Science Direct, ProQuest, OVID, Wiley Online, JSTOR, Google Scholar, Google, University book catalogue, YouTube

## Updated literature search

**Type:** repeat of the introductory and methodological literature searches along with added key terms relevant for the developing theory including concepts being auditioned as the central organising phenomenon and other major categories

### Aims:

- To confirm there remains a gap in literature justifying the research study has potential to contribute to new knowledge
- To provide supporting literature for the MPhil to PhD Transfer
- To continue refining theoretical sensitivity towards the research topic
- To use literature as a conceptual lever for further abstraction of significant concepts during concurrent data collection and analysis
- To use other theories and extant literature to help explain how participants were constructing the concept of sustainability and the social processes emerging from the data
- To check the developing theory centered around *satisficing*, *stewarding* and *bounded rationality* does not already exist

**Key terms:** Sustainability, Sustainable, Sustainable Development, Carbon Footprint, Climate Change, Intensive Care, Critical Care, Nursing, Medicine, Physiotherapy, Acute Care, Social Process, *Satisficing*, *Bounded rationality*, *Aspiration threshold*, Stewardship, *Stewarding*, Constructivist Grounded Theory

**Databases:** CINAHL Plus, British Nursing Index, PubMed, Science Direct, ProQuest, OVID, NHS Evidence, Cochrane Library, Wiley Online, JSTOR, Google Scholar, Google

## Integrative literature search

**Type:** more extensive yet focused literature search about the substantive theory

### Aims:

- To use theoretical sampling of the literature ensuring concepts searched for have emerged from this study's data
- To use reflexivity and memoing about how search terms and selected publications are relevant to the data to prevent being leading or biased
- To situate the substantive theory within the current literature base and establish how the theory contributes to new knowledge by:

- Comparing the central organising phenomenon and major categories with extant literature confirming substantive theory about sustainability in critical care practice does not already exist
- Confirming theory based on integration of Simonian *satisficing*, *neo-satisficing* and costly deliberation does not already exist
- To support writing of Chapters 6 and 7

**Key terms:** Intensive Care, Critical Care, Sustainability, Environmental Sustainability, Financial Sustainability, Social Sustainability, Systems, *Satisficing*, Herbert Simon, *Neo-satisficing*, *Bounded rationality*, Aspiration Level, Stewardship, *Stewarding*, Resources, Clinical Reasoning, Clinical Decision-making, Rationing, Resilience

**Databases:** Included those with publications related to healthcare, business, environment and sociology: EBSCOhost Athabasca (Academic Search Complete, Academic Search Elite, Business Source Complete, Business Source Elite, Business Economics and Theory Collection, Emerald Insight, CINAHL Plus, Environment Complete, MEDLINE, Science Reference Center, SocINDEX), EBSCOhost NHS Athens (Health Business Elite, GreenFILE), ScienceDirect, Journals@OVID, Proquest (Business, Health and Medicine, Social Sciences, Dissertations and Theses Global), Web of Science Core Collection, JSTOR, Cochrane Library, Google Scholar, Google, EThOS, American Doctoral Dissertations, Google Books, University of Brighton book catalogue

**Search strategies:**

- Boolean operators AND, OR and NOT used to combine key terms
- Multiple databases were searched simultaneously within a larger search engine when possible to be more efficient and streamlined
- Individual searches were saved to keep an audit trail and to retrieve, update and refine during later literature searches
- Used the “Find similar results using SmartText searching function” in EBSCOhost searches
- Truncation was used for *Satisficing*, *Stewarding* and Environmental (*Satisfic\**, *Steward\**, *Environment\**) to capture all related terms
- Searches were limited to publication dates from the last 5 years to draw from current literature except an unlimited publication time was used for these specific searches to make certain the substantive theory did not already exist in published literature:
  - (Intensive Care OR Critical Care) AND *Satisfic\** NOT Satisfaction
  - (Intensive Care OR Critical Care) AND *Steward\** NOT (Antibiotic OR Antimicrobial OR Infection)
  - (Intensive Care OR Critical Care) AND *Bounded rationality*
  - *Satisfic\** AND *Steward\** AND *Bounded rationality*

## Appendix 2 BACCN letter



Mrs H Baid



BACCN Administration  
C/O Echo Events and Association Management  
14 Blandford Square  
Newcastle upon Tyne  
NE1 4HZ

t: 0844 800 8843  
f: 0191 245 3802  
e: [baccn@baccn.org](mailto:baccn@baccn.org)

24<sup>th</sup> June 2015

Dear Heather

Thank you for your email. The National Board Professional Advisors have considered your proposal and BACCN can support your request to send out your study as long as the following two conditions apply:

1. You are a member of BACCN
2. Assurances that BACCN will be acknowledged in all future presentations and publications as a result of your work.

Once you confirm the above two, we can help to facilitate the sending out of the necessary documentation. If you would like to send through a short paragraph re your study for us to advertise we can progress this very quickly for you.

Best wishes with your research.

Kind regards

Yours sincerely



BACCN Professional Advisers  
BACCN National Board

## Appendix 3 Emails for participants

### Initial email to potential participants

Thank you for your interest in volunteering for the research study called *Sustainability in Critical Care Practice*. Participating in the study will involve a one-hour, online interview about your views on the topic of sustainability and how critical care practice can be sustainable. The interview will be conducted at a time of your convenience and a telephone interview could be arranged if preferred.

Please review the eligibility criteria and read the participant information sheet attached. A consent form has also been attached which you can save, fill out and email back if you are willing to volunteer to be interviewed for this study. I will then contact you to arrange a time for the interview.

Regards,

*Heather Baid*

---

### Thank you email for participant the day after the interview

Hello *participant's name*.

Thank you very much for participating in the Sustainability in Critical Care research study and allowing me to interview you yesterday. I appreciate the time you were able to give me in order to ask you questions about your thoughts on sustainability. I will email you again soon with the typed transcript of our interview conversation which you can review and comment on if you wish.

Regards,

*Heather Baid*

---

### Email for participant with interview transcript attached

Hello *participant's name*.

Thank you again for participating in the Sustainability in Critical Care research study and allowing me to interview you. I have attached a typed transcript of our interview. Could you please review this transcript and reply back within 10 days with any comments or concerns. If I do not hear back from you within 10 days, I will assume you have provided me with consent to use the transcript for the research study. The interview discussion will remain anonymised for any reporting of the study's findings.

Regards,

*Heather Baid*

---

## Email for to invite participate for a second interview

Hello *participant's name*.

Thank you for taking part in the research study I am conducting about sustainability in critical care practice. At the end of your previous interview, you indicated I could contact you again if I had further questions.

The next stage of the study now involves returning to people who have already been interviewed asking them to: (i) read a summary of the main concepts I have identified from the first interviews and (ii) answer questions about this summary either verbally or as a typed email reply.

If you are in agreement to answer more questions for the study, could you please:

- Click here if you would like to read the participant information sheet and consent form again
  - Review the attached document of the summary and questions
  - Let me know if you prefer to answer the questions verbally and I will be in touch to arrange another interview through an online or telephone call
- OR
- Email back your answers to the questions as a typed response.

Thank you very much,

*Heather Baid*

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## Appendix 4 Supervision meeting memo

### Supervision meeting example memo – 09/21/2015

#### Previous action plan:

- ✓ Follow up with recruitment opportunities
  - BACCN social media sites and website – done
  - Email again to people who have agreed to be interviewed (maximum 2 further emails to see if still interested in volunteering) – done
  - Contact Intensive Care Society – done but not heard back
- ✓ Continue with interviews, data analysis and memoing – ongoing
- ✓ Continue with chapter writing and preparation for transfer – ongoing
- ✓ 10 min oral presentation at Doctoral College conference 21<sup>st</sup> July 2015 – done

#### Recruitment and data collection

- BACCN advertised on webpage, FaceBook and Twitter in July
- Intensive Care Society – emailed them to request advertising on their social media sites but not heard back and they have said in a group distribution email recently that they are limiting the number of survey invites they send out each month
- 9 interviews completed with 2 more booked in and 4 more people who have emailed to volunteer (1 doctor, 1 nurse and 2 University lecturers) but no consent form returned yet or interview date booked
- Attended BACCN conference this month
  - One of the BACCN board members sent me a Tweet at the conference asking about my study and said she didn't have time to be interviewed but would share the research study's website with others in her area
  - Conference was focused on quality and safety – themes which resonated with ideas discussed by my research participants: having time to care with humanity for patients, time to take care of ourselves as healthcare professionals, resource depletion of 'stuff'/staff/money, ethical dilemmas while trying to sustain a high-quality service when there's not enough resources for all.
- Theoretical sampling: Technician and physiotherapist were mentioned by participants and then theoretically sampled. Sustainability champion (nurses) mentioned by P01 and then snowballed to P09 who P01 felt was a champion in her unit. Other types of people mentioned but not yet recruited: doctors, pharmacists, matron/managers, healthcare assistants, Band 5 clinical nurses.

#### Data analysis

- Issues and concepts discussed in all 9 interviews so far: waste, resources, efficiency, mindful practice, collaboration, novice vs. expert practice, pressure to maintain quality care with reduced financial and time resources, infection control, waste as a resource
- Initial ideas and themes emerging from analysis so far (although I recognise this list is quite descriptive and I need to go back and do a deeper more abstract analysis):

- Some participants immediately link sustainability to environmental, others it's more about financial sustainability and staffing, 2 participants have mentioned the phrase 'social sustainability' and related this to availability of beds and how to use social resources for ICU drawing from volunteers and visitors more
- Being more aware, thinking more, having some common sense
- Everyone in practice focusing on the 'right here, right now' and not seeing the bigger picture putting sustainability on the bottom of the list of things to think about – just what to get today's job done and go home – unable to see the link between sustainability and natural resources / cost of care – critical care requires more resources for society but don't think it'll affect them, short sighted way of living in a small bubble – feeling disconnected from the natural world
- Scavenging, salvaging, rationing: Working creatively, flexibly, doing the best you can with what you've got
- Sustainability champion – some have identified a specific person who is particularly passionate about environmental sustainability; and sustainability team in one Trust
- P01 and P09 discussed a lot about their passion for environmental sustainability and dilemmas they faced in practice with following infection control principles, perceiving some admissions as inappropriate, hugely wasteful environment – these factors contributed to deciding to no longer work full time in critical care. P01 became an outreach nurse and P09 still works Agency but recently completed MSc in Ecology.
- Nurses from other countries: Finland – P09 grew up surrounded by sustainability principles and was much more apparent in culture there, still works as an Agency Nurse but has recently completed MSc in Ecology (feeling guilty in practice for wasting so many resources financially and environmentally and had personal interest in biology and biodiversity and how environment works and how everything is connected, how human life is connected with environment – disappointed in nursing and healthcare and how much it was consuming resources and in practice, dilemma in fairness in the bigger picture, in 1 country you maintain people alive with large amount of money but for that same money you could keep many more people alive in another country). Slovakia and US – P08 is a Slovakian nurse (talked about trying to use minimal resources/reusing because of less money and equipment being available there) who also worked in US (talked about how as a nurse you were aware that patient needs to pay for services so you think twice as a nurse before doing things in case the patient didn't have the money to pay for it; more aware of the financial bill and you paid attention to use minimal possible resources to keep costs down and you had bar codes on all items to keep track of costs)
- Constant comparison – may need to go back to same participants with focused questions to enrich the data and to 'check out' and 'audition' theoretical codes and ideas from further comparison of data within and between interviews.
- Need to work on abstraction and finding meaning in the data that is beyond the literal (use perspective shifts from literal words to more abstract concepts). This

may be helped by considering psychological and sociological theories (e.g. cognitive dissonance).

- Other ideas explored as emerging from the data: burnout, boom and bust, emotional sustainability, rationing, protocolised care, defensive practice, sustainability may be antagonistic from the outside rather than a central principle driving practice from the inside, practice being challenged.
- **Personal development as a researcher**
  - Research student conference support discussed for local, national and international conference opportunities.
  - Completed Unit 5 Disseminating Your Research Workshop.
  - Presented Doctoral College Conference 21<sup>st</sup> July 2015 on the topic of online interviewing.

#### Action plan:

- Finish transcribing last interviews completed already
- Finish initial coding and further analysis of interviews completed already using constant comparison methods
- Continue with recruitment and data collection / analysis

#### Longer term action plan:

- Although focusing on data analysis at present, keep in mind Transfer requirements:
  - Transfer document (aiming to attend Preparing for Transfer workshop June)
  - Chapter writing – introduction, methods and methodology chapters
  - Data analysis up until that point with indication towards development of a theory
- Conference presentations – plan to present at annual Doctoral College conference and annual Sustainability Special Interest Group symposium



## Appendix 5 Participant information

### What is the purpose of the study?

I am a PhD student who is interested in researching how the concept of sustainability relates to clinical practice in critical care.

The word sustainability refers to something which can go on indefinitely within the limits of financial, social and environmental resources. Due to a limited amount of resources, the NHS currently has sustainability plans to reduce its financial cost and be more environmentally friendly whilst still meeting high-quality care for all<sup>83</sup>.

The purpose of this research study is to find out more about sustainable healthcare practice in the critical care setting. It is important to know more about sustainability in critical care practice because critical care is a large consumer of NHS resources. There is also no published research to date asking people who work in critical care what their thoughts and ideas about sustainability are. With this research study, I will be interviewing practitioners from critical care, or other people influencing critical care practice, in order to build a theory about sustainability in critical care practice.

### What happens if I volunteer?

Volunteering for the study will involve a one-hour, online interview at a time which is convenient for you. You can choose the way the video call is made (e.g. Skype, FaceTime or any other video calling programme). If you prefer, a telephone interview can be arranged instead.

During the interview, I will ask you questions about your views on sustainability and how critical care clinical practice can be sustainable. I am interested to know what you think about the resources needed to care for critically ill patients. These could be financial or environmental resources or you may have other ideas about resources for critical care practice.

The interview will be recorded using an audio voice recorder. I will then type out our interview conversation and send you a copy to review. I may ask you for a follow-up interview to clarify points made during your initial interview, but it will be your choice to decide if you want to participate in another interview.

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<sup>83</sup> Sustainable Development Unit. 2014. *Sustainable development strategy for the NHS, public health and social care system 2014-2020*. Cambridge: Sustainable Development Unit.

**Are there any benefits?**

There are no specific benefits for volunteering to be in this study. However, you will be contributing your views which will be respected in the theory that will be built from the research.

**Are there any risks?**

There are no anticipated significant risks of physical or non-physical harm to you for participating in this study. It is unlikely that you will become upset or emotionally distressed by the types of questions asked during the interview although if this happened, the interview could be paused or stopped.

**Am I required to participate? Can I change my mind at a later date?**

Participation in this study is completely voluntary and you may withdraw at any time by email without giving a reason. However, the data you have contributed up until the point of withdrawing will have already been analysed and integrated into the building theory.

**Will my name and interview responses be kept confidential?**

The researcher will be alone in a quiet room when the interview call is made to ensure privacy. Only the researcher will have the password to open the recorded interview audio files and she will be the only person to type up the interview discussion into a transcript. The PhD supervisors may read the typed transcript and may listen to the interview audio recording but the information will be kept anonymised. The audio recorder and the USB stick containing the names and contact details of participants will be locked in a cabinet while not in use. Any paper/electronic records not needed at the end of the project will be securely disposed of after 10 years.

If you discuss previously unreported serious safety issues with clinical practice, personal safety or healthcare malpractice, I will need to stop the interview and suggest you report this to an appropriate senior manager following your local clinical governance procedures. I would also be required to notify my PhD supervisors that I stopped the interview due to these circumstances and to discuss with them whether any further actions are needed.

### **What will happen when the study is finished?**

The intention of the study is to build a theory of sustainability in critical care practice. You will be emailed a summary of key findings once the study has finished. The findings will also be published in journal articles and presented at conferences. Your name and personal details will not be included in any publications or presentations and all quotations from the interview transcription will be anonymised.

### **Who has approved this study?**

This research study has been approved by the University of Brighton's Tier Two Health and Social Science, Science and Engineering Research Ethics and Governance Committee.

Thank you for taking the time to read this information. Contact details are below if you have any further questions, concerns or complaints.

**Heather Baid**

## Appendix 6 Agenda for initial interview

### Preparing

Thank you for volunteering, explain interview process, review participant information sheet  
 Refresh consent for the interview, audio recording and note-taking  
 Reminder not to identify any confidential information about patients, family or NHS Trust  
 Test audio recording equipment and ask if there's any questions before starting

### Opening – background info

What type of critical care unit do you work in? What is your current job title?  
 Which region of the UK do you work in? Have you always practiced in the UK? If not, where?  
 How many years in critical care? How many years of experience before critical care?

### Deconstructing sustainability

What drew you to volunteer for this study?  
 Is sustainability an area of interest for you? If yes: In what way? What aspects of sustainability are of particular interest? How did you become interested? When did you become interested? What or who influenced you in becoming interested? If no: Is sustainability a term you've heard before – where, when, how?  
 When you hear the word sustainability, what comes to mind for you? How did you come to view the word sustainability in this way? How does \_\_\_\_\_ relate to critical care practice?  
 Is sustainability a topic that is discussed on your critical care unit? If yes: How? When? By who? What would typically prompt a discussion about sustainability? If no: Can you suggest a reason for sustainability not being discussed?  
 When, if at all, did you first notice sustainability issues with critical care practice? If so: How did you happen to \_\_\_\_\_? Who, if anyone, influenced \_\_\_\_\_? Tell me about how \_\_\_\_\_ influenced you.

### Sustainability in practice

Please tell me about your last clinical shift in a critical care unit - were you aware of any sustainability issues during that shift?  
 If no: Can you identify any sustainability issues now that you did not notice while working that day? If so: How did these issues affect your clinical practice?  
 If yes: What were these issues? How did these issues affect your clinical practice? When did you first notice these issues? Are these issues being addressed by anyone in your critical care unit? If so: How? By who? If not: How do you think these issues could be addressed?  
 For you, what are the most important lessons you learned through experiencing \_\_\_\_\_.  
 As you look back on \_\_\_\_\_, are there any other events that stand out in your mind? Could you describe \_\_\_(each one)\_\_\_ it? How did this event affect what happened? How did you respond to \_\_\_(the event; the resulting situations)\_\_\_?  
 What helps you to manage \_\_\_(noted issue)\_\_\_? What problems might you encounter while you manage this? Could you tell me the sources of these problems?  
 Who has been most helpful for you in relation to \_\_\_\_\_? How has he/she been helpful?  
 Has any organisation been helpful in relation to \_\_\_\_\_? What did \_\_\_\_\_ help you with? How has it been helpful? I've read in the literature the term sustainability has been

linked to being able to stay within the limits of available resources. How do you think this relates to your critical care practice?

### Embedding responses back to participants

What do you think are the most important ways for people working in critical care to practice sustainably? How did you discover this?

How has your experience as a \_\_\_\_\_ affected how you think about sustainability?

Could you tell me about how your views (*or actions*) on sustainability may have changed since you have \_\_\_\_\_?

What advice about sustainability would you give to other people working in critical care?

Is there anything that you might not have thought about before that occurred to you during this interview?

Is there something else you think I should know to understand sustainability better?

### Exploratory probes – use throughout:

Please say more about \_\_\_\_\_?

Could you give me an example of \_\_\_\_\_?

Could you elaborate on \_\_\_\_\_?

Could you clarify what you meant about \_\_\_\_\_?

How does \_\_\_\_\_ relate to critical care?

How often does \_\_\_\_\_ happen? Where does it happen? When does it happen?

Who is involved with \_\_\_\_\_ happening?

Is that always the same situation or have you ever experienced it to be different?

Was that the unusual? Was that exceptional?

That's something I haven't heard before, could you explain more about \_\_\_\_\_.

Do you know other people who may experience that from a different perspective?

How did you come to know this?

Please go on \_\_\_\_\_.

I'd like to know more about that, please explain.

### Cooling out prompts – 15 min before end of interview

I've just noticed the time, is it still okay to keep speaking until (*time agreed*)?

Is there anything you think we should have talked about that we haven't had opportunity to explore?

Is there anything you would like to ask me?

Is there anything else you would like to discuss or share?

### Closing

Thank you for participating in the study.

Transcript will be typed up without your name on document to maintain confidentiality – will be emailed to you to check for accuracy and comment on if you wish. There will be 10 days to reply back with comments or concerns with the typed transcript (check to see if participant is going to be unavailable via email during that 10-day period or if more time is required for reviewing the transcript).

Could I contact you for a follow-up interview if further clarification is needed?

Snowballing – would you be willing to forward an email about the study to other people you know who may be interested in being interviewed?

Thank you again for your time.

## Appendix 7 Theory summary and focused questions

Thank you for participating in this research study about sustainability and critical care which is still ongoing. Currently, I am returning to people who have already been interviewed to show them a summary of the analysis I have done from the initial interviews with eleven participants (practitioners who all work in critical care from a variety of roles). This summary proposes a central concept and other major themes which could help to explain sustainability in critical care practice. I am interested to see the extent to which these ideas fit with your own experiences and views.

### What I am asking you to do:

- Please read this document which summarises the key ideas I have identified from analysing the initial interviews. I am checking with you that I have captured the issues with sustainability in critical care practice and whether these resonate with your experience.
- I have questions about these key ideas which are integrated throughout the document. You may also wish to make comments outside those questions.
- You can answer the questions and make other comments by:
  - Typing a reply in this document to be emailed back – this can be as long or as short as you like.
  - Letting me know if you prefer to verbally reply – I will then be in touch to arrange another online/telephone call.

### Confirmation of background details

**Your name:**

**Date:**

**Type of critical care unit where you currently work:**

**Current job title:**

## Summary of key ideas + further questions for participants

### Introduction – meaning of sustainability

Participants indicated for them, sustainability meant being able to *sustain the resources needed for critical care practice into the future*. Specific examples of resources discussed by the participants included: *physical resources (energy, water and hospital building), clinical supplies, finances, people, time and knowledge*. These different types of resources were categorised during the interview analysis as three main types: *financial, environmental and social*. The main concern participants had about sustainability was their view that the way resources are currently used for critical care practice is not sustainable for the future.

### Central idea about sustainability in critical care practice

A core theme which came across in all the interviews was sustainability becomes a part of critical care practice if resources are used in a way which is *good enough* for safe, quality care as defined by external guidelines and protocols, but stays within the limits of available resources. One participant labelled this as a critical line:

*“The guidelines coming in with recommendations for certain levels of quality of care along with reduced amounts of staff and cash available don’t match. It will be interesting to see where it goes in terms of sustainability, where that critical line is of not being sustainable at certain points and certain levels of service.”*

Other participants also discussed how sustainability occurs when time, staff and equipment are used in a way which is *good enough* to financially sustain critical care as a department. Similarly, in relation to environmental sustainability, some participants talked about using clinical supplies in a way that was *good enough* for quality patient care but which had minimal impact on the environment.

The sustainable use of resources in critical care therefore appears to involve a decision-making process about if and how resources are used in daily clinical practice. This process includes people working in critical care being *satisfied* that a *good enough* threshold of safe, quality care for the critically ill patient has been reached. For sustainability to happen, practitioners also seem to be ensuring resources are used to *sufficiently* meet the healthcare needs of patients but in a way which stays within the limits of available resources and does not have a negative impact on future resources.

A concept which could help to explain this process of simultaneously being *satisfied* and ensuring something is *sufficient* is that of **satisficing**. The term **satisficing** (*satisfy + suffice*) does exist and refers to a decision-making approach where someone sets a goal to be reached but it is not feasible to try out every single action which could be done to reach that goal. Various actions are done until the decision maker is *satisfied* that the aspired goal has been *sufficiently* met and no further actions are needed. **Satisficing** is the one central idea which stood out in the data and it is being proposed as a process which could help to explain how sustainability becomes a part of critical care practice.

Relating **satisficing** back to critical care based upon the interview discussions, practitioners need to make decisions about which resources to use for the care of a critically ill patient including various types of resources (e.g. clinical supplies, equipment, time, knowledge). Any patient could have a huge number of investigations, monitoring and treatments but the practitioner makes a decision about which actions are necessary for meeting the health needs of the patient at that time. The practitioner is then *satisfied* that *sufficient*, safe, quality care is being provided once the goal for the meeting the health needs has been met and there is no longer a requirement to continue using resources while trying out different new actions.

Participants did not state the word **satisficing** but is a label I have used during the data analysis because examples participants gave about sustainable use of resources seemed to show a **satisficing** decision-making process. This included examples about making decisions for the clinical care of individual patients as well as wider decisions for resourcing the critical care unit itself as a department.

Many participants felt personal tension and frustration with their attempt to be **satisficing** because they did not view either themselves or the critical care unit as a whole of using resources in a sustainable manner. Current situations in practice appeared to prevent them from being *satisfied* they are *sufficiently* reaching a *good enough* standard of what they perceive quality care to be while making decisions about if and how resources are used. This could help to explain why participants felt critical care practice as it is currently delivered will not be able to sustain itself into the long-term future within the limits of available financial and environmental resources.



**Question 1**

Do you recognise this idea of *satisficing* in your own practice with how you or colleagues make decisions about using resources? These could be for decisions involving any type of resource (e.g. clinical items, equipment, time, knowledge).

If yes – in what way does this resonate with your experience? Can you provide examples?

If no – can you explain how this differs from your experience?

**Question 2**

Are there times in clinical practice when this idea about *satisficing* does not fit with how you or others make decisions about resources in clinical practice?

If yes – in what way? Can you provide examples?

If no – can you explain?

**Sense of responsibility**

In the interviews, critical care was recognised by participants as a very resource intensive setting because patients are severely unwell requiring large amounts of care as expressed by this participant:

*“I’m aware that I’m working in an area that’s very intense on all levels. It’s very staff, equipment, disposables and energy intense.”*

Due to current limitations in resource availability, participants questioned how sustainable the present way of working is particularly with an ageing population influencing the demand on critical care services:

*“The main thing that comes to mind [in relation to sustainability] is the huge amount of money it costs to provide critical care and whether that can be sustained for the future with an ageing population.”*

In addition, a number of participants felt there is waste from some resources being overused because of a tendency of people working in critical care to err on the side of caution with patients who are critically ill especially if staff lack experience:

*“In critical care, it’s that whole thing of trying to do the right thing and knowing that you’ve got this person’s life in your hands, they are vulnerable and as a junior nurse you are very frightened of doing the wrong thing.”*

Participants also felt excessive use of resources leads to inappropriate admissions, too many investigations and treatments than are necessary and over using infection control precautions. Managing physical waste in a sustainable manner was discussed by a number of participants as impacting on both environmental and financial resources

*“I’ve been trying to promote recycling and prevent wasting resources. For example, for patients in isolation, you have to throw everything away after the patient has been discharged which has a great impact on the environment but also financially it’s really expensive for the NHS.”*

Because of their main concern about unsustainable use of resources at present, participants seemed to feel personally responsible to do the following in their own critical care practice:

- Only use resources when necessary
- Prevent unnecessary waste of resources
- Manage physical waste in a financially and environmentally sustainable way

### Question 3

Do you feel responsible to practice in a way indicated in the three bullet points listed above?

If yes – where does that sense of responsibility come from? Please elaborate.  
If no – can you explain?

### Question 4

Do you think your colleagues feel responsible to practice in a way indicated in the three bullet points listed above?

If yes – have they indicated where that sense of responsibility comes from?  
Please elaborate.  
If no – can you explain?

## Influences on resources use decisions

The interview data was also analysed for explanations of ‘how’ decisions about resources are made in critical care practice which then results in sustainable use of resources. For example, things which would affect how practitioners decided whether a resource (clinical item, equipment, time, knowledge etc.) is used or not and also things affecting a decision that a resource is no longer needed.

There were a number of different influences which appeared to promote or inhibit the sustainable use of resources in critical care practice including:

- Staff interaction, norms and culture
- Uncertainty and high risk with critical care patients (monitoring and clinical interventions ‘just in case’ to err on the side of caution)
- Values, beliefs and behavioural change
- Self-efficacy (personal self-belief in ability to achieve something, in this case ability to use resources in a sustainable way)
- Resource availability
- Technical knowledge and skills for critical care practice
- Non-technical knowledge and skills for critical care practice (human factors such as communication, situation awareness, teamwork and time management)

These influences were not discussed by all participants but is a summary of the key ideas expressed across the group of participants for major influences on things which help sustainability to be part of critical care practice or prevent the sustainable use of resources.

### Question 5

To what extent do the potential influences listed in the bullet points above affect your own decisions about using resources in clinical practice?

Please elaborate and provide examples.

## Conclusion

This document has provided a summary of how the decision-making approach of **satisficing** was identified during the data analysis as a core concept in the interview discussions in relation to the sustainable use of resources for critical care. I am therefore proposing **satisficing** as a significant process which could help to explain how sustainability becomes a part of critical care practice. This

process involves being *satisfied* that a *good enough* threshold of safe, quality care has been reached to *sufficiently* meet healthcare needs but in a way which remains within the limits of available resources.

Two other major themes in the data which related to **satisficing** were also presented including practitioners having a **sense of responsibility** towards achieving sustainably and the **influences on resource decisions** for critical care practice.

I am sending the previous questions about the proposed core concept and other major themes to you at this stage in the study to check out the extent to which these ideas relate to your own experiences.

**Do you have any further comments?**

Thank you very much for taking the time to read this information.

Could you please email this document back with your typed responses to questions if you prefer to reply in an email.

Alternatively, let me know if you would rather reply to the questions verbally in another interview as an online or telephone call.

Regards,  
Heather Baid

## Appendix 8 Initial codes and categories

The table presented over the next four pages depicts the initial coding and categorising of the first interviews with all eleven participants using the legend below. While undertaking the dimensional analysis technique, the categories became the dimensions and codes the sub-dimensions.

### Legend

✓	<b>Present in the data</b>	Concept directly discussed
○	<b>Absent in the data</b>	Concept not discussed
×	<b>Negative data</b>	Concept discussed but as 'not' being present (e.g. recycling is mentioned but in relation to recycling not being done)
?	<b>Inconclusive</b>	Unclear during data analysis with further clarification required

Category	Codes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11
<b>Sustainability definition</b>	Environmental sustainability	✓	✓	✓	✓	○	○	✓	✓	✓	○	✓
	Financial sustainability	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Social sustainability	✓	✓	○	○	✓	✓	✓	○	✓	✓	✓
	Sustaining critical care as a service	○	○	○	✓	✓	✓	✓	○	○	✓	✓
	Unclear on meaning of sustainability	○	✓	○	○	✓	○	○	○	○	○	○
	Linking types of sustainability together	✓	✓	✓	✓	○	○	○	✓	✓	○	✓
	Negative connotation to sustainability	○	✓	○	○	○	○	○	○	○	○	○
<b>Influences</b>	Childhood	✓	○	○	X	○	○	✓	X	✓	○	○
	Family	✓	○	○	✓	○	○	✓	○	✓	○	✓
	Sustainability in home life	✓	✓	○	✓	○	○	✓	✓	✓	○	✓
	Media	✓	○	○	✓	○	○	○	✓	○	✓	✓
	Living in other countries	○	○	○	○	○	○	✓	✓	✓	○	○
	Studying sustainability	○	○	○	○	○	○	○	○	✓	○	○
<b>Working practices</b>	Change	○	✓	○	○	○	✓	✓	○	○	✓	✓
	Creativity and flexibility	✓	✓	○	○	✓	○	○	○	○	○	✓
	Teamwork	○	✓	○	○	✓	✓	✓	○	✓	✓	○
	Stewardship – clinical, financial, general	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Non-technical skills – com, SA, caring	✓	○	○	○	✓	✓	✓	○	✓	✓	○
	Just in case – potential not actual	✓	○	○	✓	○	○	✓	✓	✓	✓	✓
<b>Waste - physical</b>	Necessary waste	✓	✓	✓	✓	○	○	✓	✓	✓	○	✓
	Unnecessary waste	✓	✓	✓	✓	○	○	✓	✓	✓	○	✓
	Infection control	✓	✓	✓	○	○	○	✓	✓	✓	✓	✓
	Over stocking	✓	○	✓	✓	○	○	○	✓	✓	○	○
	Over packaging	○	○	✓	✓	○	○	○	○	○	○	✓
	Expired products	✓	✓	✓	✓	○	○	○	○	○	○	○
	Recycling waste	✓	✓	✓	✓	○	○	✓	✓	✓	○	✓
	Waste management	✓	✓	✓	✓	○	○	✓	✓	✓	○	✓
	Throw away culture	○	○	✓	○	○	○	✓	✓	○	○	○
Energy – light, heat, power	✓	✓	✓	✓	○	○	✓	✓	✓	○	○	

<b>Resources - physical</b>	Water	0	✓	0	0	0	0	0	✓	✓	0	✓
	Physical resource intensive service	0	✓	0	✓	0	0	0	0	✓	0	✓
	Building and setting	0	✓	0	✓	0	0	0	0	✓	0	0
	Transport	0	✓	0	0	0	0	0	✓	✓	0	0
<b>Resources – clinical supplies</b>	Procurement of supplies	0	✓	✓	✓	0	0	0	0	✓	✓	✓
	Storage of supplies	0	✓	✓	0	0	0	0	0	0	0	0
	Equipment	✓	✓	✓	✓	0	✓	✓	0	✓	✓	✓
	Single use items	0	✓	✓	0	0	0	✓	✓	✓	0	✓
	Reusing and sterilising	0	0	✓	0	0	0	✓	✓	✓	0	✓
<b>Resources – people</b>	Staffing	0	0	0	0	✓	✓	✓	0	0	✓	0
	Nurturing staff	✓	✓	0	0	0	✓	✓	0	0	✓	✓
	Emotional labour of staff	✓	✓	0	0	0	✓	0	0	0	✓	✓
	Volunteers	0	0	0	0	0	0	0	0	✓	0	0
	Promoting physical well-being of staff	0	0	0	0	0	0	0	✓	✓	0	0
	Changing roles – new ways of working	0	✓	0	0	0	0	✓	0	0	0	0
<b>Resources – finances</b>	Commissioning	0	0	0	0	✓	✓	0	0	0	✓	0
	Avoiding financial waste	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Resource intensive service - money	✓	✓	0	✓	✓	✓	✓	0	✓	✓	0
	Affordability of care	✓	0	0	✓	✓	✓	✓	0	✓	✓	0
	Ability to care for ageing population	0	0	0	0	✓	0	✓	0	0	✓	0
	Justifying care	✓	0	0	✓	✓	✓	✓	✓	✓	✓	✓
	Rationing care	0	0	0	0	✓	✓	0	0	0	✓	0
	Practitioners aware of costs	✓	✓	0	✓	✓	0	0	✓	✓	0	0
<b>Resources – time</b>	Taking time to think and plan in practice	✓	0	✓	✓	0	0	✓	✓	0	0	0
	Slowing pace of practice down	✓	0	0	✓	0	0	✓	0	0	0	0
	Not having enough time	0	✓	0	0	✓	✓	✓	0	✓	✓	✓
	Too busy to think about sustainability	✓	✓	✓	0	0	0	0	✓	✓	0	✓
	Using time efficiently	✓	0	0	0	✓	✓	0	0	✓	✓	0
<b>Resources – knowledge</b>	Sustaining critical care knowledge	0	0	0	0	0	✓	✓	0	0	✓	✓
	Researching critical care	0	0	0	0	✓	✓	✓	0	0	✓	✓

	Evidenced base practice critical care	○	○	○	○	✓	✓	✓	○	○	✓	✓
	Evidenced base practice sustainability	○	○	○	X	○	○	○	X	○	○	○
	Teaching sustainability	✓	○	○	○	○	○	○	✓	✓	○	✓
<b>Quality</b>	Quality care	○	○	○	○	✓	✓	○	○	○	✓	✓
	Safe standards of care	○	○	○	○	✓	✓	○	○	○	✓	✓
	CQUIN	○	○	○	○	○	✓	○	○	○	○	○
	Consistent standards for all patients	○	○	○	○	✓	✓	○	○	○	✓	○
<b>Experience</b>	Drawing from experience of others	✓	✓	○	✓	✓	✓	✓	✓	○	✓	○
	Drawing from personal experience	✓	○	○	✓	✓	✓	○	✓	○	✓	○
	Supporting junior staff	✓	✓	○	✓	✓	✓	✓	○	○	✓	○
<b>Communication</b>	Multi-disciplinary team	✓	○	✓	✓	✓	✓	✓	○	✓	✓	○
	Negotiating care	✓	○	○	✓	✓	✓	○	○	○	○	○
	Trust wide generic emails	○	✓	✓	✓	○	○	○	✓	✓	○	○
	Discuss sustainability in critical care	✓	X	X	X	X	X	X	X	✓	X	X
<b>Values and beliefs</b>	Valuing sustainability as important	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Tension between own values and reality	✓	✓	?	○	○	○	✓	○	✓	✓	○
	Changing culture of practice	✓	✓	✓	○	○	○	✓	○	✓	○	○
	Values, beliefs, attitudes	✓	✓	○	○	○	○	○	○	✓	○	✓
<b>Feelings</b>	Frustration	✓	✓	✓	○	✓	✓	✓	○	✓	✓	✓
	Anger	✓	○	○	○	○	○	○	○	○	○	○
	Guilt	✓	○	○	○	○	○	○	○	✓	○	○
	Personal responsibility	✓	○	○	✓	✓	○	○	✓	✓	✓	✓
	Lack of control	○	✓	○	○	○	X	○	○	✓	○	✓
	Apathy	○	✓	○	○	○	✓	○	○	○	○	○
	Hopelessness	○	✓	○	○	○	○	○	○	○	○	○
	Positivity	○	○	○	○	✓	○	✓	✓	○	✓	○
<b>Service users</b>	Patients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Family members	✓	○	○	✓	✓	○	✓	○	○	✓	○
	Expectations of public / service users	✓	○	○	✓	○	○	✓	○	○	○	○
<b>Looking beyond</b>	Thinking long term	○	✓	○	✓	○	○	✓	○	✓	✓	✓



	Seeing bigger picture	0	0	0	✓	✓	✓	0	✓	✓	✓	✓
	Legacy	0	0	0	✓	0	0	0	0	✓	✓	✓
<b>Sustainability responsibilities</b>	Sustainability champions	✓	✓	0	0	0	0	0	✓	✓	0	✓
	Technologist	✓	✓	✓	✓	0	0	0	0	✓	0	0
	Estates	0	✓	✓	0	0	0	0	0	✓	0	✓
	Trust wide sustainability team	0	0	0	0	0	0	0	✓	✓	0	0
	Matron / lead consultant / managers	✓	0	✓	✓	✓	✓	✓	0	✓	✓	✓
<b>Nature / focus of practice</b>	Patient centred care	0	✓	0	0	X	✓	✓	✓	0	0	0
	Equipment centred care	0	0	0	0	✓	0	0	0	0	0	0
	Target centred care	✓	0	0	0	✓	✓	0	0	0	0	0
	Protocolised care	0	0	0	0	0	✓	✓	0	0	✓	0
	Routine practice – not always needed	✓	0	0	✓	0	0	✓	✓	0	0	✓
	Technology before patient	0	0	0	0	0	0	✓	0	0	0	0
	Prevent admissions and deterioration	✓	0	0	0	0	0	✓	0	✓	✓	0
	Flow of patients in and out of crit care	✓	0	0	0	✓	0	0	0	✓	✓	0
	Diaries, follow up, support groups	✓	0	0	✓	✓	✓	0	0	✓	0	0

## Appendix 9 Research plan approval letter



**Faculty of Health and  
Social Science**

Clinical Research Centre  
For Health Professions  
Aldro Building  
49 Darley Road  
Eastbourne BN20 7UR  
Telephone 01273 641806  
Fax 01273 643944

28<sup>th</sup> March 2013

Dear Heather

**Re: Research Plan Approval (RPA) Meeting 27<sup>th</sup> March 2013**

Thank you for attending the RPA meeting yesterday. I am delighted to inform you that your Research Plan has been approved.

Your submitted document was very well written, clear and detailed and provides an excellent springboard for the next phase of your doctorate. You demonstrated excellent understanding of the key issues related to your proposed research project.

The panel would suggest you work with your supervisors to develop a reading plan that incorporates the philosophical underpinning of sustainability; this will include its historical roots and political positioning.

Congratulations on an excellent outcome and every good wish for the further development of this study.



Acting Director of Postgraduate Studies



## Appendix 10 Ethics approval by University of Brighton

https://staffmail.brighton.ac.uk/owa/?ae=Item&a=Open&t=IPM.Note&id=RgAAAABkCGU8Hi26Q6vbj1Lc%2fgCZBwDqDZ8IAqSKS5faxTUJlhRcAAC8d6

Reply Reply All Forward

### Health and Social Science, Science and Engineering Research Ethics and Governance Committee - Decision on Manuscript ID REGC-15-006.R1

[Redacted]

To: Heather Baid

24 February 2015 12:11

- You forwarded this message on 24/02/2015 16:45.

24-Feb-2015

Dear Mrs. Baid:

It is a pleasure to approve your application entitled "Sustainability in critical care practice" which has been approved by the Health and Social Science, Science and Engineering Research Ethics and Governance Committee. The comments of the reviewer(s) who reviewed your manuscript are included at the foot of this letter.

Please notify The Chair of FREGC immediately if you experience an adverse incident whilst undertaking the research or if you need to make amendments to the original application.

We shall shortly issue letters of sponsorship and insurance for appropriate external agencies as necessary.

We wish you well with your research. Please remember to send annual updates on the progress of your research or an end of study summary of your research.

Sincerely,  
[Redacted]  
Acting Chair, Health and Social Science, Science and Engineering Research Ethics and Governance Committee  
[Redacted]

Reviewer(s)' Comments to Author:  
Reviewer: 2

Comments to the Applicant  
A sound proposal. Good luck with your research.  
Reviewer: 1

Comments to the Applicant  
You have fully addressed all the issues I raised. Hope the study goes well.

## Appendix 11 Sponsorship letter



**University of Brighton**



**Health and Social Science, Science and Engineering  
Tier 2 Research Ethics and Governance Committee**  
Mayfield House 266, Falmer,  
Brighton BN1 9PH

27 February 2015

[REDACTED]  
BACCN Administration  
14 Blandford Square  
Newcastle Upon Tyne  
NE1 4HZ

Dear REGC Committee

**University of Brighton research sponsorship**

I am writing to confirm that the University of Brighton will act as research sponsor as required under the Department of Health's Research Governance Framework, for the project entitled '*Sustainability in critical care practice*' to be carried out by *Mrs Heather Baid* (Approved Manuscript Reference -15-006.R1 ).

If there are any general questions about the university's approach to research governance, please contact

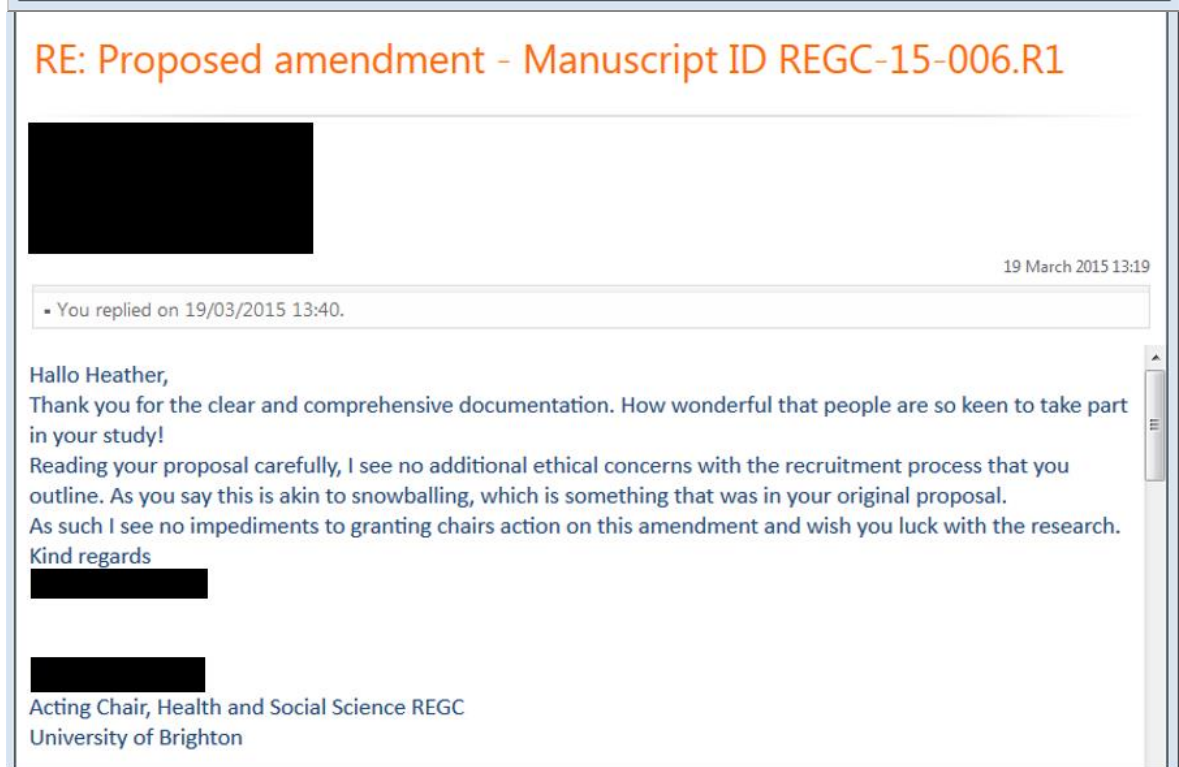
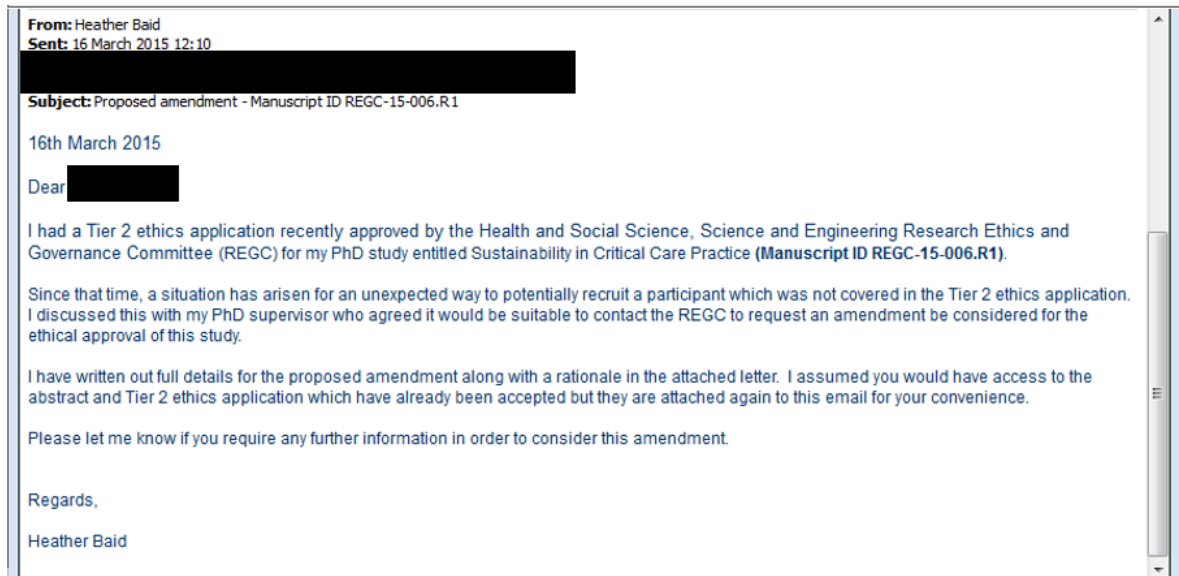
[REDACTED]

Yours sincerely,

[REDACTED]

[REDACTED]  
Chair of Faculty of Health Research Ethics & Governance Committee

## Appendix 12 Chairs action from ethics committee



## Appendix 13 Consent form

**Tick on the square to check you agree with each statement**

<input type="checkbox"/>	I have had the research project explained to me and I have also read the participant information sheet - I understand the process involved fully
<input type="checkbox"/>	The researcher has explained to my satisfaction the purpose of the study and the possible risks involved
<input type="checkbox"/>	I am aware that this research project involves answering questions using an audio-recorded online video or telephone call
<input type="checkbox"/>	I understand that the findings from the study will be published in journal articles and presented at conferences but interview quotations will be anonymised
<input type="checkbox"/>	I am aware if I make known to the researcher previously unreported serious safety issues with clinical practice, personal safety or healthcare malpractice, the researcher may be required to invoke clinical governance processes to investigate the situation / allegation further
<input type="checkbox"/>	I understand that I am free to withdraw from the research at any time but data collected up until that point will be included in the study
<input type="checkbox"/>	I agree to take part in this research which is about sustainability in critical care practice

Name:

Date:

## Appendix 14 ICUsteps service user group enquiry

### Email reply from enquiry during research planning phase about recruiting through ICUsteps if service users needed:

**From:** ICUSteps  
**Sent:** 09 May 2013 13:26  
**To:** Heather Baid  
**Subject:** ICUSteps enquiry

Dear Heather

Please accept my apologies for not responding to your enquiry before. I think your research sounds interesting and currently relevant. The current process for us to make a decision on whether we can help with your request is initially for me to consider the request and then if I think it to be relevant forward some information to the board. We ask that this is a paragraph written in lay person's language outlining your research and what you require from participants. If we agree to support your research it is this paragraph with your contact details that will go on our website/ be circulated to those who have volunteered to be involved in research. Secondly, it would be helpful for us to see a list of potential questions you may ask. We may then respond to these ourselves or circulate further.

I would be happy to take your request to the next stages and would be obliged if you could forward the above.

Best wishes  
Trustee ICUSteps

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### ICUsteps website research page:

<https://icusteps.org/professionals/research>