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STUDY TITLE: **Making the link.
Multi-Professional Care for Acutely Ill
Deteriorating Patients: A Constructivist
Grounded Theory Approach**

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Declaration

This thesis is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy. It has been composed by myself and has not been submitted in any previous application for any degree.

Signed.....Date.....

Glossary of key terms and abbreviations

ART	Acute Response Team – developed locally at the research site, this a group consisting of the Critical Care Outreach Team (CCOT) nurse, medical registrar and intensivist who attend the deteriorating patient with a track and trigger score of 7 or more. This team can expedite admission to the Intensive Care Unit (ICU) where appropriate.
AUKUH	Association of UK University Hospitals
ACAT	Augmented Care Assessment Tool: in-house physiological track and trigger score in use at the time of the data collection.
BP	Blood pressure - measured in millimetres of mercury (mmHg)
CCOT	Critical Care Outreach Team – developed in the UK, a group (or individual) with specialist critical care skills who attends the deteriorating patient who has triggered a high track and trigger score (TTS) of 5 or more. Their role is to ensure timely and appropriate care, transfer to an appropriate level of care or to facilitate a decision regarding care treatment limitation. They may also perform an educational role.

CARDIAC

ARREST Cessation of spontaneous circulation – this includes asystole (electrical activity or circulatory output), pulseless ventricular tachycardia [VT] (fast heart rate with no cardiac output), ventricular fibrillation [VF] or pulseless electrical activity (PEA), usually requiring CPR

CPR Cardiopulmonary resuscitation

CT Computerised tomography scan

DH Department of Health

EWS Early Warning Score – an aggregate TTS

Healthcare

Professional Nurse, doctor, physiotherapist, pharmacist, healthcare support worker – a member of the multi-professional team caring for the patient. The term Allied Healthcare Professionals (AHPs) includes physiotherapists, occupational therapists and others allied to health.

HDU High Dependency Unit – for the provision of Level 2 care.

HR Heart rate - usually measured from the radial pulse in beats per minute (beats / min). Bradycardia is the term used for a

slow heart rate (<60). Tachycardia describes a rapid heart rate (>100).

HCSW Health care support worker – unregistered nursing assistant. Sometimes called a nurse’s aid, auxiliary or assistant. Usually supervised by a registered nurse.

ICU Intensive Care Unit – where Level 3 care is provided for critically ill patients. An *unexpected* ICU admission is defined as a non-elective case, i.e. an unplanned emergency admission to a Level 3 bed. ICUs are usually managed by an intensivist, an anaesthetist with additional specialist training.

ICS Intensive Care Society

Level of care

LEVEL 0 Patients whose needs can be met through normal ward care in an acute hospital.

LEVEL 1 Patients at risk of their condition deteriorating or those recently relocated from higher levels of care, whose needs can be met on an acute ward with additional advice and support from the critical care team. More recently divided into 1a (patients who are acutely ill at risk of deterioration) and 1b (stable patients who are more dependent on nursing care).

LEVEL 2	Patients requiring more detailed observation or intervention including support for a single failing organ system or post-operative care and those stepping down from higher levels of care.
LEVEL 3	Patients requiring advanced respiratory support alone (mechanical ventilation) or basic respiratory support (administration of oxygen therapy) together with support of at least two organ systems. This level includes all complex patients requiring support for multi-organ failure.
LOC	Level of consciousness - may be measured numerically as the Glasgow Coma Score (GCS). Alternatively, LOC may be assessed regarding the patient's response, that is are they A – alert, V – responsive to verbal stimuli, P- responsive to painful stimuli only or U- unresponsive. This is known as the AVPU score.
MET	Medical Emergency Team – similar to CCOT, developed predominantly in Australia and USA
NCEPOD	National Confidential Enquiry into Patient Outcome and Death
NHS	National Health Service

NICE	National Institute for Health and Clinical Excellence
NORF	National Outreach Forum
RCN	Royal College of Nursing
NTL	Night Team Leader for the Hospital at Night service: senior nurse who will respond to track and trigger calls at night at the research site (in the absence of CCOT, which is not a 24 hour service).
RN	Registered nurse – qualified nurse
RR	Respiratory rate - measured in breaths per minute (breaths / min). Tachypnoea is the term used for fast breathing rate greater than >20. Bradypnoea describes a slow respiratory rate less than <8.
RRT	Rapid Response Team - Generic term for a critical care specialist team who attend the deteriorating patient, a term predominantly used in the USA.
RRS	Rapid Response System – the internationally recognised generic term for an integrated, hospital wide approach to the

care of a deteriorating patient. This process includes use of a TTS and a RRT.

SpO₂ Peripheral oxygen saturation indicates content of oxygen in the arterial circulation - measured using a pulse oximeter where oxygen saturation of haemoglobin is expressed as a percentage (%). Low levels indicate hypoxia. Normal range is 94% to 98%.

TTS Physiological Track and Trigger Score – generic term for an early warning scoring system used to identify and track or monitor the deteriorating patient, calculated from routine vital signs and the extent to which they deviate from normal reference range. When an aggregate score reaches a specified level a call for assistance is triggered.

UK United Kingdom

US /USA United States of America

**VITAL
SIGNS** Routine vital signs include RR, HR, BP, temperature, LOC and SpO₂

Abstract

The potential for decline in acutely ill and injured patients is ever-present. Rapid response systems exist to facilitate timely actions, but there are continued concerns over failure to rescue. Currently there is little understanding of what happens in ward areas when deterioration occurs and how it is recognised and managed.

This study aimed to explore what happens when patients deteriorate, how professionals work together, define and communicate deterioration and make sense of what they say and do. Using constructivist grounded theory; data was gathered over 12 months from 33 multi-professional participants on three wards in one hospital. Data analysis, concurrent with collection, utilised theoretical sampling to identify further sources of data. Constant comparison was used to develop codes and concepts from the transcripts, and NVivo® software facilitated data organisation and an audit-trail.

During 26 interviews and 48 hours of observation, 85 cases of patient deterioration were identified. Four concepts emerged from the analysis, 1) being vigilant through surveillance, 2) identifying deterioration and recognising urgency, 3) taking action by escalating and responding, 4) taking action by treating, all connected by a core concept, making the link. The need for support, use of subjective and objective indicators, competing priorities and hierarchical issues influenced the process but application of knowledge was crucial for making the link.

Collectively knowing the patient and sharing this multi-professional knowledge was key to making the link and the nurse was ideally placed to facilitate a shared mental model of deterioration across the team. New elements were identified: lay person vigilance, where significant others contributed to the rescue process; and fear of harming patients by a rescue intervention was revealed as a barrier to treating deterioration. Recommendations included protecting and prioritising resources for surveillance, valuing subjectivity and the input of all levels of staff.

Chapter One: Introduction

1.0 Introduction to chapter

Caring for acutely ill patients in hospital has become increasingly relevant for healthcare organisations over the last two decades as in-patient acuity continues to rise and a need to improve patient safety in hospitals remains high on the National Health Service (NHS) agenda. This thesis, completed during a part-time doctoral study programme, systematically addresses the gap in understanding about how the multi-professional team approaches everyday problems associated with caring for acutely ill adult patients with the potential for clinical deterioration.

This chapter provides background information and introduces a study about ward-based care of acutely ill, deteriorating adult patients in an acute NHS Foundation Hospital Trust. The area of interest is outlined and the researcher's background is discussed in respect of how the research issue was identified and prompted. The research question, aims and objectives of the study methodology are introduced and an outline of the thesis structure is presented.

1.1 Background and the phenomenon of interest

This section will provide the background and context to the study and will outline the phenomenon of interest.

1.1.1 Acute illness and clinical deterioration

Caring for the acutely ill adult with the potential for clinical deterioration in the ward environment is the focus of this research. It is important therefore to define what is understood by acuity and clinical deterioration.

The Merriam-Webster Dictionary¹ defines the adjective *acute* in terms of onset, duration and intensity, that is, *of sudden onset, lasting a short time, needing medical attention and extreme in degree, power and effect*. A concept analysis similarly defined patient acuity in respect of speed of illness onset, but also in terms of the severity of physiological derangements, the extent of any injury and the intensity of nursing care required (Brennan and Daly, 2009). Figure 1 below identifies standard terminology for levels of patient care delivered in hospitals in England (Department of Health, DH, 2000).

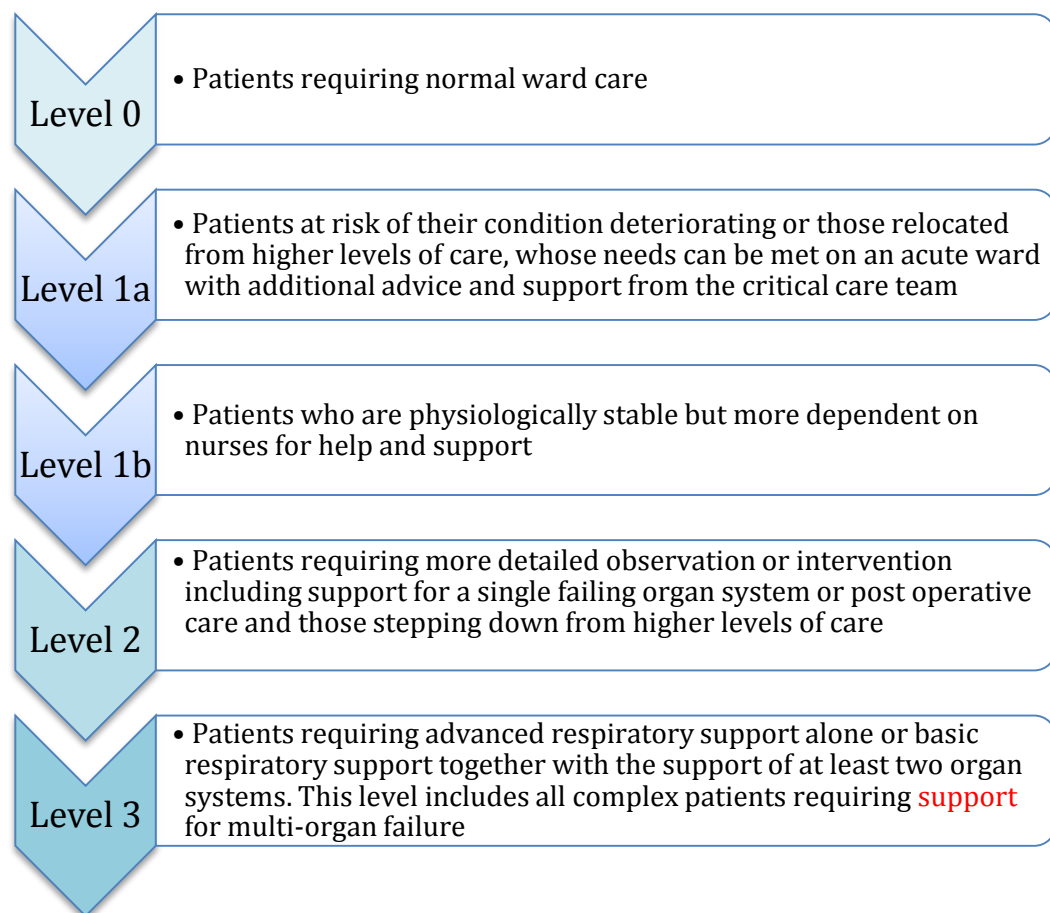
The Merriam-Webster Dictionary¹ defines *deterioration* as *the act or process of becoming worse* and *clinical* is defined as *the direct observation of a patient, based on or characterized by observation and diagnosable symptoms*.

Clinical deterioration is a dynamic state in which the patient experiences abnormalities in physiological parameters, including for example, vital signs (respiratory rate [RR], oxygen saturation [SpO₂], heart rate [HR], blood pressure [BP], temperature [TPR], level of consciousness [LOC]) and other indicators such as capillary refill [CR], urine output [UO], blood glucose [BG]) and blood chemistry or microbiology. Jones, Mitchell, Hillman et al. (2013) support this. Their review of the literature on adverse events from

¹ www.merriam-webster.com

1960-2012 highlighted that, at the time this current study was conceived, clinical deterioration was determined by chart review for changes in vital signs and other clinical observations.

Figure 1. Levels of Care (DH, 2000:10; DH, 2007). This framework illustrates the standard terminology that describes the different levels of care required by patients in acute hospitals across England and Wales used throughout this thesis.



A patient requiring Level 3 care is usually found in an intensive care unit (ICU), while Level 2 care is delivered in a high dependency unit (HDU). Acute illness is therefore placed on a continuum somewhere between normal ward care and critical illness (DH, 2000; DH, 2007). Patients

requiring Level 0, Level 1a care are usually found on the ward and are the focus of this study. In 2002, Chellel, Fraser and Fender et al. identified that 12% of patients across four United Kingdom (UK) hospitals required Level 1a care or above. The Association of UK University Hospitals (AUKUH, 2007) developed a standard tool for monitoring hospital-wide acuity and dependency that when used in conjunction with a set of practice-derived multipliers provides guidance on safe staffing levels in the ward environment. This is now known as the Safer Nursing Care Tool (Shelford Group, 2013) and is endorsed by National Institute for Health and Care Excellence (NICE, 2014a).

The Intensive Care Society (ICS, 2006) has indicated that patients are more acutely ill on hospital wards than in the past. Movement of care into the community, improved anaesthetic techniques that facilitate surgery on high risk patients, an increasingly elderly population, patients with complex problems and multiple co-morbidities, increasing public expectations and shorter length of patient stay from increased day-case interventions have all contributed to this (Audit Commission, 1999; DH, 2000; National Confidential Enquiry into Patient Outcome and Death, NCEPOD, 2005).

Despite these increasing demands for higher levels of care, the proportion of ICU beds in the UK has remained low in comparison with other European countries. Table 1 below illustrates recent comparative data. In more tangible terms, NHS England reported 3550 critical care beds were available in England in January 2010. Five years later, in January 2015, this had

increased by just 471 beds to a total of 4021². Thus with limited access to scarce ICU resources, an older, sicker patient case-mix presents new challenges to healthcare professionals who must care for high numbers of patients with complex needs in the acute ward environment.

Table 1. Comparison of UK ICU beds with other European countries.

	Population	ICU beds/100 000	ICU beds as % of acute care
Germany	81.7mil	29.2	5.6
France	65.1mil	11.6	3.2
UK	62.4mil	6.6	2.8
Greece	11.3mil	6.0	1.5
Portugal	10.6 mil	4.2	1.4
(Source: Rhodes, Ferdinande, Flaaten et al. (2012) <i>Intensive Care Medicine</i> 38 pp1647-165)			

1.1.2 Comprehensive Critical Care

Several studies showed that patients demonstrate deranged physiological signs (antecedents) for several hours prior to cardiac arrest, (Schein, Hazday, Pena et al., 1990; Fieselman, Hendrix, Helms et al., 1993; Franklin and Matthew, 1994). In a small, but sentinel study, McQuillan, Pilkington, Allan et al. (1998) found that care of acutely ill patients in ward areas was suboptimal prior to ICU admission. At the same time, a national audit across England and Wales found critical care to be *fragmented, expensive and under pressure*. With only one to two percent (%) of acute beds found in the ICU, units were unable to cope with the increasing demand (Audit Commission 1999:3). This prompted action from the Department of Health.

² <http://www.england.nhs.uk/statistics/statistical-work-areas/critical-care-capacity/critical-care-bed-capacity-data-2010-11/>

An expert group was established to review the organisation and delivery of critical care and to develop a strategy for improvement across England (DH, 2000). The resultant *comprehensive* approach to critical care that continues to influence care of the acutely ill ward patient was described as,

...the complete process of care for the critically ill which focuses on the level of care that the individual requires rather than on beds or buildings. It is a 'whole systems' approach that encompasses the needs of those at risk of critical illness, and those who have recovered from such illnesses, as well as on the needs of patients during critical illness itself (DH, 2000:3).

Capital injection facilitated an increase in critical care bed capacity and large-scale organisational and cultural change with the development of a standardised approach to care; the use of a physiological track and trigger score to identify acutely ill deteriorating patients early in the course of their decline and a supportive team of skilled critical care practitioners to respond to calls for assistance. Such teams are now referred to as the rapid response team (RRT) in accordance with international consensus opinion (DeVita, Bellomo, Hillman et al., 2006), but are known locally and in many hospitals across the UK as the critical care outreach team (CCOT) or the medical emergency team (MET) in other countries such as Australia and the United States.

Five years after the publication of the modernisation plan, the Critical Care Stakeholders Forum (2005) positively summarised the developments and reported that Level 2 and 3 beds had increased by 36% (n=851). There was

still potential for improvement and this was reinforced by work from national bodies that demonstrated suboptimal care was, and still remains, a problem (NCEPOD, 2005; National Patient Safety Agency, NPSA, 2007a; 2007b; NICE, 2007; NCEPOD 2009; NCEPOD, 2012). Most recently, the Keogh (2013) review of 15 failing Trusts highlighted the shortfalls around policies for the identification and escalation of high risk deteriorating patients, particularly at weekends and at night, 'out-of-hours'. Furthermore, the report raised concerns regarding low nurse staffing levels and skill-mix in relation to patient caseload and severity of illness.

1.1.3 Cardiac arrests

Survival-to-discharge rate following in-hospital cardiac arrest has been cited at 15 to 21%, and has changed little in many years (Tunstall-Pedoe, Bailey, Chamberlain et al., 1992; Peberdy, Kay, Omato et al., 2003; NCEPOD, 2012). The most recent national cardiac arrest audit (2011-2013) found survival to hospital discharge was 18.4% (Nolan, Soar, Smith et al., 2014). While cardiac arrests remain an outcome measure that it is clearly important to strive to reduce, increasing significance has been placed on the recognition of ward-based patient deterioration through careful attention to abnormalities and early intervention, as evidenced by the Resuscitation Council UK (2010) guidance.

1.1.4 Physiological Track and Trigger Tools

The physiological track and trigger score (TTS) or early warning score (EWS) is now a well-recognised way in which healthcare professionals can

be assisted in recognising the deteriorating patient from a set of deranged vital signs (NICE, 2007). Scores are formulated in respect of how far out of normal range each of the vital signs are found to be. When one parameter reaches a critical level, or an aggregate score generated from a number of deranged vital signs reaches an agreed trigger threshold, a call for assistance is required in order to facilitate expert intervention and treatment.

Table 2. A comparison of a single parameter and aggregate scores

	Lee et al. (1995)	Stenhouse et al. (2000) Modified EWS (MEWS)						
		SCORES						
Parameter	Triggers	3	2	1	0	1	2	3
RR	<10 or >30 breaths /min		<8		9-14	15-20	21-29	>30
HR	<40 or >120 beats /min		<40	40-50	51-100	101-110	111-129	>130
BP (systolic)	<100 or >200mmHg	<45%	<30%	<15%	normal	>15%	>30%	>45%
TPR	<35.5 or >39.5 Centigrade	<35			35-38.4		>38.4	
LOC	Decreased or altered				A	V	P	U
Urine output	<500ml in 24 hours		0.5ml/Kg/hr	<1ml/Kg/hr		>3ml/Kg/hr		
< less than; > greater than Kg =kilogrammes; min= minute; mmHg= millimeters of mercury; ml = millilitres A= alert; V= responds to verbal stimuli; P= responds to painful stimuli; U=unresponsive								

An example of a single parameter score (Lee, Bishop, Hillman et al., 1995), possibly the first of its kind, is illustrated alongside an early-published aggregate score (Stenhouse, Coates and Tivey et al., 2000) in Table 2 above for comparison. Before and after studies by both sets of researchers showed that implementing the score improved patient outcomes from earlier and more appropriate referrals to critical care.

A plethora of tools has since been published and several researchers have attempted to find the optimum score with little success, as reviews from McArthur-Rouse (2001) and Gao, McDonnell, Harrison et al. (2007) highlighted. But Smith, Prytherch, Schmidt et al. (2008a; 2008b) carried out two large studies, one of 33 aggregate scores (2008a) and another of 30 single parameter scores (2008b) to identify the tools' ability to discriminate between survival and non-survival to hospital discharge. They too concluded that no tool reached the standard of sensitivity required for clinical practice, but paved the way for the development of a national early warning scoring tool, NEWS (Royal College of Physicians, RCP, 2012). Prytherch, Smith, Schmidt et al. (2010) experimented with the effects of changing ranges and weightings with one of the better performing tools from their earlier reviews, and with the addition of oxygen therapy, formulated ViEWS. Ultimately, with the use of a colour-coded observation chart and in-built graded response template, ViEWS developed into NEWS, which performed better than all previously published scores (RCP, 2012; Smith, Prytherch, Meredith et al., 2013). The NEWS score and associated paperwork can be found in Appendix 1.

1.1.5 Intensive Care Units (ICUs)

Advances in mechanical ventilation during the Danish polio epidemic in the 1950s heralded the development of ICUs (ICS, 2006; Gilbertson, 2011), and the subsequent publication of *Progressive Patient Care* (Ministry of Health, 1962) reinforced the requirement for the systematic grouping of patients according to their illness and dependence on the nurse, rather than by

classification of disease or gender. Modern intensive care, for the sickest patients in the hospital, is now characterized in the UK by a one-to-one nurse-patient ratio and the provision of advanced support for multi-organ failure (Royal College of Nursing, RCN, 2003; British Association of Critical Care Nurses, BACCN, 2009). Coupled with highly technological monitoring equipment, the ICU facilitates close observation, early anticipation of and treatment for life-threatening events, enhanced by care from specialist nurses and rapid access to a senior doctor with training in intensive care medicine (Faculty of Intensive Care Medicine [FICM] and ICS, 2013). Close continuous monitoring of vital signs is available for high-risk patients in the critical care environment requiring level 2 and level 3 care (DH, 2000). Deterioration is detected in level 0 and level 1 patients, who are usually on the ward, with intermittent manual or digital measurement of vital signs by an appropriately trained healthcare professional, observant for changes and physiological abnormalities.

1.2 Rationale for the study

The researcher has worked in critical care for over 20 years, initially as a staff nurse, in general intensive care and cardiac surgery, and latterly as a consultant nurse in critical care, lecturer and lead nurse for a large regional critical care network across five NHS Trusts and eight hospitals. Working in the broader, strategic context of comprehensive critical care, spearheading some of the strategies to improve ward-based acute care, providing clinical and educational support in practice to ward teams across different hospitals and managing a CCOT has generated the inspiration for this study. A desire

to better comprehend what is happening in the ward environment from the perspectives of those who manage it on a daily basis was the motivation for this work. The findings aim to provide a deeper understanding of working practices of individuals and multi-professional teams in acute care, identifying and caring for the deteriorating patient early in the course of their clinical decline. As workloads and patient acuity continue to grow, the knowledge provided by this study has the potential to form the basis for further improvement and changes in practice that could generate a move towards safer patient care in the acute ward environment for the deteriorating patient.

1.3 Research question, aims and objectives

The aim of this research was to extend understanding around care of acutely ill patients in the ward arena by closely examining the interactions between members of the healthcare team, to answer the question,

What happens in practice on the ward amongst the multi-professional team when acutely ill adult patients deteriorate clinically?

The objectives of the study were to explore, understand, describe and explain

- What happens on the ward when patients start to deteriorate?
- How do healthcare professionals know that a patient is deteriorating, how do they define it and communicate it to each other?
- What issues and concerns are relevant to practitioners in the clinical environment? What are the enhancing and inhibiting factors?

- What do they do in practice and how do they make sense of what they say and do?

1.4 Overview of the research

This study explores behaviours, actions, communication and social interaction within the multi-professional team when identifying and caring for acutely ill, deteriorating patients in the ward environment and how they make sense of what is happening. Through a combination of observations and in-depth qualitative interviews with members of multi-professional ward teams, findings are used to develop an explanatory conceptual framework for use in practice development.

1.5 Grounded Theory Methodology

A grounded theory approach was taken for this study, guided by the work of Charmaz (2006), in order to increase the body of knowledge on key factors that help or hinder the care of patients with impending critical illness.

Qualitative data was collected and analysed concurrently so that early findings could be used to direct further participant and data sampling. This allowed the researcher to follow up on leads and key issues with the participants in subsequent data collection with interviews and observations that took about a year to complete. Interview transcripts and observational field notes were coded using labels (words or phrases) to describe what was happening in the data. The data was then constantly compared back and forth within transcripts, between participants, between different professionals groups, from different wards at different times of the day and

night in the analysis process. This enabled the identification of key concepts all connected by a core process within a conceptual framework. The framework is presented in Chapter Four and delineates the processes around care of the acutely ill, deteriorating ward-based patient. It aims to increase understanding, inform service improvements and guide future practice, linking closely with the patient safety agenda.

1.6 Timeframe, structure and content of the study

The author commenced part time doctoral studies with the Royal College of Nursing Institute on 20th July 2007 and the thesis was submitted in March 2015. Data collection began in October 2010 and was completed in December 2012. No data was collected between June 2011 and April 2012 due to researcher illness.

The thesis is presented in six chapters. Following this introductory chapter, Chapter Two provides further context to ward-based care of the acutely ill patient with a review of the literature. Chapter Three explains the chosen methodology and associated methods. The findings of the study are then articulated in Chapter Four. Chapter Five provides a discussion of the findings and Chapter Six concludes the thesis with recommendations for future practice, education and research.

Chapter 1: Introduction

In this chapter the thesis is introduced, background to the study is given and the aims, objectives and research question are presented. Grounded theory

is introduced as the methodology of choice and the structure of the thesis is articulated.

Chapter 2: Literature Review

The review methodology is explained and findings from the literature pertaining to identification of the deteriorating patient and rapid response teams provides further context to the current study. Gaps in the literature are highlighted to rationalise the study and conclude the chapter.

Chapter 3: Methodology and Methods

The rationale for use of grounded theory methodology is provided, underpinned by a naturalistic paradigm and a constructivist approach. This chapter articulates how all parts of the research design are congruent with the chosen approach and the essential elements required within grounded theory methodology for inclusion in the current study are explained. Qualitative data collection methods are described with explanation of how an ethical approach was taken to all aspects of the research process.

Chapter 4: Findings

The resultant conceptual framework is presented as four concepts; being vigilant through surveillance, identifying deterioration and recognising urgency, taking action: escalating and responding, and taking action: treating, all connected by a core process, *making the link*. These are presented in individual sections, illustrated with *verbatim* quotations from

the participants and the chapter concludes with a schematic diagram, which represents the findings as a conceptual framework.

Chapter 5: Discussion

This chapter presents a discussion about the findings, broken down into five sections covering each of the four concepts and the core process, linking them where appropriate to the extant literature and placing the framework in the broader context of acute illness.

Chapter Six: Recommendations and Conclusion

This final chapter articulates the strengths and limitations and a review of the study's rigour. Aims and objectives are revisited and the study's original contribution to knowledge and practice is discussed. The report concludes with recommendations for practice, policy, education and future research.

1.7 Summary

This chapter has provided background information on the phenomenon of interest and the researcher, defined key terms, clarified the aims and objectives of the study, introduced grounded theory methodology and signposted the structure of the thesis. The following chapter presents the findings of a literature review that further contextualises the study and identifies the gaps in the evidence to justify the research.

Chapter Two: The Literature Review

2.0 Introduction

This chapter presents a review of the literature pertaining to the multi-professional care of acutely ill adults in the ward environment, including the identification of deteriorating patients and the evolution, implementation and utilization of rapid response systems. The aims and objectives of the review will be articulated and the methodology used will be explained, including the search strategy, how data was extracted and managed and how studies were analysed and evaluated. Gaps in the evidence will be highlighted through synthesis of the findings and a need for further exploration into the phenomenon of interest will be rationalised and substantiated.

2.1 Aims of the review

The aim of this literature review was to provide a broad overview of the study's parameters, background evidence and context by identifying a range of relevant evidence, published and unpublished, quantitative or qualitative, from which key ideas and research findings could be extracted. This review does not adhere to formal systematic review methodology, as used by the Cochrane reviewers³ for example, in that it does not adhere to a rigid protocol, because, as Sandelowski (2008) argues, such an approach is not mandatory. A rigorous methodology was used nevertheless and a clear audit

³ www.cochranelibrary.com

trail provides evidence of the organised, systematic, logical and iterative approach taken, facilitating reproduction if or when required.

Timing of the literature review in grounded theory is contentious and detailed arguments for and against a preliminary literature review will be presented in Chapter Three. It is important to note that the literature review for this thesis was essentially a two-stage process (Stern and Porr, 2011). The literature review (1990-2009) provides a synthesis of the evidence available prior to commencing the current study and sets the phenomenon of interest (care of acutely ill deteriorating adult patients) in context of any existing knowledge, defines key terms and processes in clinical practice and identifies the gaps in the evidence, reducing the risk of inappropriate duplication, supporting the case to proceed with the research and justifying ethical approval (Parahoo, 2006). A re-examination of the literature was carried out iteratively over the subsequent five years to November 2014 and, where relevant, later evidence has been included in the data presented in this chapter and in Chapter Five, a discussion of the current study's findings.

2.2 Review methodology

The literature review methodology is presented in two sub-sections, 2.2.1 the search strategy and 2.2.2 selection and assessment of studies (including type and quality, data extraction and analysis).

2.2.1 Search strategy

This section describes how the literature search was carried out, including search terms, databases, inclusion and exclusion criteria used. The search strategy was designed to identify focussed, relevant literature and provide a transparent audit-trail to facilitate reproducibility (Bettany-Saltukov, 2010).

a) Aim of the search

The aim of the search was to identify the national and international body of literature that describes or evaluates the way in which acutely ill, deteriorating patients are identified, managed and cared for in the ward environment by the healthcare team.

b) Databases and search engines used

Publications listed on websites from national organisations (Table 3 below), familiar to the researcher, provided an initial starting point for the search in conjunction with personal knowledge of existing literature. The Cochrane Library⁴ provided an initial source for systematic reviews. Two core databases (Embase and Ovid MEDLINE) were accessed via OvidSP/Wolters Kluwer Health⁵. After initial searches, the Allied and Complementary Medicine [AMED] database was found to be inappropriate for use in this topic area and discarded. The Cumulative Index to Nursing and Allied Health Literature (CINAHL) database was accessed via EBSCO Host provider at local university and NHS Trust portals. Google and Google Scholar were

⁴ www.cochranelibrary.com

⁵ <http://ovidsp.uk.ovid.com>

used as supplementary reference points throughout the search, but not as primary access points because of their high sensitivity and poor specificity.

Table 3. National organisations and associated websites.

Organisation	Found at (website)
Department of Health (DH)	https://www.gov.uk/government/organisations/department-of-health
Intensive Care Society (ICS)	www.ics.ac.uk
Royal College of Nursing (RCN)	www.rcn.org.uk
British Association of Critical Care Nurses (BACCN)	www.baccn.org.uk
National Outreach Forum (NORF)	www.norf.org.uk
National Institute for Health and Clinical Excellence (NICE)	www.nice.org.uk
National Patient Safety Agency (NPSA)	www.npsa.nhs.uk/
NHS Institute for Innovation and Improvement	www.institute.nhs.uk/
National Confidential Enquiry into Patient Outcome and Death (NCEPOD)	www.ncepod.org.uk

c) Search terms

In addition to the Medical Subject Headings (MeSH) terms used, search terms were generated, in part, from experiential knowledge, but also from bibliographical searches using reference lists as the work progressed and key words used in the vernacular were identified. Three key areas of practice literature were searched:

- Care of the acutely ill patient prior to unexpected ICU admission, cardiac arrest, death and failure to rescue
- Factors used in the identification of the deteriorating patient, including routine observations and physiological measurements
- Rapid response systems (RRS) including physiological track and trigger scores (TTS) and rapid response teams (RRT).

Search terms used are listed in Table 4 below. To increase the power of the search, Boolean (logical) operators were also used, including *AND* to combine searches and increase specificity, *OR* to allow more than one term to be used to broaden the search and increase sensitivity, and “....” for key terms and phrases. *NOT* was used to exclude terms (e.g. paediatrics). The truncation asterisk (*) was used to source information on similar wards, so for example, *critical** would also search for *critically*.

Table 4. Search terms used.

Search Terms	
<ul style="list-style-type: none"> • Rapid response systems • Rapid response teams • Critical care outreach teams • Patient at risk teams • Medical Emergency Teams 	<ul style="list-style-type: none"> • deteriorat* • critical* acute* • ‘at risk’ • wards or ward-based
<ul style="list-style-type: none"> • Early warning scores • Modified early warning score • Patient at risk score • Physiological track and trigger scores • National early warning score 	<ul style="list-style-type: none"> • failure to rescue • antecedents • vital signs • nurse concern

c) Key author search

Table 5. Key authors used

Key Authors		
Bellomo R	DeVita M	Odell M
Buist M	Endacott R	Prytherch D
Cioffi J	Hillman K	Smith G B
Cretikos M	Jones D	Subbe C

Key authors, familiar to the researcher from previous experience and identified from the bibliographical ancestral search, listed in the summary Table 5 above, were used to focus the review and to capture additional material.

d) Inclusion and exclusion criteria

Inclusion and exclusion criteria were designed to focus the search but avoid limiting the scope too narrowly. Studies were reviewed that described, explored, explained or evaluated any intervention or outcome related to the specified population (acutely ill, deteriorating adult patients in ward settings). Primary research (all designs), literature reviews and conference papers were included; multi- or single-centre qualitative and quantitative studies were admissible if an abstract was provided to allow initial screening. Letters, editorials and commentary papers were not included. International studies were restricted to those published in the English language. The focus of this study was adult patients on general wards therefore research in obstetrics or with children under 18 years was excluded, as were studies carried out in ICU (Level 3 care), HDU (Level 2 care), palliative care, mental health, the pre-admission environment, emergency departments and other highly specialist areas. Studies involving end of life care decisions were not included in this review.

e) Date limits

The initial literature review examined the available body of work from 1990 to 2009. An early report regarding the duration of physiological abnormalities in patients prior to a cardiac arrest published in 1990 (Schein et al., 1990) provided a provisional starting point for the initial review. This review would identify gaps in the evidence and justify the current research for ethical board review in 2009/10. The review was later updated to cover the literature from 2010 to 2014. A final search was run in November 2014.

2.2.2 Selection and assessment of studies

This section describes how the data from the search was managed and how studies were selected for inclusion in the review.

a) Data management

As an iterative process over a seven-year period of study, managing the data was a complex and difficult process. This was complicated further with incidental findings and changes in database search protocols (Finfgeld-Connett and Johnson, 2012). On reflection, bibliographical management software, such as Endnote for example, would have simplified the process, but in this case Microsoft Word files were used to store results of the searches from each database under each search term. The search strategy elicited a high number of repetitive citations. Duplications were eliminated by manually cross-referencing Word files using the 'find' function and a final citation count was elicited. A separate file with an alphabetical list of all references used was manually updated regularly and can be found in the Reference section at the end of this thesis.

b) Selection of studies

Studies were selected for inclusion in the review based both on their relevance to the defined area of study and their quality. Initially, the citations were screened by title alone. The subsequent subset was then reviewed by abstract. Those studies that fitted the inclusion criteria were then subject to full-text review. Where full-text versions were available online in portable document format (pdf), studies were downloaded into

computer files with subject headings derived from the search terms (early warning scores, critical care outreach teams, antecedents, suboptimal care and failure to rescue, for example). Papers not available in full text online were obtained through a local university library and hard copies were stored similarly in box files.

Table 6. Factors reviewed in full text.

Factors reviewed in full text	
<ul style="list-style-type: none"> • Abstract and title • Introduction and aims • Method and data extraction • Sampling technique • Data analysis • Ethics 	<ul style="list-style-type: none"> • Findings and results • Transferability or generalisability • Implications for practice and usefulness

Analysis and critique of individual studies was supported by the use of the Critical Appraisal Skills Programme CASP tools⁶. CASP provides structured guidance for evaluating studies from a range of research methodologies including systematic reviews, randomised controlled trials, case control studies, cohort studies and qualitative studies. These were used free of charge in this case for non-commercial reasons under the Creative Commons license. Essentially, the full-text papers accessed were reviewed in respect of the key points listed in Table 6 above, as suggested by Flemming (2009). Appraisal notes were recorded manually, in hard copy notebooks for each paper under different subject headings.

⁶ www.casp-uk.net/

The results of the search strategy are summarised in Table 7 below, following application of the inclusion and exclusion criteria and CASP assessment checklists for study quality. More details of the findings can be found in Appendix 2.

Table 7. Results of the search strategy.

Search	Results (filters applied and duplicates removed)
Key author	84
Acute/ deterioration/ ward	38
Track and trigger scores	48
Rapid response teams	217
Miscellaneous e.g. 'failure to rescue'	85
Total	472

2.2.3 Summary

This section has articulated the literature review methodology including the search strategy used to identify evidence that explored the multi-professional care of the acutely ill patient, how the data was extracted, stored, managed and analysed, and how the quality of the studies was evaluated. The following section will present the findings of the literature review.

2.3 Findings from the review: an overview

This section will present the findings from the initial literature review, predominantly from 1990 to 2009, but with the addition of relevant papers published after the current study commenced to further justify the work.

Any one of three sentinel events, unexpected ICU admission, cardiac arrest or death, is undoubtedly a devastating outcome for patients and their families. Furthermore, these adverse events are costly to any healthcare system and have been used as markers of quality care in many organisations (Mitchell, 2013). Two key work-streams, developed over the last 15 years in England, have aimed to reduce these sentinel events, namely physiological track and trigger scores and rapid response teams. This review of the literature has highlighted two key phases of care for the acutely ill adult where problems can occur,

- *The identification phase* in which an acutely ill patient may be observed and any changes in condition may be recognised. This has been supported by the development of physiological track and trigger scores, risk assessment tools designed to enhance identification.
- *The action phase* in which a response is mounted and action is taken to reduce the risk of further patient decline, whereby the ward staff are required to escalate the problem through communication with a senior or more skilled colleague. This has been supported by the development of rapid response teams (RRTs), including critical care outreach teams (CCOTs) and medical emergency teams (METs).

The findings from this literature review will therefore be presented in two sections. The first will review the literature around identifying the deteriorating patient. The second will review the literature on rapid response teams. Gaps in the evidence will be highlighted and the chapter will conclude with a rationale for the current study.

2.4. Identifying the deteriorating patient

This section will review studies that have explored ways in which healthcare professionals identify the deteriorating patient including patient observations, the use of physiological track and trigger scores and the concepts of suboptimal care and failure to rescue.

2.4.1 Suboptimal Care

A key group of studies in the 1990s highlighted the plight of acutely ill deteriorating patients on general wards (Schein, Hazday, Pena et al., 1990; Franklin and Matthew, 1994; Smith and Wood, 1998; Goldhill, White and Sumner, 1999). Schein et al. (1990) was one of the first studies to raise concerns that patients had altered physiological signs prior to cardiac arrest and this spawned a plethora of studies to follow. Of the 64 cardiac arrests they reviewed retrospectively, 84% had serious derangements in the eight-hour period pre-arrest. Franklin and Matthew (1994) reviewed 150 arrests and found premonitory signs in 66% in the six-hour pre-arrest period. In Smith and Wood's (1998) review of 47 cardiac arrests, nearly half the patients (n=24) had abnormalities in the 24 hours preceding the event. These studies were essentially single-centre retrospective audits and therefore the findings are not generalisable. Furthermore, the definition of what constituted an abnormality varies widely between studies, rendering any comparison difficult. But these studies were important in raising awareness of an international problem (UK, Australia and USA) where patients showed signs of deterioration that were not recognised or acted upon and there was failure to obtain skilled assistance. Several highlighted

that deterioration in respiratory status was a significant factor (Schein et al., 1990; Franklin and Matthew, 1998; Goldhill et al. 1999). For example, Goldhill et al. (1999) demonstrated that despite low oxygen saturations in the six hours pre-ICU admission, oxygen therapy was only administered in 75% of cases.

A collection of studies built on the antecedent audits, focusing on patient management before cardiac arrest, death or ICU admission and highlighted the issue of suboptimal care (McQuillan, Pilkington, Allan et al., 1998; McGloin, Adam, Singer et al., 1999; Seward, Grieg, Preston et al., 2003). In their confidential enquiry, McQuillan et al. (1998) demonstrated that over 50% of patients admitted unexpectedly to ICU received suboptimal care and they highlighted a number of problems that contributed to this including lack of knowledge, failure to recognise urgency, limited supervision and failure to obtain senior support, failure of the organisation and poor management of the airway and oxygen therapy for deteriorating patients prior to an unexpected ICU admission. This study has been frequently cited including national publications such as *Comprehensive Critical Care* (DH, 2000) for example, but arguably it has some methodological limitations. It was a small retrospective audit with only 100 patients in just two centres. Suboptimal care was not defined in advance of the study and the assessors were not blinded to patient outcome and this may have biased their decisions towards suboptimal care in those patients who had died.

McGloin et al. (1999) carried out a similar retrospective study, but with some minor improvements; a slightly bigger sample (477 unexpected deaths and 98 ICU admissions), suboptimal care was defined in advance of the study and they used a panel of reviewers, blinded to patient outcome. The findings of McGloin et al. (1999) reflected those of McQuillan et al. (1998). Nearly one third of ICU admissions experienced suboptimal care on the wards, but furthermore, the mortality was higher in the suboptimal care group. Arguably, as both studies were audits the findings were site-specific and not generalisable. The McQuillan et al. (1998) study may have benefitted from timeliness rather than size or methodological rigour, resonating with many critical care practitioners at the time, prompting further research and subsequently driving change.

Seward, Greig and Preston et al. (2003) also built on the McQuillan et al. (1998) audit. They carried out another retrospective review of 200 consecutive deaths, but this was a multi-site study, pairs of doctors were used to independently assess quality of care and patients were segregated by severity using the Acute Physiology and Chronic Health Evaluation (APACHE) II score (Knaus, Draper and Wagner et al., 1985). Delays were found in diagnosis and treatment in 64% of cases.

Over ten years later, a literature review by Massey, Aiken and Chaboyer (2009) including 39 studies, reinforced five underpinning causes of suboptimal care, originally identified by the small McQuillan et al. (1998) audit. In addition, several confidential enquiries using audit methodology,

but with larger national multi-centre samples, have continued to highlight the problems associated with suboptimal care. Despite the five-year plan for critical care modernisation offered by the DH (2000), NCEPOD (2005) highlighted that 21% of ICU admissions were potentially avoidable with better ward-based care and identified that 47% of cases reviewed were classified as not good practice in respect of their acute illness. This large national audit of 1677 cases across 229 hospitals highlighted a number of failings within the system, citing evidence of unacceptable patient history and examination, delayed initial treatment, low consultant or intensivist involvement and prolonged periods of patient instability prior to ICU admission. In a later audit of 1275 emergency admissions in 233 hospitals, NCEPOD (2007) found similar deficiencies in care. Again there were unacceptable levels of clinical assessment, delayed consultant reviews and limited patient observation. Further retrospective audits, while the current study was underway, have continued to highlight deficiencies in care. In 2009, NCEPOD retrospectively reviewed the case-notes of 564 patients who had died of acute kidney injury (AKI) and found that only 50% had received good care. For the remainder, there was poor assessment of risk factors for AKI, delay in recognition (43%), inadequate investigation (33%), poor management (29%) or no senior review (24%) with poor recognition of acute illness, hypovolemia and sepsis. Furthermore, in 2012, NCEPOD showed similar missed opportunities in their review of 489 cardiac arrests. Again, poor history taking and delayed consultant reviews were recurrent problems, but the elements of suboptimal care, failure to escalate and failure to appreciate severity were ever present in this patient cohort.

The NPSA (2007a; 2007b) reinforced the work of NCEPOD (2005, 2007). In a review of 576 potentially avoidable deaths from incidents reported through the National Reporting and Learning System (NRLS) the NPSA (2007a) identified that 11% of deaths resulted from failure to recognise or act upon deterioration. Later that year, using multiple methodologies (literature reviews, focus groups, interviews and root cause analysis) to investigate causative factors of such failures, the NPSA (2007b) demonstrated that the problem was a complex combination of competing demands, poor teamwork and communication, insufficient training and a lack of relevant policies and procedures.

In summary, Quirke, Coombs and McEldowney (2011) defined suboptimal care, using concept analysis methodology (Walker and Avant, 2005), as poor patient assessment, delays in diagnosis, referral and treatment and inadequate or inappropriate patient management, all of which was exacerbated by patient complexity, workload (staffing and skill-mix), educational and organizational factors. Thus the message from all the studies that highlight suboptimal care on acute wards is clear; failure to observe, recognise, escalate and treat deteriorating patients can result ultimately in failure to save the patient's life. But while these studies raise awareness of the problems ward teams face with respect to the acutely ill patient, they provide only broad brush-stroke type evidence. They are, in the main, audits of practice and this methodology falls short in providing substantial context to the cases examined. Such audits cannot uncover what happens in the clinical setting, in part because they are reliant on

retrospective evidence and the accuracy of documentation. The current study, using alternative methodology, aimed to delve deeper into the contextual aspects surrounding patient deterioration and its antecedents.

2.4.2 Failure to rescue (FTR)

As the studies reviewed in this sub-section will show, continuing suboptimal care presents the potential for failure to rescue (FTR), that is, death which occurs following a treatable complication (Griffiths, Jones and Bottle; 2013).

Americans Silber, Williams and Krackauer et al. (1992) first used the term FTR to describe the frequently occurring situation in which patients die from an adverse event or post-operative complications. They examined death rate, adverse event rate and the failure rate (proportion of patients who suffered an adverse event who died) in 5972 post-operative patients. They found that adverse events were associated with patient characteristics, but FTR was associated with hospital characteristics. Underpinning root causes of FTR and death were seemingly different to the causes of post-operative complications and adverse events. The ability to rescue a patient after developing a complication is hospital-related, because survival after surgery when something goes wrong is highly dependent upon the skill of the team involved. So, if complication occurs, ability to rescue is paramount.

It is important to note that this initial work was carried out in the USA, and as such there may be several factors that make the process problematic in its transfer to the UK. Their data was readily available and potentially coded

accurately by the large American health insurer, Medicare. Others have indicated that the same information would be costly to obtain in the NHS with a requirement for prospective data collection and detailed examination of case notes as there may be problems with differences in coding strategies for complications and secondary diagnoses (McKee, Coles and James, 1999). Furthermore, Silber et al. (1992) examined a narrow group of surgical patients and findings may not be generalisable to the wider surgical population or medical patients with a wider range of co-morbidities. They specified a standardised list of post-operative complications for which patients would require intervention (e.g. pulmonary embolism, cardiac arrhythmias, heart failure, pleural effusion, pneumothorax, renal dysfunction, wound infection, pneumonia and stroke) and this might not be relevant to other groups of patients. The sensitivity and specificity of this list arguably influenced the study findings and future use of additional or fewer complications would prohibit any wider comparisons. Achieving consensus opinion between a wider group of clinicians on the list of complications, or definitions of such, might be problematic. Furthermore, increasing the number of possible complications and the potential for over-reporting complications would provide an opportunity to falsely reduce the failure to rescue rate. Arguably, documentation must also have played a key role in this work. Silber et al. (1992) highlighted that some deaths occurred without any adverse events; thus failure to observe closely or failure to document could be factors that influenced the findings, or the list may not have been sensitive enough to identify all adverse events post-operatively. Shock (i.e. tachypnoea, tachycardia, hypotension and hypoxia) is a glaring omission

from their list.

Since this seminal work (Silber et al., 1992), several others have used the FTR metric as an outcome measure and an indicator of quality care. For example, McHugh, Kelly, Smith et al. (2013) showed that the odds of FTR were lower in United States' magnet hospitals, with better work environments, better staffing ratios and a more highly educated nursing workforce. A multi-centre UK qualitative study showed that the escalation process was a key area for improvement in FTR (Johnston, Arora, King et al., 2014). In Australia, a large population based study across 82 hospitals in Australia demonstrated a decrease in FTR was associated with a number of safety improvement programmes (Ou, Chen, Assareh et al., 2014), while Wakeam, Hevelone, Maine et al. (2014) demonstrated that FTR was higher in US hospitals that admitted higher proportions of uninsured patients. Furthermore, recent studies have reinforced Silber's original concept in different groups of patients, for example Glance, Dick, Meredith et al., (2011) in trauma patients; Reddy, Shih, Englesbe et al. (2013) in cardiac surgery; Sheetz, Krell, Englesbe et al. (2014) in the elderly.

FTR has perhaps evolved from its original US definition, where the term in common parlance now describes a broader situation in which patient safety is compromised by inadequate or inaccurate assessments and failure to detect changes or recognise deterioration and reflects the UK findings in respect of suboptimal care.

A number of factors have been shown to impact on FTR rates and staffing issues are predominantly highlighted. Aiken, Shang, Xiu et al. (2013) found a high FTR associated with greater use of agency nurses in the UK. Griffiths, Jones and Bottle (2013) found lower FTR rates were associated with more doctors and nurses per bed, but a higher number of doctors in relation to nurses had an even greater impact. Most recently, a large multi-centre European study of 422 730 patients showed that an increase in a nurses' workload by one patient increased the risk of death within 30 days by 7% (Aiken, Sloane Bruyneel et al., 2014). Others too, have identified the positive impact of better nurse-patient ratios, including improved quality of care (Needleman, Buerhaus, Mattke et al., 2002). Some have provided potential rationale, including more frequent patient surveillance (Shever, 2011), focused on the early signs of deterioration (Taenzer, Pyke, McGrath et al., 2011), more highly educated nurses (Aiken Clarke, Cheung et al., 2003; Kendall-Gallagher, Aiken, Sloan, 2011; Aiken et al., 2014) and anaesthetist involvement (Silber, Kennedy, Even-Shoshan et al., 2000). FTR was decreased in US hospitals that admitted high proportions of uninsured patients if staffing levels were good (Blegen, Goode, Spetz et al., 2011).

Thus the failure to rescue metric provides a benchmarking tool that can be used to monitor the effects of managing the acutely ill patient, but it is important to remain cognizant of the issues around documentation of adverse events and differences in coding strategies internationally. Gawande (2012) provides a logical summary that failing less is not necessarily the solution; rather better rescuing shows greater

improvements in patient outcomes, and one might argue that this principle is the key issue, that is in danger of getting lost amongst the arguments for data accuracy, thus the focus should arguably move to ways in which rescuing can be improved. The findings here suggest that differences in mortality are associated with the ability to rescue patients from complications and this is now used as a proxy measure for quality. The current research is timely as it explores the complexities of failure to rescue cases in context and arguably benefits from using both retrospective and prospective exploratory methods. Ghaferi, Birkmeyer and Dimick (2011) reinforced however that what makes some hospitals better than others is not fully explained and further research into cultures and attitudes that influence recognition and management of the acutely ill deteriorating patient was required. This is a gap in the knowledge that the current study aimed to fill.

The following sections will examine the evidence around some of the potential reasons why teams sometimes fail to rescue patients.

2.4.3 Patient observations

Early changes in patient physiological signs or routine observations can indicate clinical deterioration, but in practice these can sometimes be false positive alarms and amount to nothing. This principle was illustrated in the SOCCER study, a large, multi-centre, cross-sectional survey of all patient admissions over 14 days (n=3046) in which researchers examined the prevalence of 26 early and 21 late signs of deterioration (Jacques, Harrison,

McLaws et al., 2006). Unsurprisingly, they found more than half the patients had the early signs, but only 0.5% had the later more deranged signs. Furthermore, the same team (Harrison, Jacques, McLaws et al., 2006) examined if a combination of early and late signs would predict death. They found that the combination was more closely associated with death than early signs alone. Three to four signs were associated with a 6.5 fold increase in risk of death, but more than five resulted in 27-fold increase in the risk of death. Thus sensitivities and specificities of the different indicators of deterioration emerged from this study. A sensitive reference range for any indicator will arguably identify lots of deteriorating patients with early signs, but not all of these will go on to arrest. Conversely, a higher more specific reference range, indicative of a sicker patient, will identify fewer deteriorating patients, but most of these could go on to arrest unless they receive medical intervention. This is important because decisions regarding sensitivities and specificities of the indicators of deterioration can impact on workload of those responding to deteriorating patients as well as patient safety, but also one needs to be cognizant of any interventions that may have halted deterioration. For example, Burgess, Herdman and Berg et al. (2009) found that setting alarm limits on continuously monitored patients for heart and respiratory rates with high sensitivity (and low specificity) resulted in frequent alarms with a lot of false positives. This increased the workload of the ward-based nurses who were unable to manage the high number of triggers. Conversely, increasing the specificity of the parameters reduced the false alarms and the subsequent nursing workload, but some deteriorating patients may have been missed early in

the course of their decline and opportunities for early intervention could have been missed.

Change in respiratory rate is a potentially important and early indicator of patient deterioration where knowledge of basic human physiology renders this a logical deduction. Hypoxaemia (low levels of oxygen in the arterial blood), hypercapnoea (high levels of arterial carbon dioxide) and any condition that results in metabolic acidosis such as acute kidney injury or poor tissue perfusion in shocked states, prompts an increase in respiratory minute volume as a compensatory measure when chemoreceptors detect acid (a fall in blood pH). Thus many patients will initially breathe faster when they start to deteriorate. Several researchers have found cardiac arrest is preceded by deterioration in the respiratory rate (Schein et al., 1990; Chaplik and Neafsey, 1998; Chaplik and Neafsey, 1998; Goldhill et al., 1999; Cretikos, Chen, Hillman et al., 2007).

Fieselman et al. (1993) more specifically identified the trigger point most sensitive and specific to predict cardio-respiratory arrest. They compared 72 hours of pre-arrest vital signs in 59 arrests with those from 91 patients on the same wards who did not arrest. A rate above 27 breaths per minute was a statistically significant predictor for cardiac arrest after controlling for age and gender with a specificity of 83% and a sensitivity of 54%. This was a small single-centre retrospective study the findings of which may not be generalisable, nevertheless the respiratory rate has since served as an early indicator of clinical deterioration and is a parameter used in all early

warning scores (Smith et al., 2008a; 2008b). Consensus opinion now recognises that altered vital signs predict risk of a sentinel event (DeVita, Smith, Adam et al., 2010) and several studies have demonstrated the sensitivity and specificity for other vital signs associated with, or predictive of cardiac arrest, the results of which have underpinned the development of TTSs (Buist, Bernard, Nguyen et al., 2004; Goldhill and McNarry, 2004; Cuthbertson, Boroujeerdi, McKie et al., 2007; Duckitt, Buxton-Thomas, Walker et al., 2007; Churpek, Yuen, Huber et al., 2012).

A physiological track and trigger score (TTS) is used to identify patient deterioration in ward areas from a set of deranged vital signs. A high score on the TTS signifies patient decline and the need for support from a critical care specialist practitioner. The tool needs to be sufficiently sensitive to pick up early deterioration, but not too specific where triggers are not reached until the patient is critically ill and the opportunity for early intervention and treatment is delayed or missed. As identified in the introductory chapter to this thesis, a plethora of studies has reviewed the sensitivity and specificity of the many tools currently available and the NEWS performed best (RCP, 2012; Smith, Prytherch, Meredith et al., 2013).

2.4.4 Compliance with observations and score

Apart from the technical aspects that make up a good TTS (sensitivity, specificity and simplicity), compliance with its use is arguably an essential factor. For the potential benefits of a tool to be fully realised, regular monitoring of routine vital signs at an appropriate frequency is required, the

score must be calculated correctly and recorded on the chart for review. When a trigger score is reached, a call for assistance must be made. The implementation of NEWS has been linked with an increased compliance in use of a tool, resulting in an increase in escalations to the RRT (Austen, Patterson, Poots et al., 2012). Although the increase was in part due to improved sensitivity of the score, researchers concluded that the addition of an observation chart with an integrated colour-coded score enhanced overall compliance with the process. Others have shown similar where the implementation of a TTS positively influenced compliance with vital sign documentation (Ryan, Cadman and Hann, 2004; Hammond, Spooner, Barnett et al., 2013) and in a simulated environment Fung, Khan and Dawson (2014) showed improvements in relation to the speed and accuracy of recognition when the observation chart was displayed in graphical format, rather than simply numerically depicted.

Vital signs are essential components of a TTS, so without measurement and documentation of observations at an appropriate frequency, opportunities to generate a trigger score will potentially be missed. In 2007, NICE mandated that six mandatory vital signs (RR, HR, BP, SpO₂, temperature and LOC) should be monitored every 12 hours as a minimum, and increased in frequency where abnormalities were present, but a number of studies have highlighted poor documentation of vital signs in a variety of situations and environments that have continued over time, Chaplik and Neafsey (1998) in the US, Chellel et al. (2002) and Gopal and Stenhouse (2002) in the UK and Ahrens (2008) in Australia. More recently, a small survey of healthcare

support workers (HCSW) in one hospital, with a 36% response rate, highlighted concerns regarding inaccuracies in early warning scores. The HCSWs were responsible for calculating the early warning scores, but only 35% of respondents stated that they monitored the patients' mental status (a component of the score), rendering scores inaccurate in the remaining 65% of cases (James, Butler-Williams, Hunt et al., 2010). Despite respiratory rate being an early indicator of deterioration, this parameter has been reported, albeit through retrospective audit methodology, to be poorly documented (Butler-Williams and Cantrill, 2005), as has oxygen saturation and fluid balance and, where abnormalities were present, frequency of observation was not increased (NCEPOD, 2005). This is particularly worrying in light of findings that indicate respiratory complications most frequently result in FTR (Sheetz et al., 2014) or precede cardiac arrest (Goldhill et al., 1999).

Some researchers have questioned why such deficiencies exist in practice. Evidence suggests that observations are not collected uniformly throughout the 24-hour period or in accordance with patient severity, rather collection is dictated by routine rather than patient need (Smith, Schmidt, Prytherch et al., 2008; Hands, Reid, Meredith et al., 2013). When night and daytime observations (n=950 043) were compared, Hands et al. (2013) showed that observations reduced at night irrespective of patient acuity and escalation protocol was not adhered to. High workloads at night were considered to be a contributory factor. It was important therefore that, in the current study, participants could be observed during the night as well as the day shift.

Some small qualitative studies have demonstrated over reliance on electronic monitoring and delegation of the observations to less-skilled healthcare workers. Hogan (2006) employed qualitative focus groups of RNs, HCSWs and student nurses to investigate lack of monitoring. She found that the monitoring role had been delegated to the HCSWs, but they did not have the same access to training as the RNs and students. Wheatley (2006) carried out an ethnographic study, interviewing and observing four RNs and four HCSWs. This was only a small study and there is no explanation regarding if data saturation was achieved, but this researcher also found observations delegated to the HCSWs, limited access to training and an over-reliance on electronic equipment. This evidence suggests that the role of the HCSW may be a key component in the care of deteriorating patients and was a sensitizing concept for the current study where it was considered that HCSW would be essential contributors.

Correct calculation of the score is important paramount as errors and underscoring can result in failure to identify deterioration. In a retrospective review of 3739 sets of observations with a documented EWS, researchers found 21.9% were incorrectly calculated and subsequently failed to generate the requisite triggers in 66 deteriorating patients (Smith and Oakey, 2006). As with other single-centre, retrospective audits, the findings of this study are not generalisable, in particular because this study was carried out during a very busy period following an outbreak of Legionnaire's disease. But it highlights a need for caution that full compliance with and accuracy of track and trigger scores cannot be taken

for granted. Mohammed, Hayton, Clemments et al. (2009) demonstrated how the accuracy and efficiency of TTS calculation could be improved with the use of a hand-held computer. In a three-phased study with 26 surgical nurses from two hospitals, they compared track and trigger score calculations between pen and paper versus a hand-held electronic device. They demonstrated nearly two-fold improvement in accuracy from 58% to 96%, the time taken to calculate was reduced by a few seconds and the device was well received by the participants. This was only a small study, but others have shown similar with the use of bedside electronic capture of vital signs and electronic alerts sent directly to doctors (Jones, Mullally, Ingleby et al., 2011; Bellomo, Ackerman, Bailey et al., 2012).

In their large multi-centre before and after, but un-blinded study Bellomo, Ackerman and Bailey et al. (2012) examined the effect of electronically generated alerts on frequency and type of calls and survival to hospital discharge or 90 days with 18305 patients. The frequency of calls triggered by respiratory signs increased (21.3 calls /1000 admissions pre intervention compared with 24.1/1000 admissions during the intervention), cardiac arrest rate fell from 3.5 to 2.8 arrests per 1000 admissions and survival increased from 86% to 92% ($p=0.04$). Length of stay was also significantly reduced which is important because as well as the advantages for the patient this carries a financial benefit for the hospital. Somewhat emotively, the researchers translated their findings into 12 lives and 1750 nursing hours / year / ward saved. What the researchers do not highlight though, is the differences between nurse to patient ratios in the UK and USA

for example, size and configuration of the rapid response teams, availability of critical care beds and any differences in sensitivity and specificity of the different scores used internationally. Nevertheless, these findings are encouraging, demonstrating ways in which rapid response systems can potentially be improved.

The users of the track and trigger score are a major concern. If the score is underused then, by definition, it is hard to evaluate its effectiveness. From their review of 16 studies (1995-2009) Massey, Aiken and Chaboyer (2010) highlighted reluctance on the part of some nurses to use a TTS. Clearly, there is a need to explore why the scores are underused and this was a motivator for the current study. A small, single-centre qualitative study in the UK, explored the use of TTS from the perspectives of both the ward nurse escalators (n=11) and the outreach nurse responders (n=3). They showed that some nurses use their clinical judgment first and then use the track and trigger tool to quantify deterioration (Donohue and Endacott, 2010).

Fullerton, Price, Silvey et al. (2012) expanded on these findings in their large but single-centre retrospective observational cohort study of 3504 patients. Human clinical judgment was compared with use of a TTS for identifying adverse events. They found that clinical judgment alone had a sensitivity of 61.8% and a specificity of 95.1%, but when combined with clinical judgment, while detection sensitivity improved to 72%, there was some loss of specificity at 84%. In both of these studies one might consider that a different, more sensitive TTS would have elicited different comparative results, but similarly human factors may have influenced the nurse-

escalators' decision-making process, such as the nurse to patient ratio, years of experience and qualifications amongst the sample of nurses. But the clear difference here between the two methods of identifying deterioration is the use of objective versus subjective indicators and this may be an area for further investigation.

As part of a large Intensive Care National Audit and Research Centre (ICNARC) study, Hutchings, Durand, Grieve et al. (2009) carried out a qualitative review of track and trigger tools, using semi-structured interviews with 112 multi-professional ward-based staff. Thematic analysis identified that most participants were in favour of using a TTS and the objective information the score provided was seen to improve identification, speed of response and the institution of treatment. Participants were worried however that a low score might generate a false sense of security, that all was well with the patient when it was not. This reflects other researchers' concerns relating to the poor sensitivity of the early track and trigger scores (Gao et al., 2007; Smith et al., 2008a; 2008b) and reinforces the importance of findings from Donahue et al., (2010), Massey et al. (2010), Fullerton et al. (2012) where a tool and human clinical judgment are seen as symbiotic.

2.4.5 Escalation

Studies evaluating the use of track and trigger scores have highlighted some associated problems in the rapid response process. Key amongst these is evidence to suggest that nurses fail to follow escalation protocols (Rowan,

Adam Ball et al., 2004), but Green and Alison (2006) highlighted doctors' failure to attend in response to triggered calls. Survey responses from 117 nurses and doctors just six months after implementation of a TTS, highlighted issues for medical staff with regard to the triggers used and the increased workload, particularly out of hours. This evaluative study is limited by a low response rate (36%) and was arguably carried out prematurely in the change process, but nevertheless it draws attention to a key issue, namely that while improvements are made in the escalation process, the resources required to muster a response will also require attention. Arguably, optimum improvements will only be realised if the response arm of the process can be adequately resourced to address the calls for assistance. Furthermore, these problems do not relate specifically to track and trigger scores rather they may simply be reflective of the struggles experienced within everyday practice. These two studies emphasize the importance of consideration of contextual factors that surround the escalation process, rather than focusing on the score *per se* and this adds credence to the current study, which aimed to explore this.

Researchers have nevertheless continued to elucidate quantitative evidence to demonstrate effectiveness of the TTS. A recent study from Churpek, Yuen, and Edelson (2013) highlighted the advantages of a TTS in predicting mortality and cardiac arrest. Using a large sample of patients (n= 59,643) from one hospital, split into two cohorts, they found their TTS performed well as a predictor for both these outcomes, but less so for predicting ICU admission. They found that *vital signs preceding death were generally the*

most deranged (Churpek et al., 2013: 567). Personal clinical experience suggests that this is often the case, but indicators for ICU admission can be multiple and complex. The score may be instrumental in highlighting a problem, but arguably the actions of the team in response to that trigger are key in effecting a safe patient rescue. This point is reinforced by a group of researchers (Tarassenko, Clifton and Pinsky et al., 2011). They used 64,622 hours of data from 863 patients using continuous bedside monitoring to identify the properties of HR, SpO2, RR and systolic BP for use in an alert system. They highlighted that although their monitors generate an alert, this trigger simply indicates that other actions need to take place. Thus the potential for process failures are multiple and complex, and it may be unrealistic to expect that implementing a score alone will solve the problems of failure to escalate. As such, these findings rationalize the current study, which aims to fill the gap in the knowledge base around why staff members fail to escalate.

Communication has been shown to be key in the escalation process and studies have shown that the track and trigger tool can help. Odell, Forster, Rudman and Bass (2002) demonstrated that a TTS improved nurses' ability to convey urgency, regardless of their knowledge and skills. Sharpley and Holden (2004) reinforced this with findings from a small-scale post-implementation survey and pilot evaluation, which suggested that objective definition of deterioration using trigger scores empowered nurses to call doctors, resulting in earlier patient reviews. Day's (2003) findings suggested that it was probably the caller, rather than the score that

prompted a response from the doctor. In her two-month, single-centre audit in which all trigger calls to the doctor for help were recorded (n=45). When response times to calls made by CCOT were compared with those made by ward nurses, the doctors' response was considerably faster with the CCOT nurses (11 versus 46 minutes). Response times were not associated with patient acuity or score. These findings are not generalisable, but may resonate with some users, and were later reinforced by Andrews and Waterman (2005) who found the TTS improved nurse-doctor communication in the escalation process. In one of the few studies to take a grounded theory approach, interviews with nurses, doctors and healthcare support workers highlighted that junior nurses' use of non-medical language rendered them less credible informants and doctors did not respond best to the sometimes intuitive concerns of the nurse, rather they responded more positively to quantitative, objective data. Researchers concluded that the way in which information was packaged was key to the escalation process (Andrews and Waterman, 2005:473).

2.4.6 Subjective cues

Some scores have the additional criterion that allows the nurse to call for help when 'worried' about a patient. This suggests that patients, who do not have any objective measurable signs and do not trigger the TTS, may still be an intuitive concern to the nurse. This facility has been available at the current research site for nearly 15 years, but international consensus opinion supports the use of such subjective criteria because it increases empowerment to call for assistance (DeVita et al., 2006). 'Nurse concern'

indicates a potentially vulnerable patient group that is arguably worthy of further investigation and this was one of the sensitizing concepts for the researcher at the outset of the current study.

'Being worried' was the trigger for 18% of calls by nurses in one Australian hospital and this prompted an investigation into the less measurable triggers that constituted such concern (Cioffi, 2000a). For some it was patient colour or signs of agitation, with slight or no change in vital signs, but for many, however, it was just a feeling that the patient was not right. Taking a critical perspective, Cioffi's (2000a) high specificity, low sensitivity, single-parameter TTS was in part potentially responsible, because her tool would arguably only identify the sickest patients, late in the course of their decline. Of the non-triggering group there could have been quite a large proportion for which one would expect the nurse to be concerned. As the Smith et al. (2008a; 2008b) reviews of 63 published scores highlighted, all had sensitivities too low for clinical practice, so it is suggested here that frequent 'nurse concern' triggers were the inevitable result of an insufficiently sensitive scoring system. Arguably, with a more sensitive, aggregate tool in place, patients in Cioffi's (2000a) study would have triggered sooner, pre-empting and reducing some of the 'worried' concerns, particularly in cases where several observations were just marginally deranged.

Others have explored the less measurable, more subjective aspects of identifying patient deterioration. For example Cioffi, Conway Everist et al.

(2009; 2010) interviewed 17 nurses who had triggered a call for assistance based on concern, rather than objective signs. They identified ten changes that manifested as concern for nurses e.g. agitation, impaired mentation, new symptoms, noisy breathing and inability to talk in sentences, but suggested further exploration was required. In a more recent enhancement, Carberry, Clemments and Headly (2014) took investigated a new approach to identifying deterioration with the use of trigger questions added to their early warning score. They concluded that the trigger questions had prompted nurses to ask key questions pertaining to the bigger ward picture, namely, were any of their patients scoring high, needing oxygen over 40%, fast fluids, blood, or medical review out of hours in order to highlight when nurses should be worried. A post-implementation survey (with 61% response rate) showed that over 80% of respondents thought the trigger questions improved identification and referral for deteriorating patients. Thus there is a body of evidence that tentatively suggests that an objective score should be used in conjunction with recognition of less measurable, more subjective signs and this may be a key area for further investigation. This was an area in which the current study aimed to focus, to identify some of the early signs ward teams used to identify and recognise deterioration.

2.4.7 Summary

This section of the literature review has highlighted the significance of patient observation for both objective and subjective signs in order to recognise the deteriorating patient. But compliance with the requirement for observation and use of the track and trigger score is variable, the reasons

for which have not been fully articulated. While it is clear that observation, recognition of deterioration and escalation for assistance does not always happen, it is unclear why this is the case. The current study aims to fill that gap in our understanding.

2.5 Rapid Response Teams (RRT)

This section will review studies that have evaluated the impact of rapid response teams (RRTs) on the care of acutely ill ward patients, to set the current research in context and identify gaps in the knowledge.

RRTs may work alongside or replace traditional resuscitation teams (Pebody, Cretikos, Abella et al., 2007), but with early intervention and treatment they might be able to interrupt a system of potential problems or errors that can lead to cardiac arrest. RRTs may include a nurse, doctor, intensivist, physiotherapist, clinical specialist or respiratory therapist (Thomas, VanOyen Force, Rasmussen et al., 2007) and a recent report suggests that the addition of a pharmacist to the team can speed up medication administration (Feih, Katz and Schaafsma, 2013). Teams can be physician-led, but most in the UK are nurse-led (Ball, 2002; McDonnell, Esmonde, Morgan et al., 2007) and have been shown to be both safe and more cost-effective (Rubis and Popovich, 2013). Furthermore, user perception was shown to be the same, regardless of delivery by a doctor or advanced nurse practitioner (Newman, Wathen, Dobyys et al., 2013). More recently, developments have demonstrated the cost-effective use of parent teams in the role of the RRT (Moldenhauer, Sabel, Chu et al., 2009; Howell,

Ngo, Folcarelli et al., 2012). Howell et al. (2012) demonstrated that patient outcomes could be improved with the use of a single parameter score supported by a response from the patients' parent team, rather than a Medical Emergency Team. They carried out a single-centre interrupted time series analysis with 171,341 patient admissions over 59 months and showed a significant 80% reduction in the odds of unexpected deaths, but not overall mortality. This was a single centre study and results may not be generalisable to other centres, with findings arguably dependent upon the clinical acumen of the parent teams involved.

2.5.1 Role of the RRT

Several national bodies have supported the development of Critical Care Outreach Teams (CCOT) in the UK (DH, 2000; ICS, 2002; DH and Modernisation Agency, 2003; NCEPOD, 2005; Critical Care Stakeholder Forum, 2005), most recently defined as,

A multidisciplinary organizational approach to ensure safe, equitable and quality care for all acutely unwell, critically ill and recovering patients irrespective of location or pathway (NORF, 2012:5).

The role of the CCOT in England is multi-faceted; to avert admissions to intensive care by delivering timely preventative care on the wards, to share critical care skills with ward staff, to enable discharges back to the ward, and more recently, to support patient rehabilitation after a period of critical illness (DH, 2000; NICE, 2009; NORF 2012). It would seem appropriate therefore that mortality and cardiac arrest rates are used as key outcome measures of their effectiveness. In 2007, the International Liaison

Committee on Resuscitation (ILCOR) recommended an Utstein-style approach to reporting RRT activity, including both patient and hospital level outcome measures, to enable comparison between healthcare systems (Peberdy, Cretikos, Abella et al., 2007). In 2011, Oglesby, Durham, Welch and Subbe identified 'score-to-door' time as a benchmarking measure (the time between the patient triggering a call for assistance and admission to the ICU). With no single comprehensive, evidence-based triggers to initiate team assistance however, comparisons are hampered and international differences between systems make it difficult to evaluate RRTs as an isolated intervention.

2.5.2 Difficulty in evaluating services

CCOTs were established quickly, in an inconsistent and *ad hoc* way across England after the publication of *Comprehensive Critical Care* (DH, 2000), with different typology, size and service models, based on local needs and resources as evidenced by surveys in the UK. This was similar in Australia and the US as well (McDonnell et al., 2007; National Institute for Health Research, 2009; Jones, Drennan, Hart et al., 2012; Elliott, Chaboyer, Ernest et al., 2012; Winters, Weaver and Pfoh et al., 2013; NORF, 2012). This national and international variation, alongside the complexity of the intervention, compounded by the multiplicity and variability in track and trigger tools used to identify patients, means that large multi-centre randomized controlled trials (RCTs) have been rendered almost impossible (MacKinnon and Morgan, 2002; Robson, 2002; Cuthbertson, 2003; Williams, Subbe and Gemmell et al., 2003; Ball, Kirkby and Williams, 2003; McDonnell et al.,

2007). Evaluation and isolation of the benefits of rapid response systems is therefore challenging. As Delaney, Angus, Bellomo et al. (2008) explain, while RCTs provide causal inferences, they are usually used to test single treatments rather than complex, multi-faceted interventions. The nature of the intervention renders concealment and a double-blind trial impossible. Thus difficulties arise in defining the specific intervention, deploying it in a standard manner where a variety of professionals deliver it across multiple sites and arguably some beneficial outcomes are not measurable. Furthermore the Hawthorne effect has the potential to influence the control areas. This effect, a phenomenon derived from experiments between 1927 and 1932 in the Hawthorne works at the Western Electric Company (Roethlisberger, Dickson and Wright, 1939) suggests that people may alter their performance when they are being studied (Campbell, Maxey and Watson, 1995).

2.5.3 Small quantitative studies

There is nevertheless a plethora of published papers from the year 2000 onwards that simply describe the implementation of rapid response teams in their many guises (for example, CCOTs, METs, ICU liaison nurses, and patient at risk teams). These are some early single-centre studies or post-implementation local audits that use outcomes such as survival rates and readmission to ICU as indicators of effectiveness and may not be generalisable to other organisations, for example, the ICU liaison nurse in Australia (Barbetti and Choate, 2003; Chaboyer, Foster, Foster et al., 2004; Chaboyer, Gillespie and Foster et al., 2005), an outreach team in the UK

(Coombs and Dillon, 2002; Leary and Ridley, 2003; Watson, Mozley and Cope et al., 2006) and a medical emergency team in Canada (Baxter, Cardinal, Hooper et al., 2008).

Others have found reduction in unexpected ICU admissions (for example, Bristow et al., 2000; Ball, Kirkby and Williams et al., 2003; Bellomo, Goldsmith, Uchino et al., 2003) and decrease in length of ICU stay (Pittard, 2003; Bellomo et al., 2004). However Barnes, Rechner, Odell et al., (2003) found length of ICU stay increased after CCOT introduction and this was later reinforced by findings from Priestley, Watson, Rashidian et al. (2004).

Several small, observational before-and-after studies from key authors have shown a positive impact of RRTs on mortality and cardiac arrest rates since their inception (for example, Buist, Moore, Bernard et al., 2002; Bellomo, Goldsmith, Uchino et al., 2003; 2004; DeVita, Braithwaite, Mahidara et al., 2004). Buist et al. (2002) showed how implementing a MET reduced unexpected cardiac arrests by 50% and mortality rate from 77% to 55%. More recent studies have reaped the benefits of larger sample sizes over a longer time frame (for example Campello, Granja, Carvalho et al., 2009; Konrad, Jaderling, Bell et al., 2010; Beitler, Link, Bails et al., 2011). More recently a large five-year single-centre pre and post study of over 250 000 patients, showed a significant reduction in both cardiac arrest rates ($p=0.001$) and mortality rates ($p<0.0001$) (Al-Qahtani, Al-Dorzi, Tamim et al., 2013).

Other studies however have shown no significant changes with implementation of RRTs (Chan, Khalid, Longmore et al., 2008; Karvellas, deSouza, Gibney et al., 2012) but any study of RRTs is dependent upon the physiological track and trigger tool in place and ward teams' compliance with the required escalation protocol at the research site. Thus, if low sensitivity calling criteria were used then failed or delayed identification of patient deterioration could have influenced the results. For example, Beitler et al. (2011) compared three years before and three years after RRT implementation and showed a fall in deaths per 1000 discharges from 15 to 13 ($p=0.004$) and a corresponding significant fall in cardiac arrests per 1000 discharges from 3.28 to 1.2 ($p<0.001$). They used a highly specific TTS, thus nearly half of the escalations (47%) in this study were based on clinical judgment alone rather than prompted by triggers from the tool. This process may work satisfactorily where an observant ward-based workforce can watch closely for and identify deterioration, but with a different, smaller or less knowledgeable group of nurses then these results could have been quite different.

2.5.4 Large quantitative studies

A few larger, more rigorous studies have been conducted, but provide only tentative evidence of the benefits of RRTs. A Cochrane systematic review (McGaughey, Alerdice, Fowler et al., 2007) identified only two studies of suitable rigour for inclusion, a UK study (Priestley et al., 2004) and the Australian MERIT study (Hillman, Chen, Cretikos et al., 2005).

Priestley et al. (2004) carried out the only single-centre cluster RCT in the UK to investigate the impact of a nurse-led CCOT. They implemented an early warning score and a 24-hour CCOT service using a phased approach across 16 wards in one 800-bedded hospital over 32 weeks. Researchers showed a significant decrease in hospital mortality on the intervention wards that researchers argued was difficult to ignore, irrespective of the relatively small sample size. Mean length of stay however increased for the patients seen by CCOT when compared to the controls. This might be explained simply; those patients retrieved after deterioration would require a period of recovery from their critical illness rather than simply dying, but researchers indicated this was not supported by the data.

The MERIT study investigators (Hillman et al., 2005) carried out a large multi-centre RCT of METs across 23 Australian hospitals. Eleven hospitals acted as the control while 12 implemented a MET, all of which were matched at baseline. A four-month training and implementation period commenced, followed by a six-month study period. Any differences in outcome measures (cardiac arrests rate, unexpected ICU admissions and death) were not significant; there was however a lower cardiac arrest rate in the intervention hospitals compared with the controls (1.31 versus 1.64/1000 admissions; $p=0.736$), a decrease in unplanned ICU admissions (4.19 versus 4.68 / 1000 admissions; $p=0.599$) and unexpected death rate (1.06 versus 1.18/1000 admissions; $p=0.752$). An overall reduction in cardiac arrests and unexpected deaths across all sites suggested there had been some cross contamination into the control groups.

One of the largest early evaluative UK studies was carried out by Gao, Harrison, Parry et al. (2007), an observational study using Intensive Care National Audit and Research Centre (ICNARC) time series data for 350 000 admissions in 172 ICUs across England over eight years (1996 to 2004). But they too showed no change in overall mortality and no significant effects on outcome for those discharged to the ward alive after an ICU episode. Nevertheless, some beneficial effects were seen; there was a decrease in cardiopulmonary resuscitation (CPR) before ICU admission, a decrease in out-of-hours admissions to ICU and a decrease in acute physiological scores on ICU admission. Thus it would seem that implementation of CCOTs alongside an early warning score was associated with patients who were admitted to ICU in a more time-critical manner and were less sick on arrival.

In addition to the Cochrane review, several other reviews have summarised that the potential benefits of rapid response teams are equivocal. An early systematic review of 23 studies concluded that there was insufficient evidence to demonstrate RRT effectiveness (Esmonde, McDonnell, Ball et al., 2006). But later, with access to a larger body of work, a systematic review and meta-analysis including over one million patients demonstrated that RRTs were associated with a 33.8% reduction in cardiac arrest outside ICU, but there was still insufficient evidence to support their effectiveness in reducing mortality (Chan, Jain, Nallmothu et al., 2010). Several literature reviews tentatively indicate that RRTs could reduce cardiac arrest rates and mortality (Aneman and Parr, 2006; Winters, Pham, Hunt et al., 2007; Ranji,

Auerbach, Hurd et al., 2007; Massey et al., 2009; Laurens and Dwyer, 2010; McNeill and Bryden, 2013) but all highlighted that studies reviewed were methodologically poor. More recently, Winters et al. (2013) carried out a large systematic review of 44 studies and showed that rapid response systems were associated with both reduced cardiac arrests and mortality, but highlighted that uptake of services could be improved. Endacott, Eliot and Chaboyer, (2009) raised an important issue in their meta-synthesis of 20 studies regarding the variability of CCOT interventions. They suggested that Outreach should be viewed as a bundle of care or treatment package, rather than a singular intervention. Furthermore, they highlighted a lack of measurement regarding the communication process between ward teams and CCOT, and this provided ongoing impetus for the current study.

2.5.5 Qualitative studies

Findings from most of these large quantitative studies were equivocal, however a large multi-centre qualitative study, found that, from the users' perspective, CCOT had a clear positive impact on the delivery and organisation of care (Baker-McClearn and Carmel, 2008). They carried out 100 semi-structured interviews with acute hospital staff from eight hospitals in which participants indicated that since the implementation of CCOT they had experienced critical care admissions to be more timely, or averted altogether. Furthermore, doctors and nurses felt empowered to care for seriously unwell patients on the wards through the delivery of additional education. This was counterbalanced with concerns that junior doctors might be deskilled in the presence of CCOT.

Other researchers have turned to the users to evaluate RRTs, demonstrating ward nurses' satisfaction to support their continuation. Several have used the survey approach (Valentine and Skirton, 2006; Richardson, Burnand, Colley et al., 2006; Jones and Bellomo, 2006; Salamonson, Van Heere, Everett et al., 2006; Galhotra, Scholle and Dew et al., 2006; Hatler, Mast, Nedker et al., 2009; Leach, Mayo and O'Rourke, 2010), but all had low response rates (e.g. 33% in Valentine and Skirton, 2006) and findings are therefore only tentative. Al Qahtani (2011) found that all nurses were satisfied with the RRT (n=274), they responded in a timely manner (97%) and helped to manage the sick patient (94%). Likewise, Pattison and Eastham (2011) identified that the RRT was seen as a back up, to support the nurses in caring for patients at risk. Galhotra et al. (2006) found that experienced nurses viewed RRTs more positively, but Salamonson et al. (2006) found that junior staff needed more confidence to be able to refer patients. Pusateri, Prior and Kiely's (2011) 30-item Likert scale survey, with 131 respondents (34%) showed that most nurses felt that RRTs improved patients care (92%) and working conditions (83%), but they too highlighted that 31% were hesitant to call, discouraged by physicians. A survey by Jones, Mitra, Barbetti et al. (2006) found that staff members were confident in their own ability to manage the situation. These findings further emphasize that, as in Winters et al. (2013), uptake of RRT services may be a key factor in success or failure of a rapid response system and this area of practice is therefore worthy of further exploration in the current study.

More recently, Astroth, Woith, Stapleton et al. (2013) used semi-structured

interviews with nurses to identify barriers and facilitators to calling the RRT. Similar to the aforementioned surveys, the knowledge and expertise of the RRT enhanced the process, but they identified barriers to communication with both the RRT and doctors and concluded that more studies were required. Benin, Borgstrom, Jenq et al. (2012) interviewed 49 doctors, nurses and technicians in order to describe the impact of a RRT. They found that the system empowered nurses and improved morale, but with immediate access to expert help participants felt that workload was redistributed appropriately.

Suggesting that little was known about the social context of Rapid Response Systems (RRS), Mackintosh, Rainey and Sandall (2012) compared them in two hospitals using an ethnographic approach with 150 hours of ward-based observation and 35 interviews with managers, nurses, doctors and healthcare support workers. They found that the RRS formalised identification and escalation of the deteriorating patient, but without objective signs, getting help was difficult and junior doctors experienced continued difficulties escalating across hierarchical boundaries. Arguably, these less tangible aspects do not lend themselves to measurement, but compounded with the findings from Endacott et al. (2009) that RRTs improved communication between critical care and the ward, ward-based multi-professional communication was clearly identified as an area for further investigation in the current study.

Interestingly, some researchers in these early studies paid limited attention

to the human element of rapid response teams, but Leach and Mayo (2013) aimed to identify what constituted effective RRT performance. Using grounded theory methodology they observed and interviewed 17 key informants from which they identified organisational culture, team structure, expertise, communication and teamwork as key factors in their theory of effective RRTs. While the researchers do not identify the particular variant of grounded theory methodology used, they clearly articulate the some of the key components of the approach (theoretical sampling, concurrent data collection and analysis, the use of the constant comparative technique and achieving data saturation). These findings could be used to guide improvements and developments within existing RRTs. While some have explored team configuration (Rubis and Popovich, 2013; Newman, Wathen, Dobyns et al., 2013; Moldenhauer et al., 2009; Howell et al., 2012), Brainard, Makic, Dingmann et al. (2013) demonstrated how a bespoke RRT training course improved self-assessed communication skills, confidence and team efficiency.

2.5.6 Evaluation of the findings

This plethora of studies carried out predominantly in the 2000s, demonstrates the potential beneficial effects of rapid response teams on patient outcome, but they also highlight that quantitative methodologies fall short in providing the in-depth intelligence required on the processes that influence their overall effect. The studies cited purport to be evaluating the rapid response team, sometimes in combination with a track and trigger score, but essentially they are measuring what Endacott et al. (2009) chose

to identify as a bundle or package of activities. This bundle may include the need for patient observation, the appropriate use of a track and trigger score, timely escalation to the team and achieving a rapid response, where the combined effect of all elements will influence whether the patient is rescued or not. There are potentially other factors that may inhibit or enhance the effects of a rapid response system, and it was the gaps in this area of knowledge that the current study aimed to fill.

a) Long-term studies

Thus from a critical perspective one needs to consider other potential reasons for the limited evidence of RRT effectiveness, particularly in light of the slow and often-protracted route of massive organisational and cultural change. Arguably, the timing of some of the earlier research (e.g. Priestley et al., 2004; MERIT study investigators, 2005) may have been somewhat premature, that is before the change required had been fully established. More recent studies have been facilitated by extremely large sample sizes gathered over several years, enhanced by the availability of large databases of administrative data, and these present a clearer picture where initial improvements were limited, but as processes matured and systems became better established, researchers were able to demonstrate significant improvements in patient outcomes (Tobin and Santamaria, 2012; Herod, Frost, Parr et al., 2014; Chen, Ou, Hillman et al., 2014). In Tobin and Santamaria's (2012) Australian study of 6 million admissions, no improvements were seen in the first two years after RRT implementation, but after ten years they showed a statistically significant decrease in

mortality from 4.56 to 3.92 deaths per 1000 bed days ($p < 0.001$). In the 12-year study by Herod et al (2014) it was 2005 before any real improvements were seen, after which there was a sustained decrease in mortality, independent of cardiac arrests and unplanned ICU admissions that researchers suggested was a direct benefit of the RRT.

Failure to rescue (FTR) may be a valuable measure of quality that can be used in respect of RRTs and Moriarty et al. (2014) present a convincing case for using FTR as a metric for monitoring the effect of RRTs. In a before-and-after study, over more than five years in two hospitals, they demonstrated that FTR rates fell and unplanned admissions to ICU increased, but not until the second year after implementation when an increased call rate to the RRT was established. There was no change in cardiac arrest rate, but the researchers concluded that FTR might be a better measure of RRT effectiveness. This would seem a logical conclusion where previous evidence presented has suggested that improvement requires us not to fail less, but to get better at rescuing patients (Gawande, 2012).

There is a downside to long-term studies however; where numerous service improvements are implemented over time it is more difficult to isolate the impact of the RRT from other changes. Chen, et al. (2014) demonstrated improvements over eight years in 82 Australian hospitals; the uptake of rapid response systems doubled and cardiac arrests and associated mortality fell by more than 50%, but researchers' concerns indicated that any decrease might be coincidental and not directly attributable to

implementation of a RRT. Similarly, a large observational study over eight years in 10 US hospitals showed in-house mortality improved significantly ($p < 0.001$) with a RRT when before and after periods were compared, but researchers were unable to attribute the improvements entirely to the intervention (Salvatierra, Bindler, Corbett et al., 2014).

The long-term evaluation studies may have benefited from increased uptake of RRTs over time and increased use of the service may be a way of enhancing improvements made. One study highlighted that an increase in call rate to RRT was associated with a fall in cardiac arrests. As with the FTR rate in the Moriarty et al. (2014) study, an increase from 13.7 to 25.8 calls per 1000 admissions was associated with a 17% fall in cardiac arrest rate over six years (Foraida, DeVita, Braithwaite et al., 2003). Another showed that cardiac arrests fell from 4.06 to 1.9 per 1000 admissions over four years post RRT implementation, where for every 17 calls to the RRT, one cardiac arrest was prevented (Jones, Bellomo, Bates et al., 2005). Consensus opinion has subsequently suggested that RRT calls should be monitored per 1000 admissions as this captures both the detection rate for deterioration and team activations (DeVita et al., 2006) and has since been referred to as the *dose* of a RRT (Jones, Bellomo and DeVita, 2009:313).

b) Extenuating variables

Other studies have highlighted the importance of multiple influencing factors on effects of RRT implementation. In practice, RRTs can play an influential role in supporting end-of-life decisions. One study showed a

significant increase in allow natural death (AND) orders over a 13-year period after implementation of a RRT ($p < 0.001$) (Smith, Hayashi, Lee et al., 2014) and another study reinforced that the RRT-initiated discussions on limiting treatment for patients with cancer had a positive effect on 30-day mortality (Pattison, Ashley, Farquhar-Smith et al., 2010). Increasing AND orders in patients for whom resuscitation is futile will inevitably have a positive effect on frequency of cardiac arrest calls and resuscitation outcomes. Furthermore, during a large international study to identify score-to-door times (the time between trigger generation on the ward and admission to ICU), Oglesby et al. (2011) showed that with 71% of admissions to ICU delayed, it might be organisational rather than patient-related factors that influence the impact of RRTs. This is compounded by other studies that have highlighted similar delays. Pattison and Eastham (2011) found average delays of nearly three hours between the point of deterioration and escalation, while Adlestein, Piza, Nayar et al. (2011) found similar delays in both calling for help and responding.

Another factor for consideration is that patients identified for RRT intervention are, by definition, a potentially high-risk vulnerable group of patients made up of some of the sickest patients on the wards, so the teams are dealing with patients who have a high risk of death from the outset. Some researchers have reinforced this point with large samples of patients over long periods. In a four-year retrospective review of patients seen by the RRT, Smith, Santamaria and Reid et al. (2014) showed that this cohort of patients were significantly older, had more co-morbidities than those not

seen, and this rendered them an independently higher mortality risk ($p<0.001$) than other patients. In a similar ten-year retrospective review, researchers showed a high mortality rate (25%) in patients seen by the RRT (ANZICS-CORE MET dose investigators, 2013). Thus given the high mortality rate in patients seen by the teams, it would seem logical that strategies are required for earlier detection and opportunities to intervene sooner, before the criteria for calling RRTs are met. It is essential therefore that new research examine strategies for earlier detection and how these might be deployed. It is anticipated that the insight into what happens in practice in the early stages of patient deterioration on the ward, that the current study aims to provide, will fill this knowledge gap.

c) Failure to escalate

If the RRT is not alerted to a problem, they will not be able to respond. In a retrospective medical record review of 575 sentinel events (cardiac arrests, unexpected ICU admission or MET call), Trinkle and Flabouris (2011) found that not calling for help when a patient triggered on the early warning score was associated with unexpected ICU admissions ($p=0.01$). Later, Boniatti, Azzolini, Viana et al. (2014) showed that those who were not seen by a RRT did worse than those who did. From a database of 1148 RRT calls, they showed a higher mortality at 30 days post-call in those with a delayed RRT review ($n=246$, 21.4%) when compared with those who were seen on time ($p<0.001$). Researchers concluded that this study reaffirmed the need for a RRT.

In the RESCUE study, a prospective, multi-site, point-prevalence review of vital signs in over 2000 patients in 10 Australian hospitals, nurses reviewed patients over a 24-hour period for evidence of RRT triggers (Bucknall, Jones, Bellomo, Ackerman, Bailey et al., 2013). Of the 1688 patients assessed, 55 fulfilled the trigger criteria at the time of the visit for RRT, but despite reviewers informing the shift leader of abnormal vital signs, no calls were made to the RRT within 30 minutes required. Similarly, Guinane, Bucknall, Currey et al., (2013) used a retrospective chart audit to identify such a group. Of the 568 case-notes reviewed, one patient in seven triggered the criteria, but very few were escalated to the RRT. Ward-nurses initiated treatment independently, but when unable to do so they escalated to a doctor (not the RRT). Researchers concluded that more research was required to understand the decision-making process in ward-based patient deterioration. This was encouraging for the current study, which may help to fill part of this knowledge gap.

RRTs were introduced to reduce delays in essential treatment to prevent further patient deterioration, but they can only be effective if they are called for their assistance. In a pilot study, where observers reviewed 17 cases of patient deterioration, Peebles, Subbe, Hughes et al. (2012) found delays in RRT escalation, as did Guinane et al. (2013) and Bucknall et al. (2013). This could be overcome with automated alerts. But one researcher has suggested that some senior nurses and doctors might be resistant to ICU interference in ward-based care (Robson, 2002). Shearer, Marshall, Buist et al. (2012) reinforced this over a decade later in a multi-methods study that

revealed socio-cultural factors and intra-professional hierarchies as the most significant barriers to team activation. They found that the most common reason for not calling the team was a perception that the appropriate expertise was already assembled at the bedside and that the situation was under control, so the RRT was not required. Again, the need to identify ways in which patient problems can be identified earlier in the course of the patient's decline is emphasized and this is explored further in the current study using a qualitative approach. One might assume that close monitoring of the patient would reduce some of the delays in calling the RRT, but this is not necessarily the case as shown by Tirkkonen, Yla-Mattila, Olkkola et al. (2013). They carried out a prospective observational single centre study across specified 45 beds in which they identified that failure to escalate occurred more frequently in continuously monitored patients (81%) than those with manually measured vitals (53%) in ward areas ($p=0.001$). They emphasize the important point that the benefits of intensive monitoring are lost without appropriate escalation and response.

One solution to the problem of failure to escalate has been developed while the current study was underway. Electronic recording of vital signs, calculation of TTS and automated triggers sent directly to the RRT may improve escalations. Kollef, Chen, Heard et al. (2014) tested the use of real time alerts sent to RRTs (against a control group) in a group of 571 patients across eight medical units, demonstrating a significant reduction in hospital stay for the intervention group ($p=0.038$). Similarly, over a two-year period with 3030 RRT activations, researchers showed a reduction in ICU

admission rate and lower 28-day mortality in surgical patients with the use of electronic triggers (Huh, Lim, Koh et al., 2014).

In another solution to failure to escalate, one group of researchers looked at other ways in which deteriorating patients could be identified, alongside the TTS. Guirgis, Gerdick, Wears et al. (2013) implemented proactive rounding in a 696 bed trauma centre where members of the team trawled the wards in search of deteriorating patients. Comparing patients in the pre-implementation period (n=70 229) and post (n=153 138) over seven years, they found that the number of RRT interventions increased and this was associated with a significant increase in transfers to higher levels of care ($p<0.001$). The quarterly cardiac arrest rate was halved and associated mortality was also reduced. Conversely, in another single-centre three-year before-and-after study, Butcher, Vittinghoff, Maselli et al. (2013) were unable to show any benefits of proactive rounding by a RRT.

d) Negative effects of RRTs

Finally, and perhaps most importantly, since the implementation of RRTs, there have been very few arguments against their use and no writers have yet indicated that services should be discontinued. Skill reserves were a key theme in the more negative press. One study argued that RRTs deplete the reserve of senior experienced nurses in ICU (Riley and Faleiro, 2001). Two separate literature reviews highlighted concerns of de-skilling ward staff (Jones, King and Wilson, 2009; Winters et al., 2013), but neither of these studies quantified this concern. Qualitative studies highlighted similar. For

example, semi-structured interviews with participants in the Baker-McClearn and Carmel (2008) study highlighted concerns that doctors were becoming de-skilled and Benin et al. (2012) found that RRTs potentially reduced autonomy of trainee doctors.

2.5.7 Summary of findings from the RRT literature

The evidence reviewed here is somewhat equivocal in its support of RRTs, but a case has been made for this multi-faceted intervention not lending itself to measurement and control. There is little agreement between the outcome measures of effectiveness used in the studies discussed, which have included survival rates, readmissions to ICU, length of stay, cardiac arrests and mortality. Rather, this emphasizes the importance of a need for uptake of outreach services (Winter et al., 2013) and the significance of considering the intervention as a package (Endacott et al., 2009). This has not prevented the continued development of RRTs, and on balance the variety of evidence from a wide range of sources and settings and different measurement approaches may support this. Indeed, national publications have called for nationwide implementation of RRTs 24 hours a day, seven days a week (NICE, 2007; Faculty of Intensive Care Medicine and ICS, 2013). This may be appropriate in light of evidence that indicates a decrease in cardiac arrest rates associated with a higher 'dose' of RRT calls (Jones et al., 2009).

The evidence surrounding the development of RRTs sets the scene in preparation for the current study, which explores the communication

amongst the multi-professional team regarding care of the deteriorating patient, but unlike the majority of studies reviewed here, the focus will be on the earlier phase of patient decline, well before arrival of the team, and this may be a potential area where improvements can be made.

2.6 Rationale for further research

The emphasis of early research has been on testing and measuring the outcomes and effects of rapid response systems (a team and a score). The findings of this review indicate that exploring their complexity in respect of caring for the deteriorating patient from a positivist research approach is fraught with difficulty, particularly because of the heterogeneity of the scores and services in operation and an inability to control many of the confounding variables involved. There is no evidence that suggests unequivocally that rapid response systems are effective, nevertheless there are some clear and obvious associated benefits in practice that mean few have had the courage to remove them from practice. There has been a noticeable move however, while the current study has been underway, to investigate the less measurable aspects of rapid response systems as evidenced by the user surveys and qualitative studies carried out most recently (Leach et al. 2010; Al Qahtani, 2011; Pattison and Eastham, 2011; Pusateri et al., 2011; Benin et al., 2012; Mackintosh et al., 2012; Winters et al., 2013; Astroth et al., 2013; Leach and Mayo, 2013).

On a practical level, scoring systems that identify patients at risk of deterioration and teams of clinical experts available to deal with the

complex and time consuming needs of acutely ill deteriorating patients would seem to be an appropriate, common-sense solution to suboptimal ward-based care and FTR. However, evidence and personal experience suggests that despite implementation of track and trigger scores and rapid response teams, there are multiple opportunities for things to go wrong along the trajectory of care for the acutely ill patient. Yet there is limited research that explores what happens at the 'coal face' in the very early stages of decline, when the patient first starts to deteriorate clinically, what healthcare professionals look for, how they interact with each other, how they communicate what they find, how they respond, act and behave, and what enhances or inhibits this work.

These questions can arguably be addressed using a grounded theory approach, which essentially asks the question, what is happening here? Only three grounded theory studies were located in this review, two of which were published after the commencement of the current study (Andrews and Waterman, 2005; Pattison and Eastham, 2011; Leach and Mayo, 2013), but this is a methodology that enables the researcher to get close to the action and to find out what is happening in practice. The next chapter will articulate the benefits of such an approach in investigating the care of acutely ill deteriorating adults amongst the multi-professional team in the ward arena.

A track and trigger tool can alert the healthcare professional to early deterioration, but it would be helpful to know what other factors might

support ward-based teams even sooner, what techniques healthcare professionals already use and are in some cases taken for granted, how they learn them, from whom, and how that information is recorded. If these issues can be isolated, potentially workers can be taught how to deal with them. The body of work reviewed here and in the background section of the introductory chapter has focussed on the abnormal vital signs or antecedents that precede cardiac arrest, the trigger scores and the response teams, but less attention has been paid to those who are dealing with the daily issues of increasingly acutely ill patients in the very busy clinical environment of a ward on a regular basis. The initial work for this study was prompted in part by Tee, Calzavacca, Licari et al. (2008) who highlighted that at the time we knew little about how nurses and doctors respond to changes in the patient's condition and what teams do at the bedside that might benefit the patient. Thus there seemed to be room for further development and enhancement of rapid response systems and the approach to care of the acutely ill patient *per se*. There is little understanding about how the process can be augmented further, to make it sooner, faster and better. This study aims to fill that gap.

2.7 Summary

This chapter has reported the findings from an iterative literature review. A search strategy has been articulated with results presented as a series of themes that set the research in context of the existing body of work regarding identification and care of the acutely ill adult within a rapid response system. Gaps have been identified in existing knowledge that have

rationalised the current study. The aim of this study was therefore to extend understanding around care of acutely ill patients in the ward arena by closely examining the interactions between members of the ward based team, to answer the question,

What happens in practice on the ward amongst the multi-professional team when acutely ill adult patients deteriorate clinically?

The objectives of the study were to explore, understand, describe and explain

- What happens on the ward when patients start to deteriorate?
- How do healthcare professionals know that a patient is deteriorating, how do they define it and communicate it to each other?
- What issues and concerns are relevant to practitioners in the clinical environment? What are the enhancing and inhibiting factors?
- What do they do in practice and how do they make sense of what they say and do?

The next chapter will explain the chosen methodology and methods that were used in this thesis.

Chapter Three: Methodology and Methods

3.0 Introduction

This chapter presents the methodology and the methods used in the current study, all within a rigorous, ethical framework. Cognisant of Bryant's (2002) challenge for researchers to clarify their stance and maintain consistency of design, this chapter will clearly articulate how the chosen naturalistic, interpretivist paradigm, grounded theory methodology and qualitative methods link together within the constructivist approach to explore the phenomenon of interest. This grounded theory study is justified from its ontological, epistemological and methodological underpinnings, and key elements of the grounded theory method (GTM) are discussed and rationalised, including ethical approval, patient recruitment, data gathering, analysis and trustworthiness.

3.1 Phenomenon of interest

This research began with the phenomenon of interest, that is, multi-professional care of the acutely ill, deteriorating patient on the ward, discussed in Chapter One. Chapter Two highlighted the plethora of studies examining the implementation of rapid response systems, but there was a paucity of work surrounding the earlier processes of care for this vulnerable group of patients, before they triggered the rapid response system. Care of the acutely ill adult with impending clinical deterioration involves social processes (communication) within the multi-professional team and therefore lends itself to a research approach that facilitates the exploration

of human interaction in the natural setting. This element of practice does not lend itself well to objective measurement. Thus it will be argued here how the constructivist grounded theory approach would enable the researcher to ask about and observe in practice what happens within the multi-professional team when patients start to become acutely ill in a variety of situations and contexts, how professionals behave, how they act and interact when identifying and helping the deteriorating patient. This has only partially been explored before and may be helpful in generating a theory or conceptual framework that explains what happens when a patient deteriorates on the ward and could direct future service improvements. This chapter presents an argument that suggests how such an investigation fits well within the naturalistic paradigm and a qualitative, exploratory approach. This enables the researcher to enter the participants' domain, become closely involved in the action and to learn from them in their real world, by listening to and observing them in the context of their clinical environment.

3.2 Paradigm and rationale

Research is guided by a paradigm (Khun, 1970). A paradigm is a basic belief system or worldview, a framework that encompasses philosophical thought about the nature of reality (ontology) and the relationship between the researcher and what is known and how we come to know, whether the researcher is part of the knowledge or separate from it (epistemology) (Crotty, 1998; Guba and Lincoln, 1994). Subsequently the methodology, influenced by ontology and epistemology, refers to how we gain knowledge

about the world in a practical way (Guba, 1990; Guba and Lincoln, 1994; Crotty, 1998; Denzin and Lincoln, 2000; Denzin and Lincoln, 2005). The paradigm, research question and how data is gathered are therefore intrinsically linked within a specific perspective. The following sections situate the current study, its methodology and methods within the naturalistic, constructivist paradigm. Three alternative perspectives (positivism, post positivism and the naturalistic paradigms) are considered here (Guba and Lincoln, 1994).

3.2.1 Positivism

Positivist researchers assume that one single, measurable, objective reality exists ready to be discovered, within a value-free framework, which can be observed, captured and understood through scientific enquiry (Parahoo, 2006). Distanced from, and independent of, the subject matter, the researcher collects quantitative data to empirically test predetermined hypotheses, discover cause and effect relationships between controllable variables and make predictions that are verifiable and generalisable from the direct measurement of large numbers of randomly selected cases in a rigorous experimental approach with statistical data analysis (Lincoln and Guba, 1985; Denzin and Lincoln, 2000). Some studies, such as drug trials for example, are clearly well served by research carried out from this perspective. The medication dose can be systematically measured, a large sample of the population can be randomised and controlled and outcomes can be clearly monitored from which statistically significant, generalisable conclusions can be drawn. An inquiry that plans to explore the more

complex and multi-faceted phenomenon of multi-professional care of the deteriorating patient in context however does not lend itself to such a reductionist approach, where variables arguably cannot be controlled or removed, as indicated in Chapter Two, and blinding of the researcher is not possible or desirable.

Thus, as outsiders, separate from the investigation, positivist researchers look for a single truth, causative explanations, prediction and control, using objectivity, deductive reasoning and statistical analysis (Parahoo, 2006), but this is not useful for investigating the complexities of human experiences in context. The phenomenon of interest here requires a different approach to facilitate a deeper understanding of the problem in its natural, contextual setting. Arguably, this could not be best achieved using a positivist approach.

3.2.2 Post-positivism

Post-positivism emerged from a critique of positivism and this movement is an example of what Khun (1970) described as a paradigm shift. Post-positivist researchers hold similar beliefs to the positivists in that an external reality is purported to exist and can be measured, but for them there are multiple realities that can only be partially captured (Appleton and King, 2002). Based on a belief that everyone experiences reality in a similar way, there is no clear, definitive objective truth, rather truth discovered is probable. Thus the researcher aims for a detached, objective position while recognising the possible effects of background knowledge and contextual

factors on what is seen and heard in the field. For a study of the phenomenon of interest guided by this perspective, the researcher might take a mixed methods approach, triangulating qualitative and quantitative data so that errors or faults in each could be overcome. Some researchers recognise however that not all phenomena, as in this study, are conducive to measurement, and meaning can be lost when it is fragmented into component parts (Allcock, 1997; Annells, 1997). The positivist and post-positivist paradigms, summarised in Table 8 below, with an objectivist measurement and realist stance, arguably have potential limitations for investigating human behaviour and complex social phenomena and are therefore not suited to a study that aims to explore participants' thoughts, feelings, behaviours, actions and interactions in the clinical healthcare setting.

Table 8. Summary of philosophical assumptions in three paradigms

Paradigm	Positivist	Post-positivism	Naturalistic
Ontology	Single reality exists	Reality exists but may be multiple and impossible to accurately perceive	Multiple realities exist
Epistemology	Objectivist where the researcher is far-removed from the investigation	Detached and objective researcher but recognises potential contextual influences	Researcher interacts with participants in their natural setting
Methodology	Experimental under controlled conditions	Modified experiments, multiple methods, triangulating qualitative and quantitative data	Qualitative data from interviews, observations

3.2.3 Naturalistic or constructivist paradigm

Naturalistic research, developed during the late 19th and early 20th centuries by social scientists, encompasses a set of beliefs in which proponents consider experience to be context-bound and socially constructed, that objectivity and neutrality of the researcher is impossible to achieve so their values have to be an integral part of the study, rather than divorced and separate from it (Appleton and King, 1997). Research influenced by this paradigm usually involves collecting rich, thick descriptive data (Geertz, 1973) which is described, analysed and interpreted through a close relationship between researcher and participants, and where data gathering and analysis are carried out simultaneously. The 1960s heralded a period of development of a systematic approach to qualitative naturalistic inquiry as the positivist approach came under criticism (Rutty, 1998).

Neither the positivist nor the post-positivist approach was adopted for this study, as they were considered unsuitable for the phenomenon of interest. In research underpinned by these paradigms the researcher remains separate from the investigation. As an employee at the research site, with a role in care of the acutely ill patient, the researcher was linked to the population under investigation and shared some of the values and beliefs of the participants. The researcher could have become detached from the participants, but this was not desirable where the aim was to understand what was happening at ward level between the multi-professional team, and the researcher needed to be close to the action. If one considers that participants' perceptions are shaped by their surroundings, emotions,

cultural, social and political factors, this meant exploring how they constructed their own reality in the context of the clinical arena, in the natural setting, anticipating that there might be multiple competing realities. Subsequently this led to the consideration of the constructivist interpretivist approach.

3.2.4 Constructivism

When constructivism underpins an inquiry, phenomena can be studied in their natural setting in order to understand how the participants construct reality in context, where meanings are embedded in the actions they perform (Parahoo, 2006). Constructivists take a relativist stance, that is, participants may behave and think differently in different contexts, relative to the situation and their actions are open to interpretation by any given observer (Appleton and King, 1997). The aim is to develop an understanding of the meanings they place on the phenomenon, from their perspective. Thus, constructivists argue that reality is relative to the individual and multiple mental constructions of reality can exist concurrently in the minds of different participants. Each participant sees the situation from a unique position. By talking with the participants and observing them in practice, the researcher can get close to the action and learn about what happens, some of the hidden assumptions, what these mean to the participants and how they make sense of their world (Charmaz, 2006).

This approach was considered an appropriate strategy for the current research because it matches the aims of the study and reflects a perspective where multiple realities can exist. With a subjectivist epistemology, participants and researcher can work together to co-create understanding of the phenomenon (Denzin and Lincoln, 2000). The complexity of healthcare professionals' interactions, while caring for acutely ill patients, lends itself to exploration directly in the ward setting because it is neither possible nor desirable to remove or separate participants from their physical environment and study them in a 'laboratory-like' situation. While it may not be feasible to access participants' attitudes and beliefs as static and measurable entities, their interactions and how they bring issues and problems to the fore by their actions in practice or talking about them can be studied (Carter and Little, 2007).

By talking to participants and interacting with them in their daily activities, the researcher gains access and insight into practice, learning from them in close proximity to maximize knowledge generation by engaging in their world. This approach aims to reveal multiple subjective realities, rather than one hard truth, and findings that are relative to the context of the study and relevant to the participants, possibly transferable to other areas rather than generalisable to all (Guba and Lincoln, 1994). Thus, consumers of this research may feel a resonance or recognise similarities with their own practice and subsequently apply them to their own area of work. It is acknowledged however that findings will reflect a standpoint; different researchers exploring the same phenomenon might construct different

knowledge in a different time and place because truth is relative and dynamic.

3.2.5 Summary

In summary, the aim of this study was to provide new and deeper insights into a complex and sometimes problematic area of patient care, so the design was informed by a naturalistic constructivist approach. The goal was for the researcher to be an integral part of the study, to enter the participants' social world and its construction simply by being there amongst the action, and through gaining a shared understanding with the participants. A belief that researcher and participants both influence the environment and are in turn influenced by it, meant that interaction and collaboration between the two in this study resulted in joint creation of data and knowledge (Guba and Lincoln, 1989). The next section will explain why grounded theory was the methodology of choice.

3.3 Grounded Theory Methodology

Grounded theory is a research approach, presented originally by Glaser and Strauss (1967) that provides a systematic approach to data collection and analysis as a counter to the positivist criticism of naturalistic research approaches,

*...the discovery of theory from data systematically obtained
from social research* (Glaser and Strauss, 1967:2).

A problem focused approach, grounded theory centres on action, incidents and the main concerns of the participants, providing the opportunity to

study how people experience, approach and resolve everyday tribulations to identify what is happening in practice (Gibson and Hartman, 2014). More simply, it provides an opportunity to study social action and what happens in context (Stern and Porr, 2011). Coupled with the promise of a theory or a framework that will *fit*, will be *relevant* and *work* in practice (Glaser and Strauss, 1967:3), the opportunity to produce something concrete and substantial made it an attractive option for investigating the phenomenon of interest.

A grounded theory or conceptual framework, developed inductively from the data has the potential to advance understanding of a phenomenon (Higginbottom, 2004). While several authors have noted a plethora of studies using this approach in nursing research (Tarozzi, 2011; Stern and Porr, 2011; Birks and Mills, 2011), it has been used rarely to investigate care of the acutely ill adult. Andrews and Waterman's (2005) 'packaging' study was a singular example identified from the literature review (discussed in Chapter Two) before the current study began. As such it became a favourable option to fill the gaps in current understanding.

Grounded theory is purported to facilitate the exploration of interpersonal activities and is particularly valuable when little or no previous knowledge or theory exists (McCann and Clark, 2003), therefore it was considered ideal to explore multi-professional ward-based care of the deteriorating patient. It focuses on social action; social processes and the way individuals interact and express themselves socially, providing potential access to their motives

and beliefs from a study of human behaviour. Researchers usually ask open questions about what is happening in practice and watch how people interact in the clinical environment (Sbaraini, Carter, Evans and Blinkhorn, 2011), and as such, GTM is well-placed to explore the complexities of how groups of professionals work together when caring for the deteriorating patient.

The methodology for the current study has been heavily influenced by the work of Charmaz (2006) and the importance of including all key tenets of grounded theory was crucial to its rigour. Her practical guide through each stage of the research process including theoretical sampling, data gathering with interviews and observation, data analysis with coding, the constant comparative technique and writing memos directed the research proposal and the ongoing research process for this thesis (Charmaz, 2006; 2014). Key tenets of grounded theory methodology are explained in more detail in section 3.7 below.

An overview of grounded theory methodology has been presented in this section, deemed as appropriate for the current study because it examines social processes around the phenomenon of interest, the end result of which will be something tangible, a conceptual framework that could explain current practice and guide future improvements. Key elements of the research process will be discussed in more detail in the following sections. How these are operationalised is dependent upon the philosophical underpinnings of the particular variant of the methodology, and this is

explained below by way of the historical development of Grounded Theory over the last 50 years in the next section.

3.4 Grounded Theory: the historical perspective

This section aims to set constructivist GTM within the context of a collection of variants underpinned by a range of philosophies from positivism to post-modernism (Mills, Chapman, Bonner and Francis, 2006); what Charmaz (2014; 14) refers to as a *constellation of methods*. Essentially, each approach varies according to its ontological perspectives on what can be known about a phenomenon and the epistemological nature of the relationship between the researcher and participant. Schwandt (2000) and Denzin and Lincoln (2000:12) indicate that this is historically situated, but the researcher must identify which variant is most closely aligned with their own perspective. The following sections illustrate how GTM can vary according to its philosophical underpinnings, and why constructivist GTM was chosen.

3.4.1 Positivist grounded theory

Denzin and Lincoln (2000:12) described seven 'moments' in the history of qualitative research and these are summarised in Table 9 below. The development of GTM arose in what they call the 'golden age' and has been developed over nearly 50 years.

Table 9. Moments in qualitative research – a summary

Date	'Moment'	Associated GTM publications
1900-1950	1 st Traditional (positivism) <i>Logical positivists in the Vienna Circle challenged by early qualitative inquiry from the Chicago School</i>	Mead (1934) Blumer (1969)
1950-1970	2 nd Modernist /golden age (post positivism)	Khun (1970) Glaser & Strauss (1967)
1970-1986	3 rd Blurred genres (post positivism)	Glaser (1978)
1986-1990	4 th Crisis of representation (of the author)	Strauss (1987) Strauss & Corbin (1990)
1990-1995	5 th Post modern, experimental and new ethnographies	Glaser (1992) Strauss & Corbin (1994)
1995-2000	6 th Post experimental enquiry	Corbin (1995) Strauss & Corbin (1998) Charmaz (2000)
2000-	7 th moment	Clarke (2005) Charmaz (2006)
<i>Source: Denzin & Lincoln (2000)</i>		<i>Source: Birks & Mills (2011)</i>

During the *traditional* period (1900 to 1950), when positivism predominated, qualitative studies were criticised as unscientific. In 1967 however, two American sociologists, Barney Glaser and Anslem Strauss, designed a methodology that they hoped would counter criticism of the naturalistic approach. In this groundbreaking work, Glaser and Strauss (1967:6) articulated a methodology for *generating* theory from data systematically obtained in social research (rather than verifying others' theories). Despite these protestations, their initial approach arguably has positivist leanings, suggesting that the truth is just there, waiting to be discovered, and that theory will emerge from the data. Their research process starts with a general area of interest (rather than a hypothesis) around which data, either qualitative or quantitative, can be systematically

gathered. Data collection and analysis take place simultaneously to direct further sampling from which theory (an abstract, conceptual understanding) composed of core categories and social processes is discovered (Gibson and Hartman, 2014). They purported that grounding theory in the data meant it was more likely to *fit* the situation being researched and *work* in practice (Glaser and Strauss, 1967:3).

3.4.2 Post-positivist grounded theory

After Glaser and Strauss parted company in the 1970s, GTM developed in two different directions. Glaser maintained a positivist approach (Glaser, 1978; 1992) discovering reality by distancing the researcher from the data and allowing concepts to emerge, thereby producing what he claimed were more abstract results. Conversely, the Straussarian approach is based on the view that multiple realities exist, where the researcher takes a more subjective stance and theory is constructed together with the participants (Corbin and Strauss, 2008), studying social phenomena (Gibson and Hartman, 2014). Some have situated this approach with the post-positivist tradition (Denzin and Lincoln, 1994; Guba and Lincoln, 1994), while others, such as Annells (1997) suggest that it is underpinned by the constructivist paradigm. An alternative view is proffered, that their approach has evolved over time, supported by Corbin's (2009) own suggestion that the philosophical thinking in Denzin and Lincoln's (2000:12) third post positivist *moment* (1970-1986) influenced the earlier versions of their methodology (Strauss and Corbin, 1990; 1998).

3.4.3 Constructivist grounded theory

Constructivist grounded theory was the chosen methodology for the current study underpinned by relativist ontology and a subjectivist epistemology (Charmaz, 2006; 2014). This meant the researcher would enter the enquiry with the belief that multiple realities, all of equal value exist, but that any findings would be contextual (related to the situation). Data would not be discovered, rather it would be created through social interaction between the researcher and participants, constructing and reconstructing the data together. The researcher would not be a neutral observer; rather she would be part of the findings, involved in their construction and the interpretation (Charmaz, 2006). The outcome, a conceptual framework, would not emerge from the data as Glaser and Strauss (1967) suggest, rather it would be generated, developed and integrated by the researcher using rigorous grounded theory methods to produce a composite picture, or a consensual view from contributors (Birks and Mills, 2011).

Charmaz (2006) provided guidance on the use of a constructivist approach to GTM for the current study. There are no rigid guidelines however and grounded theory cannot be applied in a formulaic, step-like approach (Tarozzi, 2011; Stern and Porr, 2011), but it does offer a systematic approach to both data collection and analysis that Charmaz (2006) suggests can be adopted flexibly, rather than prescriptively. Thus the practical aspect of what she presents appealed because it provides the opportunity to understand other people's social reality by reporting detailed description of

what is happening in practice, by studying and conceptualising meaning (Gibson and Hartman, 2014).

Thus the users of the research output might recognise the similarities between the research setting and their own and subsequently apply the findings in practice. The understanding that any construction is unique and may never occur the same way again however, was quite daunting to contemplate initially. There was concern that handling multiple points of view might be too onerous. Knowing that different researchers exploring the same phenomenon might construct different knowledge in a different time and place because truth is relative and dynamic added to the pressure. That is, the quality of the research would very much depend on researcher experience, intellect and ability to interpret the findings.

While grounded theory studies underpinned by the positivist and post-positivist paradigms are written with rhetorical neutrality, a formal writing style, technical terminology and a passive voice (Cresswell, 2007), a study underpinned by the interpretivist paradigm will be more rich and detailed, with rich, thick description where meaning is located in events, processes and structures.

3.4.4 Summary

In summary, this section has highlighted how grounded theory methodology can vary dependent upon the underpinning paradigm, ontology and the position of the researcher. Grounded theorists aim to learn about what is happening in the worlds of their participants, what they do in practice and

how they explain their actions, aiming to develop a theory about what is happening (Charmaz, 2006). It involves an in-depth exploration of participants' actions and interactions and what they mean in context. It would seem incongruent therefore for the researcher to be distant and removed from the action. Using a grounded theory approach could help to create a new understanding of patient care as common actions and social interactions are found in the data, arguably best when created together by the participants and the researcher, thus a constructivist approach was considered more congruent with the desired research output. Findings from this study have the potential to increase healthcare professionals' understanding of how they currently interact and what that means in relation to patient care through the development of a conceptual framework. It is proffered here that constructivist grounded theory is therefore a suitable approach to explore the complexities of care for the deteriorating patient.

3.5 Symbolic Interactionism

Grounded theorists take a very pragmatic approach and this is appealing; they aim to learn about what the participants do in practice and show how they explain their actions (Charmaz, 2006). Grounded theory is rooted in the theoretical perspective of symbolic interactionism (SI), so the two are philosophically similar. SI is based on the principle that humans act in a certain way towards things based on the meaning they attribute to them, through their interaction with the things and others in social context (social processes), and interpreted further through interaction with oneself, like an

internal dialogue, where the mind, body and behaviour are inseparable (Mead, 1934; Blumer, 1969:4). To clarify, reflex action is an example of a *non-symbolic* interaction, that is, when a person responds *without* interpretation.

Both SI and GTM researchers look for social processes, where meaning is socially constructed and language is the source of this meaning through social interaction. The current research aimed to find meanings in context that is, how the participants made meanings from events and how they acted and most importantly, interacted (Blumer, 1969). In order to do so, the researcher must develop *a familiarity with what is actually going on in the sphere of life under study* and in doing so, getting close to the action, they may be able to *lift the veil that obscures or hides what is going on* (Blumer, 1969:39). Translated into practical application and research methods, this arguably makes interviewing and observation suitable ways for capturing the data in context (McCreaddie and Payne, 2010).

In keeping with the constructivist interpretivist approach, SI shares the assumptions that multiple realities exist (Blumer, 1969). SI will therefore form a kind of 'backdrop' to the data analysis in this study, to direct the researcher where to look, in order to make sense of the data, to help understanding of what was seen and heard in practice (Stern and Porr, 2011:31). The development of concepts in this research will subsequently come from the defining activities of the participants as they interact with each other and the researcher (Blumer, 1969:4).

3.6 Aims, objectives and research question revisited

The aims and objectives and research question are revisited and restated here in light of the chosen methodology. The question was intentionally broad in order to avoid focusing too specifically on a substantive area before data collection commenced. Formulated in the grounded theory tradition, it allowed the researcher freedom to investigate the phenomenon as key concepts developed from early data analysis.

The aim of this research was to extend understanding around care of acutely ill patients in the ward arena by examining the interactions between members of the multi-professional team, to generate a theory or conceptual framework to delineate the social processes around that care. Using a constructivist grounded theory approach the researcher planned to explore with the participants the answer to the question,

What happens in practice on the ward amongst the multi-professional team when acutely ill adult patients deteriorate clinically?

The resultant framework, constructed by the researcher with the participants, aimed to explain what happens in practice, highlight issues and concerns, aid understanding and guide future action.

The objectives of the study were to explore, understand, describe and explain

- What happens on the ward when patients start to deteriorate?
- How do healthcare professionals know that a patient is deteriorating, how do they define it and communicate it to each other?

- What issues and concerns are relevant to practitioners in the clinical environment? What are the enhancing and inhibiting factors?
- What do they do in practice and how do they make sense of what they say and do?

3.7 Key tenets of Grounded Theory

Regardless of the ontological and epistemological differences, there are some common threads running through all variants of grounded theory (e.g. Glaser and Strauss, 1967; Strauss and Corbin, 1990; 1998; Charmaz, 2006; Corbin and Strauss, 2008). These relate specifically to the management and analysis of data, namely theoretical sampling with concurrent data collection and analysis, the constant comparative technique, memo writing, theoretical sensitivity and theoretical saturation (Birks and Mills, 2011). It is important to note however that grounded theory is not a process that can be applied with rigid guidelines, rather there needs to be a flexible approach (Stern and Porr, 2011), but it could be argued that without adherence to core processes of the methodology the research could not legitimately be referenced as grounded theory. The following sections will explain how all these elements of constructivist GTM were operationalised in the current study, as well as the methods of data gathering, ethical issues and the cannons of rigour.

3.7.1 Theoretical sampling

The approach to sampling in this study was planned as a two-stage strategy. Sampling would be purposeful in both stages, but in slightly different ways.

The initial sample would be a convenience (but purposive) sample in order to provide some baseline relevant data, that is, participants would be recruited from the research wards who had experience of caring for acutely ill deteriorating patients. Early sampling was not a pilot study and had not been planned as such; rather it was a starting point for analysis from which the early codes and nascent concepts would be needed before theoretical sampling could begin. A potential limitation of this approach is that theoretical sampling might be started too soon, before sufficient baseline data is gathered, with resultant unfocussed or premature categories (Charmaz, 2014). It was essential therefore to conceptualise relevant ideas before moving on to the next stage. Charmaz (2006:18) warns against *skimpy* data in these early stages, so it was important to sample key informants who could provide rich data at the outset of gathering in order to answer the broad question, *what is happening here?* Using observational methods of data collection in the early stages of the research proved to be a useful strategy in which the researcher could obtain a broad view of the field upon which later interview questions were posed. Thus, the subsequent theoretical sampling approach would also be purposeful, but one in which the researcher was able to focus on data that helped to fill out developing codes, categories and concepts. The sampling strategy in constructivist grounded theory is therefore directed by the ongoing analysis of the data (Charmaz, 2006) and the researcher role is similar to that of a journalist or detective, following up on leads found in the early data (Stern and Porr, 2011).

Early analysis of the first tranche of data from the initial participants provided some tentative categories that directed the next phase of data gathering. Theoretical sampling then enabled the researcher to pose more focussed questions to the participants and start to sample the data more theoretically. That is, in an iterative process, the researcher had to make strategic decisions about where to look and from whom to gather more data that would develop the categories already identified and further expand on their properties (Birks and Mills, 2011). This functioned as a time saving device, because as Charmaz (2006) suggests, less effort is wasted on aspects of care that have nothing to do with the emerging theory. Table 10 below lists the participant inclusion and exclusion criteria.

Table 10. Inclusion and exclusion criteria for study participants

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • Employed by the Trust at the research site • Working on one of the four designated acute wards (two surgical and two medical) • Over 18 years old • Registered nurses • Doctors • Physiotherapists • Occupational therapists • Pharmacists • Healthcare support workers • Healthcare staff with experience of caring for the acutely ill deteriorating patient 	<p><i>Healthcare professionals not working in acute areas on the designated wards were not invited to participate.</i></p>

An example from the current study may serve to clarify this process. Some of the early interviewees talked about recognising deteriorating patients because they were *not right*, so later participants were asked if this was

their experience and if so, what were the early signs that for them constituted being *not right*. Checking out this principle with different professional groups was a helpful strategy that served to further fill out the category *not right*. Later on in the data gathering, explaining some of the categories to the participants during interviews to see if they resonated with their experience was a way of 'member checking', (Charmaz, 2006:111). Furthermore, Pope and Mays (1995) highlight that where a sample is theoretically informed and relevant to the research question, this minimises the possible bias arising from selecting a sample on the basis of convenience. Memos, discussed in section 3.7.4 below, provide an audit trail of decisions made regarding theoretical sampling.

3.7.2 Coding the data

In this section, the initial and focussed coding processes adopted in the study will be explained.

In this study, the researcher typed the transcripts *verbatim* as soon as possible after the data gathering sessions. Listening to the interview recordings and typing up observational field notes enabled the researcher to become familiar with and immersed in the data once more. A final check of the completed transcript against the digital record or hand-written observational field-notes meant that the data was listened to or read at least three times before coding commenced and a high standard of transcription accuracy was established. Arguably however data analysis had already

commenced cognitively during the data gathering as the researcher interviewed and listened to the participant or observed them in practice.

a) Initial Coding

In the first round of coding, data was analysed line-by-line and coded using a word or phrase to capture the essence of what was happening, to label or define the important actions or words in the text, written in the margin on the hard copy of the transcripts or field notes (Saldaña, 2009; Birks and Mills, 2011). Thus verbs were adopted for the codes where possible, as recommended by Charmaz (2006), in order to stick closely to the meanings within the data and capture the action. Researcher-generated codes took the form of gerunds (the noun version of the verb), so for example *vigilance* was coded as *being vigilant*.

Most codes were generated from the researcher's vocabulary, labelling what was happening in the data, however codes were also formulated from the language used directly by the participant. *In vivo* codes thus comprised and preserved the participants' own words *verbatim* and their meaning (Charmaz, 2006:55; Birks and Mills, 2011). Being *not right* is one example of an *in vivo* code, a term that several participants used to identify the early stages of deterioration, a condensed, shorthand term used colloquially in the shared vernacular with significant meaning for the participants in this research. These types of codes helped to anchor the analysis firmly in the participants' world (Charmaz, 2006).

b) Focused coding

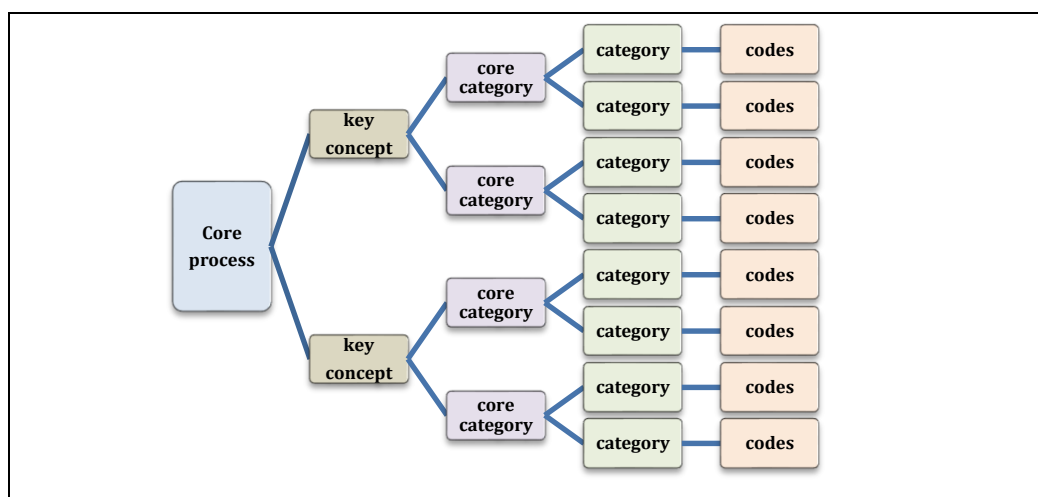
Data was coded for a wide range of activities; practices, episodes, encounters, roles, social types, relationships, groups, behaviours, rules, emotions and hierarchies, but not for themes. Themes, or rather what were referred to as categories in this study, came later from focused coding (Saldaña, 2009). Initial line-by-line coding was quite a slow process, but it enabled the synthesis of large volumes of data into a condensed form. As coding became more focused, patterns began to emerge from the data (Saldaña, 2009) and as Charmaz (2006:57) suggests, the most *significant* or *frequent* codes were identified and grouped together into categories.

Larger chunks of data were then reviewed together, incident-by-incident, and labelled using new codes where appropriate or using the most significant of the earlier codes. Codes, the single units of analysis, were then clustered together to create categories that synthesized and explained larger segments of the data. Categories, and the way that they linked together, would eventually form the basis of the key concepts used in the construction of the final framework.

Coding and categorising the data was not a linear process, rather it was iterative and cyclical as the researcher moved back and forth between different segments of data, comparing incidents, participants, new data with old data, with line-by-line and focussed coding. With each cycle, the codes and categories became more refined and abstract, providing a more conceptual grasp of the whole (See Figure 2 below). But most importantly, sticking closely to the data promised to produce a framework that would *fit*

with the participants' experiences and have *relevance* for them in practice (Charmaz, 2006:54).

Figure 2. Coding, categorising and conceptualising the data. This figure illustrates how codes were sorted into categories, and then categories were sorted into core categories and ultimately into key concepts (only two are shown here). Colour coding links to that in Figure 3 presented later.



c) Axial and theoretical coding

Further coding strategies, axial and theoretical, provide a framework that can be applied to data to guide the researcher and add structure to the final analysis. These were not used in the current study and the rationale for this decision is given below.

Axial coding is a process that helps the researcher to specify the properties and dimensions of a category and to articulate how categories are linked or related, pulling together the fractured data (Strauss and Corbin, 1998:124; Corbin and Strauss, 2008). This arguably forces the researcher to apply a predefined scheme, namely conditions, actions and consequences, onto the data. If however, as Charmaz (2006:63) suggests, the researcher can *tolerate*

ambiguity, the data will provide the direction required and a scheme is superfluous. In the current study, specific factors that either enhanced or inhibited actions within each of the core categories were identified.

Theoretical coding, articulated by Glaser (1978), allows the researcher to select from a list of 18 theoretical coding families. This list was extended in a later publication to include more theoretical codes (Glaser, 1998). Saldaña (2009:163) suggests it is an *umbrella* term used to cover all codes and categories, the core that helps to integrate the work. Theoretical coding was not applied in this study as it presented a conflict with the underpinning principles of not wishing to force the data into preconceived categories, and as Charmaz (2006) indicates, the data itself will invoke the codes required. She suggests however that theoretical codes can be used if they fit, and they may move the analysis in a more theoretical direction, but one must avoid imposing the framework on the data analysis (Charmaz, 2006:63).

Saldaña's (2009: 187) 'touch test' was useful as a check on the theoretical or conceptual rendering of the data in the current study. He explains that to progress from the real to the abstract, one needs to apply the 'touch test'. For example, a 'mother' can be touched, but the concept of 'motherhood' cannot. None of the core categories in the final conceptual framework from the current study can be touched e.g. *being vigilant through surveillance*, articulated in section 3.7.3 below and fully in Chapter Four.

d) Data management

Glaser (2005) highlights his resistance to the use of computer software for qualitative data analysis and Charmaz (2006) provides no guidance on its use, but more recently Birks and Mills (2011) encourage its use in conjunction with manual approaches. Initially, manual data analysis was the plan in the current study in order to fully immerse oneself in the data. After coding the first few transcripts however, it soon became apparent that handling a large amount of data in this way would not be feasible. Manual coding continued throughout the study, using paper-printed transcripts, but NVivo⁷ was employed as a data storage and sorting facility. This data management package was selected because it was available to students at the University of Warwick at no additional cost. When feeling overwhelmed by voluminous data, a comprehensive visual representation of the whole dataset on a computer screen was a helpful adjunct to the analysis process. The database remains in storage to provide a clear and transparent audit trail of the coding decisions made during the analysis process.

3.7.3 Constant comparative method

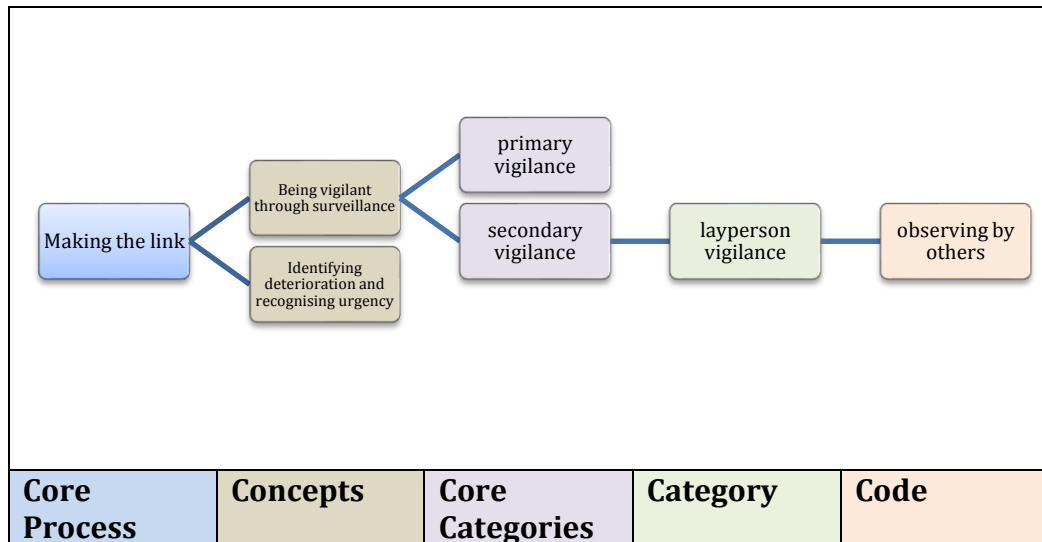
The constant comparative technique is a key component of grounded theory and was used repeatedly throughout the analysis process, where the researcher constantly returned to the data to check developing categories and concepts to guide the gathering of new data where appropriate (Charmaz, 2006). Each new set of data was then compared with the last.

⁷ www.qsrinternational.com

Each incident was compared and contrasted with others in order to focus on the emerging properties of a category and identify patterns within the data. Category was compared with category, incident with incident, participant with participant, groups of participants and data from the same individual were also compared for emerging ideas (Birks and Mills, 2011). Through comparison of the data, either from different or similar groups and events, categories and their properties and their relationships with each other started to develop (Charmaz, 2006). The number of categories was then reduced through the discovery of uniformity between them, giving rise to the core categories, that is, higher-level concepts that provided the building blocks of the framework. Figure 3 below provides an example from the current study to clarify.

Initial coding of the data highlighted codes such as *checking, observing, being observant, being vigilant*. These codes developed into the category *vigilance*. With further comparison different types of vigilance were identified, namely *primary vigilance* (carried out by nurse participants), *secondary vigilance* (carried out by those with less contact, in a peripatetic role) and *layperson vigilance* (provided by non-healthcare professionals, such as the patients' significant others). All of these codes and categories were collectively housed within the core category or concept of *being vigilant through surveillance*.

Figure 3. An example of codes, categories and core category. This links to Figure 2 above and uses examples from the current study to illustrate how codes became categories, core categories and concept



3.7.4 Memos

Writing memos has been described as the intermediate step between data collection and writing the draft report (Charmaz, 2006) and in the current study memos served as an integral part of coding the data. For this researcher, memos were akin to thinking aloud about patterns in the data and, as such, continue to provide a permanent and transparent audit trail of the analysis process undertaken. The researcher read a line or section of a transcript, coded it, and then paused to write a memo about the code (or the category in which the code was framed). All memos were documented with a title, date and referenced to the code or category with which they were associated for further analysis. Thus, thoughts and feelings about the data, codes and categories and how they linked together over time were recorded, as instructed by Charmaz (2006:72:82). This gave the researcher

opportunity to think about the data, develop a writing style, discover gaps in the data and generate new ideas for data collection while maintaining an audit trail of the research process, similar in style to a journal (Birks and Mills, 2011).

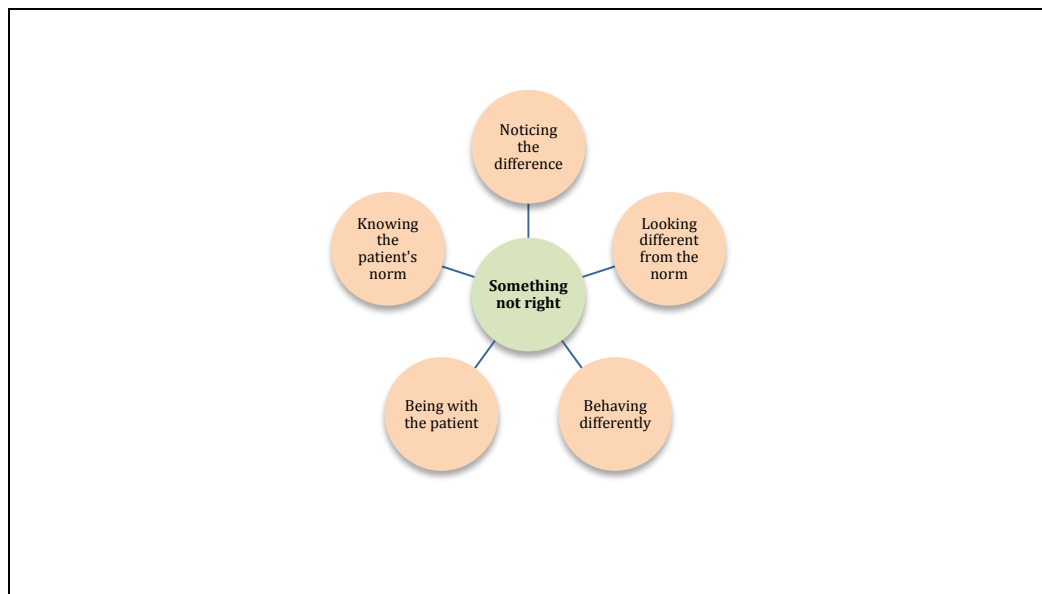
In a final step, memos were sorted to facilitate the generation of the conceptual framework; by putting all the fractured data back together in such a way that it explained what was happening in clinical practice. The nature of memos, written rapidly and spontaneously in informal, unofficial language for personal use, as advised by Charmaz (2006:80:84), rendered them difficult to write directly into a computer. Pencilled notes were more convenient during the analytic process, where ideas flowed freely and uninhibited, but this presented difficulties during the sorting process. On reflection, typing up handwritten memos into NVivo® would have been time consuming, but could have eased the sorting process and allowed for the cutting and pasting of key sections of text into the final report.

Clustering and diagramming

Clustering is a technique, recommended by Charmaz (2006:86) to understand and organise material. As a visual learner the researcher found this technique helped to capture spontaneous thoughts about connections and relationships within the data, sometimes clearer than verbose memos (Birks and Mills, 2011). A central idea or category was written in the centre of a map, with spokes to smaller circles that showed the defining properties and relationships. Figure 4 below highlights a simple example from the

current study. As the study progressed, diagrams became more complex and were used to identify connections between categories and concepts, which ultimately developed into the final framework (Figure 21 in Chapter Four). The process of memo writing and diagramming aims to facilitate the development of theoretical sensitivity.

Figure 4. A cluster diagram. Using an example category from the current study, *Something not right*, this figure illustrates how diagrams were used to illustrate the code sorting process



3.7.5 Theoretical sensitivity

According to Glaser and Strauss (1967:46) theoretical sensitivity is the ability of the researcher to have *theoretical insight* into an area of research (and potentially themselves), but also to be able to make something with that insight. This was potentially daunting for a novice in grounded theory, the challenge to *think theoretically* (Tarozzi, 2011:11), where the threat of being simply descriptive rather than analytical was ever-present. But

Tarozzi (2011) is reassuring in his assertion that producing a theory is a skill that can be taught and therefore learned. Thus, the early interviews in the current study provided the opportune training ground. Personal reflection upon the increasingly theoretical memos produced, as the study progressed, indicate that learning to theorise is possible. The process of stopping and thinking about the data as it was gathered, comparing it with other pieces of data, discussing with supervisors, making connections and developing new questions to go deeper each time was, as Charmaz (2006) indicates, theorising. This was supported by her advice to avoid coding data for themes because this would result in a simple description of action rather than a theoretical rendering of it. Coding for action throughout from the outset, in the form of gerunds and asking 'What is this a study of?' at each stage of the analysis, facilitated the identification of three concepts and a core connecting process (Charmaz, 2006).

3.7.6 Reflexivity

Charmaz (2014) explains that the researcher does not enter the field with neutrality rather what they bring to the study will influence what is seen and how it is interpreted. In this study it was therefore important for the researcher to be reflexive and to take account of any personal assumptions at each stage of the research process; including interaction during the interviews and observations in practice, interpretation during the analysis of the data, and the theorising. Researcher reflexivity is demonstrated in Chapter Five, where a reflexive stance is taken to explain retrospectively how the research was conducted, through scrutiny of what the researcher

brought to the research and how that may have influenced the findings. This is expanded on, specifically in section 5.8.1 and explains how steps were taken to prevent researcher preconceptions being forced onto the data, particularly in the coding and analysis process.

3.7.7 Timing of the literature review

The timing, function and positioning of the literature review in grounded theory methodology is contentious and debated. Positivistic views of Glaser and Strauss (1967) and Glaser (1978; 1992) suggest that the researcher should enter the field with limited *a priori* knowledge to avoid imposing preconceived theories onto the data. Similarly, Corbin and Strauss (2008:36) warn against being *stifled* or *constrained* by the literature. The literature review is therefore sometimes delayed to prevent this. Birks and Mills (2011) suggest a compromised superficial consultation to provide some insight. In the current study however, timing of the literature review was informed and influenced by the philosophical underpinnings of the study design, the rationale for which is extrapolated in this section.

If avoidance of imposing preconceived theories onto the data is paramount then arguably no researcher would be able to carry out a study within their area of expertise, or at the very least, only one study would be possible, as future studies would be contaminated by knowledge from the first. Indeed, Glaser and Strauss (1965; 1968; 1970) themselves would have struggled to carry out their consecutive studies of the dying process under such restrictions. Dey (2010:176) argues for a more balanced approach where

the researcher is open-minded rather than empty-headed. The common sense approach suggests it is potentially naïve to expect a researcher to enter the field with a completely clean slate. Taking a constructivist approach (Charmaz, 2006), the key principle here is essentially how the researcher uses the literature to inform the study without allowing the learning to prejudice data analysis, striking a balance between stifling theory with extensive insight and possessing enough knowledge to carry out the study.

The literature review presented in this study (Chapter Two) was carried out at the outset of the study for several reasons. It was used predominantly to provide justification for the study to the ethics review committee, to identify the extent of current knowledge, and highlight the gaps in the literature in respect of the deteriorating patient. Furthermore, it was used to set the study in context and explain essential concepts in the current vernacular for the uninitiated reader. The strategy here was to use the literature review as a starting point, without letting it *stifle creativity or strangle* theory development (Charmaz, 2006:168). The literature is used later in the discussion section also (Chapter Five), but in a slightly different way, to illustrate where the new concepts and their categories converge and diverge with the extant literature. As theory developed the published literature was used to help link the concepts within the framework. Stern and Porr (2011:49) refer to this as a two-staged approach; the *primary* review provides initial sensitising concepts to facilitate the analysis while the *evolving* review provides data to supplement the comparative process.

3.7.8 Theoretical saturation

It would seem logical from the earlier explanation of theoretical sampling that the exact number of participants cannot be specified from the outset of any qualitative study because the precise number required for data saturation will always be unknown (Stern and Porr, 2011). For the purpose of ethical approval however, a sample size of up to 50 participants was estimated. This was based on similar published grounded theory studies in other substantive areas, reviewed for guidance. For example, Stern and Porr (2011:52) indicate *30 to 40 interviews and hours of observation* are usually sufficient to achieve saturation. Essentially, the sample size required for the current study would be that required to achieve 'saturation' point, that is when data gathering no longer triggered new insights into the area under exploration and all concepts, categories and their properties were fully developed (Charmaz, 2006). Dey (1999:257) however uses the term *theoretical sufficiency* that he argues fits better with the research process, resolving personal concerns that whenever data gathering ceased there might always be another participant with new ideas just around the corner.

3.8 Data gathering methods

A simultaneous, within-methods triangulation approach was used to gather data for this study (Casey and Murphy, 2009). That is, two methods were used alongside each other, interviewing and observing participants to collect qualitative data. This strategy aimed to enable the researcher to see the world from the participants' perspective as far as possible, and produce rich data (Geertz, 1973), that was *detailed, focused and full* (Charmaz,

2006:14). Interviews and observations might provide different data, but this would represent the participants' different perspectives, possibly changing over time or in different contexts, reflecting the multiplicity of realities that would ultimately enhance the credibility of the findings (Mulhall, 2002). But it is important to note that in the current study, one method was not used to confirm or verify information provided by the other. Rather these dual methods with a variety of multi-professional sources were sought to provide greater depth, breadth and completeness to the data. That is, data would be more contextual, holistic and comprehensive (Casey and Murphy, 2009).

Charmaz (2006) indicates that data needs to be of good quality, credible, suitable and sufficient to capture relevant events. That said, data gathering in this study was dependent upon several factors, not just the methods themselves; the number of participants who agreed to take part, how articulate they were, the quality of the data they imparted, and the ability of the interviewer or observer to view the participants' world as if through their eyes, to hear and see what was relevant and check out taken-for-granted aspects of care. There was also an element of serendipity with the observations of practice, being there at the right time, when deterioration occurred. The following sections will explain each data gathering method in detail.

3.8.1 Interviewing

This section will delineate the type of interview used, the role and position of the researcher, the skills required, maintaining rigour and ethical issues relating to this method of data gathering.

a) Type of interview

In-depth interviews are frequently used in qualitative enquiry because they provide a flexible way of gaining insight into a person's world (Charmaz, 2006). Semi-structured, face-to-face interviews were used in this study, that were conversational in style, but with a purpose (Chenitz and Swanson, 1986). That is, participants were asked to recall and talk about episodes of patient deterioration. The interviewer then framed questions to explore their experiences and ideas further and follow up on leads in these and other sessions.

It was difficult to anticipate all potential questions that would be asked during the interviews, but a set of questions that might be used was prepared for the proposal and submission for ethical review (see Table 11 below). Stern and Porr (2011) highlight that such a schedule is only required in the early interviews, after which the questions become more structured as the researcher follows up on leads, theoretically sampling data to fill out the early codes and categories.

Table 11. Potential interview questions

Early questions	Later question
<i>Can you tell me about an experience in which you cared for a deteriorating patient on your ward? Can you describe the events that led up to the situation? How did you feel? What went well, what not so well? What do you remember feeling at the time? What did you do? How have your views and thoughts changed since this event? What have you learned from this experience? Having gone through this experience, what advice would you give to others?</i>	<i>Other people have described [brief general explanation]. Has this been your experience or have you seen something different?</i>

b) Role of the researcher

This early, open-ended interview approach aimed to facilitate participants to speak freely, avoiding direction from the interviewer. The researcher planned to take a naïve stance within the field, not just because the methodology requires this, but despite considerable experience in ICU, she was indeed a novice in the process of ward-based care. It was therefore key to learn from participants as the experts, taking nothing for granted, to find out what it was like to care for deteriorating patients by listening to what they had to say (and, or, watching what they did).

During approximately one-hour interviews, the researcher listened to the participant without interruption unless something was said that required clarification, then the aim was to probe further into a particular area, or to paraphrase what was heard and confirm understanding. Key to the interviews however, was an understanding that they provided accounts of

reality as perceived by the participant and, through dialogue with the interviewer, were a reconstruction of a reality (Charmaz, 2006).

Charmaz (2006) highlights that participants and interviewers may act according to a number of factors; their appraisal of each other, the situation, their prior knowledge, the content of the interaction, power, professional status, race, age and gender issues in respect of the research topic. The aim was not to try to eradicate these differences (what positivists would see as biases), but rather to embrace them. The researcher must interpret the interview data, through reflexivity, in light of their different stances, because it is impossible to separate the researcher from the participant in the generation of data, and the interview is the construction site (Birks and Mills, 2011).

c) Ethical interviewing: interviewer skills

Nurses arguably have a repertoire of transferable skills in using themselves as a research instrument (Bulpitt and Martin, 2010), for example, the ability to quickly form a relationship with the participant and develop a rapport that facilitates disclosure of sensitive information (Leslie and McAllister, 2002). Previous personal experience with research interviews and consulting with service users in a clinic environment suggest that active listening, showing interest and engaging fully with another person are effective techniques for encouraging dialogue. The construction of data through a two-way conversation means that the interviewer can share a part of their self in an authentic or genuine way (Bulpitt and Martin, 2010).

For example, by empathising with the participant and contributing some short stories, this might encourage participants in turn to reciprocate.

Wearing casual clothes (rather than a formal suit) to reduce any potential power differential, sitting at a slight angle rather than directly opposite the participant and adopting a relaxed, open posture with appropriate use of eye contact were non-threatening strategies that were used to optimum effect. In addition, encouraging prompts were given, both non-verbal and verbal, such as 'tell me more' or 'that is really interesting' or 'others have said similar' or simply nodding when participants talked about key issues.

Genuine curiosity was a powerful driver for the researcher, but self-awareness was key to an ethical approach, in that there is a fine-line between authentic interest and blatant voyeurism (Clarke, 2006). The temptation to gather information about the order of events and who did what, when and how was initially quite compelling, however knowing this was the type of objective information a positivist researcher would gather, questions were directed more towards finding out about participants' assumptions, attributed meanings and clearer definitions of terminology from a constructivist perspective (Charmaz, 2006). Over time, listening to, reflecting on and learning from the early interviews, this developed into a more natural strategy for the discussion. By facilitating participants to reflect on their experiences, several spoke at length and needed very little prompting or questioning, other than *tell me more*. So for example, when one participant said she knew the patient was deteriorating because they had *a look about them*, she was asked to elaborate further by the researcher.

Later interviews were more focussed and the questions intentionally became more narrowed towards the key concepts that had emerged from earlier data analysis, from what others had said or what had been observed in practice. Essentially, what the early participants said guided subsequent questions asked of them during their interview and other data gathering. For example, in the initial interviews participants talked about the early signs of deterioration, so in later interviews participants were asked if they had experienced similar. There was some concern that this might be seen as a preconceived question, but this is an example of the researcher's intention to seek alternative perspectives on a particular concept already revealed by others, rather than being forced by the researcher (Charmaz, 2006).

In order to safeguard participants' right to privacy, interviews were conducted in either a seminar room available to the researcher or in a venue of the participant's own choosing within the hospital, where there was no disruption and conversations could not be overheard. As soon as possible after the meeting, the digitally recorded interviews were transcribed *verbatim* by the researcher. Earphones were used to prevent recordings being overheard during transcription. In part, interviews were recorded to leave an audit trail, but also because the researcher wanted to concentrate on what was being said during the interaction, maintain eye contact and use other non-verbal skills, rather than focus on writing notes and running the risk of missing vital data.

Comfort of the participant was paramount. The interview took place at time convenient to them. By using an open-ended questioning approach the aim was not to challenge the participant, but rather to make them feel sufficiently comfortable to speak freely. It was therefore important for the researcher to put the participant at ease quite quickly, but pacing the interview was key. As a rapport developed and the participant relaxed, it was acknowledged that they might be at risk of forgetting they were involved in research and reveal more than perhaps intended. The potential for a skilled interviewer to manipulate the participant into speaking more freely was recognised and a careful, cautious approach was taken. The researcher planned to remind the participant if they started to reveal more than perhaps one would expect, but this issue did not arise. If however, any evidence of persistent bad clinical practice had been revealed, the researcher planned to suggest that the participant should discuss the issue with a senior colleague on the team. Responsibilities of disclosure within the principles outlined by the Nursing and Midwifery Council (NMC, 2008) would have been upheld if required, but there were no such incidents during the study.

Talking about emotive topics and drawing out deep meanings requires careful, sensitive questioning and a trusting relationship that can take time to develop. By laddering the questions, moving from questions about actions and events towards more personal thoughts and feelings, meant that the researcher could limit the risk of emotional distress by only moving to a deeper level with the permission of the participant (Price, 2002). When the

researcher was unsure, permission was requested in order to continue a particular line of questioning. Thus the participant had maximum control over the speed with which the interview moved forward.

Interviewing participants about sensitive topics can bring to the fore feelings of sadness, failure or inadequacy for some, potentially prompting participants to question their own or others' competence. Participants can become upset during interviews if they talk about distressing or embarrassing events, but in this study they were informed, in advance, of their right to terminate the interview at any time. All participants were informed of the Trust's self-referral counselling service, using the Trust's leaflet already available in-house (*Staff Talk* Poster and Leaflet, V1, 31/12/09, Appendix 4). At the end of each session, the researcher ensured that the interview did not end abruptly after an emotive discussion and endeavoured to end on a positive note (Clark, 2006; Charmaz, 2006). A short period of time was spent winding down the interviews with a reflective debrief. No participant became visibly distressed and none withdrew from the study.

3.8.2 Summary

This section has provided an explanation of how data was gathered during the interview process. It is intentionally detailed to clarify the rigour and ethical nature of the data collection.

3.8.3 Observation

This section will explain the way in which participants were observed in practice by the researcher, the role and position of the researcher, how data were recorded, rigour was maintained and any associated ethical issues.

a) Why observe?

Observing participants in practice was used to gather data because it would provide a deeper understanding of the phenomenon than interviews alone (Hammersley and Atkinson, 1995). Placing the researcher right amongst the action would potentially present some unique insights into the actions and interactions of healthcare professionals in context that might otherwise have been difficult to obtain (Angrosino and Mays de Perez, 2000), because the participants themselves might not be consciously aware of them or might be unable to articulate them (Corbin and Strauss, 2008). By watching, listening and informally asking to check out any understanding, the observer initially took a broad perspective on the area of interest and tried to understand the world from the participant's angle, how they experienced the deteriorating patient, how they made sense of things, how they dealt with problems and how they related to and interacted with each other.

b) Observer-participant role

The researcher assumed the role of observer-participant, shadowing a specific healthcare professional for a shift, but with the option to move elsewhere if a situation arose. Field notes were recorded during the session in a notebook, while moving around (where possible) to avoid lapses in

memory, and then more detailed notes were made at naturally occurring breaks in the activity and at the end of each observation session. The opportunity to gain insights into the interaction between different professionals in different situations was key and the aim was to ascertain, *what is happening here?* Thus, annotations were made using a structure informed by Charmaz (2006) to this end; the context, the actions, who did what, how, when and why it happened, the conditions at the time and any key words and comments made.

In the interests of transparency and reciprocity, and not wishing to appear surreptitious, participants were made aware that notes were being written and they were invited to review them if they wished, but none of them chose to do so. This may be because the researcher was as explicit as possible and used the notes as a prop in later discussions, for example, saying something like,

I made a note here, look, about what you said to Dr X, can I ask you, what you were thinking you would like him to do?

Field notes were typed up immediately after the session by the researcher. As with the interviews, an unstructured approach was used initially when little was known about the area, but as concepts started to emerge from the data, the aim was that these would provide a focus of interest for further exploration. This was possible in the interviews, but data gathering during observation sessions was influenced by what was happening on the ward at the time.

Being there, in order to capture relevant action presented a considerable challenge. Acuity and dependency levels of ward-based patients (levels 1a and 1b respectively as defined in Figure 1, Chapter One) are monitored twice yearly at the research site using the *Safer Nursing Care Tool* methodology (AUKUH, 2007; Shelford Group, 2013). The level of care required by each patient across the Trust is recorded at 14:00-15:00 hours daily for 28 days every six months. This ongoing study, led by the researcher in a nurse consultant role, provided clear indication that there were four wards (two medical and two surgical) with the highest numbers of level 1a patients. These wards would therefore provide the greatest opportunity to observe patient deterioration. Mobile positioning involves following a person throughout a given activity or period (Polit and Hungler, 1999) and shadowing a participant who worked on one of the key wards with a high proportion of level 1a patients proved to be an efficient strategy. The role of the researcher during the shadowing period was essentially to be that of observer, but it was agreed in advance with the participants that there would be some minor involvement in care that would not distract from the research activity, at the level of a healthcare support worker, if required (for example, giving a patient a drink or helping to sit them up in bed).

c) Ethical issues and participant observation

The ethical issues associated with observing participants in clinical practice are complex. Maintaining confidentiality of participants involved in the observations presented more challenges than the interviews. The researcher clarified the potential risks to the participants during the

informed consent process, namely that data collection would be conducted in an open arena and other members of the ward team who knew about the research might therefore realise they were involved. In actuality, most people visiting the wards from elsewhere were busy and appeared unconcerned with what was happening in relation to the research.

Consideration was given to the Hawthorne effect and how it could influence the participants' behaviour, knowing they were being observed (Roethlisberger et al., 1939; Campbell et al., 1995). The effect potentially diminishes over time as participants get used to the observer's presence, but this presents a different issue where participants may forget they are being observed and involved in research and may reveal things unintentionally.

The researcher planned to minimise the risk by working alongside the participants, helping with simple aspects of care and building a rapport with them. Transferable skills from working as a clinical nurse-teacher were brought in to play here, being able to quickly integrate into a team and work inconspicuously. As with the interviews, when the researcher was unsure about being there with the participant, verbal checks for permission to continue were made which also served as a reminder that they were involved in research.

The researcher role and responsibilities were clarified from the outset of the observation session (Kennedy, 1999). If the researcher's critical care skills and knowledge were requested, participants would be asked to call instead for assistance from the CCOT (as it is normal accepted practice for CCOT to

attend or give telephone advice if team members are worried or unsure about something). Thus the position of the researcher and the data collection would not be compromised and duty of care would be maintained. In an emergency however, such as a cardiac arrest for example, in the absence of other support, a clinical role would have been assumed and any assistance provided as required by the researcher. There were no cardiac arrests during the observation sessions. Knowing when to intervene and when to pull back was difficult. For example, when the ward staff were unable to quickly obtain a bladder scanner to ascertain if a patient had a full bladder or not, the researcher palpated the patient's lower abdomen to assess the situation. On reflection this might be construed as clinical intervention, where 'palpation' indicates an advanced clinical skill. In reality, this involved gently pressing on the patient's bladder and asking them if it made them feel like they wanted to urinate, which, it could be argued, is less interventional than the term 'palpation' suggests. Overall, the aim was not to become directly involved in patient care to ensure the researcher was able to carry out any observation unhindered.

It was impossible to predict which patients might become involved in the study; all patients on the research wards had the potential to deteriorate. All patients were therefore given written information about the study on admission to the ward, but extreme caution was applied with wording of this document to avoid causing unnecessary worry regarding potential deterioration (see Information for Patients in Appendix 9). Posters served as a visual reminder that observational research was underway in the clinical

areas (Appendix 8 and 9). It was clearly articulated in these and the patient information leaflets that they had the right to refuse involvement in any observation. The unpredictable nature of acute illness rendered patient consent prior to any event very difficult (and impossible once deterioration takes hold). Thus wherever possible the patient and the relatives (if present) were informed of the research face-to-face and verbal permission to observe was obtained at the bedside on a shift-by-shift basis. In practice this involved the researcher introducing herself to each patient individually, while accompanying the participant on his or her initial rounds. Patients were told that the focus of the observation was on the healthcare professionals rather than the patients themselves; no personal patient details or anything they said would be recorded. The patients' records were not scrutinised and there would be no narrative analysis of the healthcare professionals' documentation. Signs of clinical deterioration were recorded by the researcher, but only in respect of what the participants said and the subsequent actions taken by them in response to those changes, for example, where a patient became hypoxic, hypotensive and tachycardic and was subsequently administered oxygen therapy and intravenous fluids (or not). The focus was always on the healthcare professional. At the end of each observation session the researcher thanked the patients for allowing her to be present with their nurse. No patient refused observation.

The risks and benefits of both methods of data gathering were considered. There were no direct benefits to the patients involved, but future patients may benefit from implementation of the findings of the study. On balance

however, there is minimum risk associated to the patient with participant observation. It was considered that initially the team may be distracted by the presence of an observer, but it was anticipated that this would be short-lived, as the participants got used to the presence of an observer.

3.8.4 Summary

This section has provided an explanation of how data was gathered during the observation process. As with the interviews, it is intentionally detailed to clarify the rigour and ethical nature of the data collection.

3.9 Other ethical issues

The previous sections have focussed on the ethical issues specifically related to data gathering. This section outlines the broader ethical issues that were addressed in preparation for the study, underpinned and structured by four key principles: respect for autonomy, beneficence, non-maleficence and justice (Beauchamp and Childress, 2009) but more specifically including data storage, confidentiality and privacy, gaining access and recruitment, consent and role of the researcher. Local ***** NHS and Trust ethics committee approval was granted on 21st June 2010, reference number 10/H0408/33. All documents alluded to below, relating to ethical approval of the study, can be found in Appendices 4 to 11.

3.9.1 Respect for Autonomy

a) Privacy, confidentiality and data storage

All research materials and equipment pertaining to the current study (hand-written field notes, the digital recorder, paper copies of the transcripts and consent forms) remains stored in a locked, fireproof cabinet in the researcher's secure Trust office. Electronic files of transcripts and data analysis are stored in password-protected files on the researcher's personal section of the Trust server using a password-protected Trust computer in a secure office at the research site. Only the researcher and supervisors have had sight of the anonymised raw data. All data remains stored as itemised here and will remain so for 15 years after publication of this study, as per local Trust *Retention and Destruction of Records Policy* (ISP-10, March 2009).

All participants were allocated a coded pseudonym (an alphabetical letter and an associated ward number [1-4] e.g. A1) on recruitment to the study. One electronic file, stored as itemised above, lists the participants, their work location and their associated pseudonym. Only the researcher knows all the names of the participants. Any real names of people or places mentioned on record by participants were removed during the transcription process to maintain confidentiality. Patients involved in the observation sessions were not identified and were not allocated a pseudonym. Cases were referred to simply by room number (e.g. R10) or bed location (Bay C Bed 2) in fieldnotes. It would therefore be impossible to trace any patients who were observed during the data collection, and this was the intention as they were not the focus of the study.

b) Gaining access and recruitment

Following ethics committee approval, permission to access the four designated wards was obtained from the relevant directors of nursing, heads of nursing (matrons), allied health professionals manager, service line directors, consultant physicians and surgeons. Ward leaders on each of the four wards were approached for permission to present information about the study on the wards and to speak at ward meetings.

Potential participants were given information about the study and all the possible risks and benefits of the research including a letter of invitation (Appendix 5) an information sheet (Appendix 5) and an information leaflet (Appendix 7).

- Copies of the *Information for Staff* poster and leaflet (V1, 31/12/09) were displayed on each of the wards (Appendix 7 and Appendix 8).
- The researcher delivered the brief *Information for Staff* presentation (V1, 31/12/09) at staff meetings, where invited, to inform teams about the research to be undertaken.
- *Letters of invitation* (V1, 31/12/09) were sent directly to individual members of the multi-professional team (Appendix 5) with the *Information for Potential Participants* (V1, 31/12/09) (Appendix 6).

In order to avoid coercion, the researcher's contact details were provided in the letter of invitation and potential participants were asked to contact the researcher for further information if they were interested in being involved

in the study. Once the potential participant registered an interest, the researcher met with them to discuss the study in more detail and answer any queries they had. Participants then had a further 24 hours at least to consider if they wished to take part before signing a consent form.

c) Consent

Once the researcher was convinced that the potential participants had understood the information provided; written (signed) consent was obtained. It was anticipated that some participants would consent to interview but might not wish to be observed in practice, so they were asked to consent to either (or both) on separate consent forms (*Consent form A* [interview] and *Consent form B* [observation] V1, 31/12/09) (Appendix 10 and 11). Participants who agreed to be observed signed both consent forms to allow the researcher to ask questions at convenient times during the observation session. Interview participants were asked to consent for the meeting to be digitally recorded.

Following the first data collection, if further sessions were required, then verbal consent only was obtained from the participant, with reference to the initial form signed. Thus written consent was only taken once. One RN participant was observed twice in order to capture data on both the day and the night shift for the purposes of comparison. One physiotherapist participant was interviewed twice. Following a period of illness, the researcher aimed to compare data over time, but no new concepts were identified from analysis of the second interview. All remaining participants

contributed once. The initial information-giving strategy aimed to ensure all healthcare professionals accessing the ward were informed about the study in advance of the start date. Verbal consent was obtained from all key staff on duty during an observation session (two or three registered nurses and two or three healthcare support workers) for the researcher to be present during any of their conversations with the participant.

3.9.2 Beneficence and non-maleficence: balancing risk

If at any time there was reason to suspect that continuation with data gathering might result in injury or harm to the participants, then it was planned that data collection would cease, as described in the data gathering sections above (3.8.1 and 3.8.3). Participants were assured, during the consent process, that they were free to withdraw from the study at any time without the need for further explanation. No participant withdrew consent at any point in the research process and no one became visibly upset or distressed.

The potential emotional impact and emotional labour of data gathering on the researcher was also considered, particularly in respect of the potential for empathic relationships to generate distress and for fieldwork to create feelings of isolation (Bloor, Fincham and Sampson, 2008). In reality, no personal difficulties were experienced in dealing with emotions during data collection. Any issues were discussed during debrief with research supervisors.

3.9.3 Role of the researcher

The role and responsibilities of the researcher were clearly delineated from the outset of the research in *Information for Potential Participants* (V1, 31/12/09) and were operationalised as discussed in the sections above on data gathering. The role of the researcher will be discussed further in Chapter Five.

3.9.4 Justice

In order to maintain fair and non-discriminatory selection of participants, participation was open to all members of the multi-professional team on the four study wards. All participants had direct access to the researcher at any point during the study to clarify any information, available via multiple communication systems (email, telephone and the Trust's wireless communication system, Vocera).

3.9.5 Evaluating the research

Rigour is arguably an important aspect of ethical practice; the aim in this study therefore was for the approach and findings to be trustworthy. Any study is subject to judgment regarding its quality or rigour and a range of criteria is available to this end (Lincoln and Guba, 1985; 1989; Hammersley and Atkinson, 1995; Beck 1993; Charmaz, 2006).

There is currently no consensus on standard criteria for assessing quality of naturalistic studies however, and Rolfe (2004) argues that the variety of

qualitative approaches make it difficult to identify a set of predetermined criteria that will work for all. I subscribe to the perspective that factors relevant to the study's methodology should be used where possible. Rigour will therefore be demonstrated in this study by the application of four criteria for trustworthiness proposed by Charmaz (2006:182-183), appropriate to the constructivist grounded theory approach.

- *Credibility* is the extent to which the study and its findings are plausible
- *Resonance* can be achieved where deep insight into participants' experiences are found and it makes sense to them
- *Originality* depicts the ability of the findings to provide new insights into the phenomenon
- *Usefulness* relates to how well the research has captured the participants' practice and how relevant the findings are to their practice.

These factors and trustworthiness of the study will be addressed in greater detail in Chapter Six.

3.10 Summary

This chapter has outlined the methodology and methods used in this grounded theory study, illustrating the philosophical, ethical underpinnings and the steps taken to ensure a rigorous approach. The approach aimed for consistency throughout, where all aspects were underpinned by a constructivist's view of the world, from a standpoint that values the multiplicity of realities and the perspectives of the participants to facilitate

findings that are co-created by interacting with each other and the researcher. The next chapter presents the study findings.

Chapter Four: Findings

4.0 Introduction

Firstly, the participant sample and the context of the research environment will be described. The research findings will then be presented and the framework will conclude the chapter.

4.1 Sample and context

4.1.1 The sample

Thirty-three members of the multi-professional team (16 registered nurses [RNs], four doctors [two senior, two junior], eight physiotherapists [one senior, seven junior], two pharmacists and three experienced HCSWs) from three wards participated voluntarily in the research. This amounted to 26 hours of interview data from 25 participants and 48 hours of observational data from eight nurse participants. From this there were 85 cases of patient deterioration identified.

Observations were carried out mainly in the daytime, but two participants were observed working together during a night shift (Chris and Alan). Most participants were interviewed or observed once, but Dawn, a physiotherapist, was interviewed twice and Chris, an RN, was observed on two occasions. Two participants, Alan and Helen, were observed incidentally on second occasions while other participants were the focus. Data was

gathered over two years (October 2010 to December 2012), but no data was gathered between June 2011 and April 2012 due to researcher illness.

Each participant is identified in this report by a unique identification code, formulated from a prefix number of the ward on which they worked (1, 2 or 3), a letter (allocated in alphabetical order) and the number of the occasion on which they participated in the study. For the purposes of more humanistic reporting, gender-specific pseudonyms were allocated to each participant, using the letters of the alphabet from their code. For example, the code for Wanda, 2W1, indicates that participant W was a female from ward 2, and it was her first contribution to the research. The participant's code and page number from their transcript is used throughout this report to identify the location of any quotations used (e.g. 2W1:3). Single letters I, L, O and Q were avoided as they were considered difficult to distinguish from the numerals one and zero, and any identifiers using these (e.g. 1I1 or 102) might have been difficult to distinguish in print. When all other letters of the alphabet were utilised, later participants were labelled with two letters (e.g. AA, BB, CC etc.). Peripatetic participants who worked on more than one ward, like the physiotherapists and pharmacists, were not allocated a prefix code (e.g. Trish, T1). A full list of the sample is summarised in Appendix 3.

4.1.2 Context and environment

Four wards with high levels of patient acuity were identified as potential sites for the research in one hospital of a large acute foundation Trust with approximately 650 beds in a mixed urban and rural area of the UK. Data was

gathered from three wards; the fourth ward was not required as data saturation was achieved after observing or interviewing 33 participants from one medical and two surgical wards. Figure 5 shows a typical ward layout and Figure 6 illustrates a standard four-bedded bay.

Figure 5. Typical ward layout (*not to scale*). All research wards had the same layout with 12 single rooms and three bays of four beds.

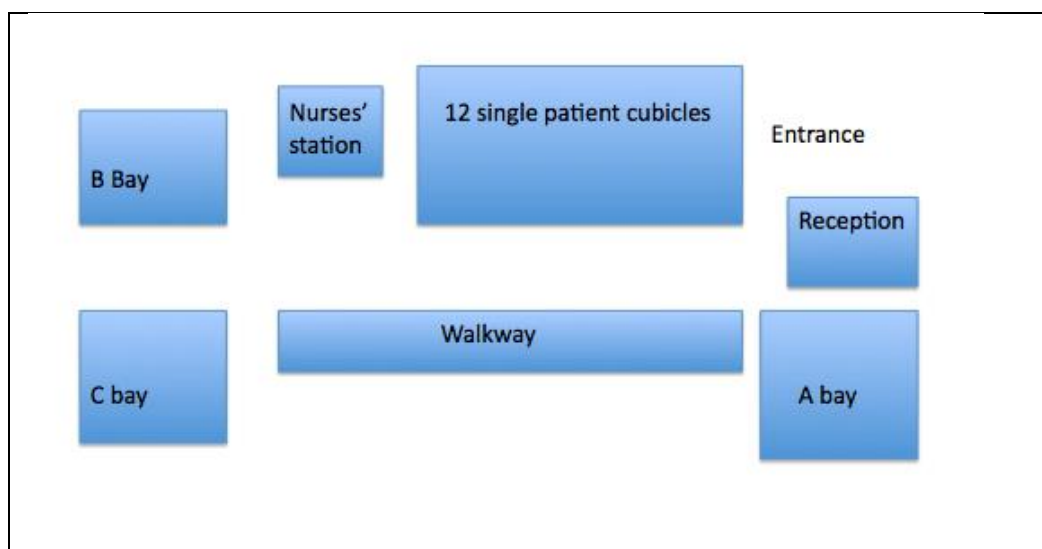
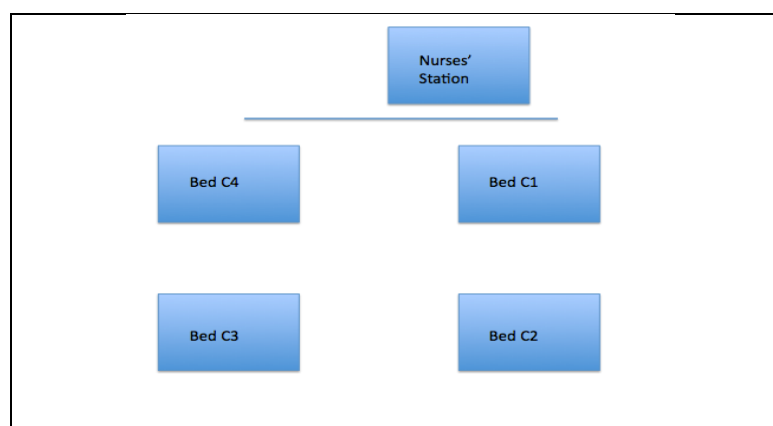


Figure 6. Typical bay layout (*not to scale*). Each bay had four beds numbered clockwise, 1 to 4



At the time of the study, each ward was open to a maximum of 24 beds, staffed by three registered nurses (RNs) and three healthcare support workers (HCSWs) on the day shift, reducing to two of each at night.

4.1.3 Handling and analysing the data

Verbatim interview transcriptions and fieldnotes were first coded manually and then uploaded into computerized data management software where they were coded and recoded further. Codes were compared with codes within transcripts, between participants, on different shifts and across different groups of participants. Codes were sorted into categories and these were ultimately sorted into four concepts, connected by the core concept, *making the link*.

The following four sections will present the findings as four interlinked processes

4.2 Being vigilant through surveillance

4.3 Identifying deterioration and recognising urgency

4.4 Taking action: escalating and responding

4.5 Taking action: treating.

Tables 12, 15, 16 and 17 presented below within each section will illustrate how each concept was developed from categories and codes.

Findings in respect of the core process, *making the link*, which connected all four processes within a cyclical trajectory of care, will be integrated into

each of these four sections. A simplified version of the resultant conceptual framework is presented in Figure 7 below.

Figure 7. The four key concepts connected by the core process *making the link*. This figure focuses on the central components taken from the full conceptual framework presented in Figure 19 below at the end of this chapter.



Key *verbatim* quotations from the 33 multi-professional participants and 85 cases of patient deterioration will illustrate how these findings were developed. Summative presentation of these findings as a conceptual framework will conclude the chapter.

4.2 Being vigilant through surveillance

4.2.1 Introduction

Findings relating to *being vigilant through surveillance* will be presented here. This conceptual process provided the starting point on a trajectory of care for the deteriorating patient. An overview of the concept is illustrated in Table 12 below which summarises the findings, illustrating how codes became categories and ultimately formulated the concept being vigilant

through surveillance. Colour coding links to that used in earlier Figures 2 and 3 on pages 100 and 104 respectively.

Table 12. Being vigilant through surveillance: categories, subcategories and codes.

Concept	Categories	Subcategories and codes
Being vigilant through surveillance	Primary vigilance	Checking
		Subjective and objective indicators
		Increasing vigilance
	Secondary vigilance	Layperson vigilance

4.2.2 Organising care: primary and secondary vigilance

Being vigilant through surveillance comprised two categories that related to how care was organised across the multi-disciplinary team. Participants gathered intelligence, subjective cues or objective signs, about the patient through personal, first-hand surveillance activity (*primary vigilance*) or through others (*secondary vigilance*).

a) Primary vigilance

Primary vigilance was a process that involved participants intermittently checking directly on the patients to gather intelligence first-hand. Checking, carried out in the main by those in closest proximity to the patient, involved touching the patient, looking at and listening to them or their family members, reviewing the charts and measuring vital signs, and was perceived as an essential part of the nurse's role, described by Chris as the

Fundamentals of nursing, checking your patient.... you check everything (1C1:45).

Observations revealed that RNs carried out routine and regular surveillance of their caseload as they checked and assessed each patient several times per shift, travelling back and forth between rooms and bays (1B1, 1C1, 1C2, 2G1, 2H1, 2J1, 2M1, 1KK1). In most cases their visits were short in duration and any intervention was usually brief, but as Nora indicated, the sicker patients received more frequent visits and subsequent increased vigilance,

...if you think there is any reason they might go off then you just have to keep going in and checking...check a bit more, just double-check (2N1:22).

b) Secondary vigilance

Secondary vigilance captured the additional activity and intelligence gathered by the multi-disciplinary team. Organisation of the work was such that the RNs relied upon information from the HCSWs, and in turn, doctors relied on information from the RNs. The peripatetic staff (physiotherapists, pharmacists, specialist nurses and doctors) and the patients' relatives provided further information pertinent to their role, knowledge and understanding, from their regular routine checks and visits. Peripatetic team members were not as close in proximity to the patient or with them for as long as the nurses. For example, pharmacist Trish highlighted that she would only *spend a couple of minutes* (T1:6) talking to the patients, but all professional groups added something to complete the metaphorical jigsaw of deterioration,

I see our role as just being an add-on to the doctors' and nurses' role.

There has been a lot of work on whoever goes and sees the patient should check they are ok and if there is anything they need (T1:1).

Reflecting on her experiences, Trish exposed a potential underpinning hierarchy of surveillance, where she was *just* an *add-on*, but she highlighted the different layers of vigilance and surveillance that provided fresh eyes on existing problems. For example, a pharmacist might notice that a patient on anti-sickness medication had *got their face in a sick bowl all the time* (T1:4), indicating a need to review the available alternatives.

c) Layperson vigilance

Layperson vigilance, a sub-category of *secondary vigilance*, embodies the process in which patients' significant others monitored changes in their condition. This was a recognised and valued resource by several participants from different professional groups,

Patients' relatives see changes in the patients. They know the patient best. They notice changes (2P1:5).

They provided an additional level or source of surveillance in the organisation of care, providing support in a resource-limited environment,

If the relatives don't stay, you just have to keep looking (2N1:24).

Furthermore, the patient was a useful source of intelligence. Participants identified examples where the patient alerted them to changes in their condition and this prompted increased vigilance, for example, a physiotherapist said,

Patients will start off saying, I don't feel right, I don't feel well, I feel off it. If you've got them early I would often say to the nursing staff that I would keep an eye and make sure (Y1:7).

Other participants acknowledged patients as a secondary source of surveillance that should be heeded and encouraged because, *patients tell you it all (2JJ1:14)*, therefore patients should be given*the confidence to speak to us (1HH1:17).*

d) Subjective and objective indicators

Being vigilant meant surveying the patients for both subjective cues and objective signs, knowing and understanding what they were looking for and what might indicate deterioration. Participants from all professional groups checked the patient for subjective cues of deterioration, but it was the HCSWs, closest in proximity to the patient, who described this type of surveillance most. Cues included their look or general appearance (1S1:12; 2P1:27), colour (1R1:4; 2P1:27; 2W1:5), appetite (2P1:27), behavioural patterns (Y1:5), with contrasting examples like *bright and chatty (1S1:12)* or *wanting to be left alone (2P1:27).*

The frequency with which the participants (predominantly HCSWs) carried out formal objective observations and recording vital signs was determined by Trust policy, based on national guidance, which mandates that a minimum of 12-hourly observations is required (NICE, 2007). Vital signs were recorded on the patient's chart and an increased frequency was observed where patients were found with abnormalities. The informal and

frequent visual checks for subjective cues were described by the participants in the interviews (e.g. 2N1:22) and were observed in practice, overheard in conversations (e.g. 1B1:2-5 and 1C1:1-3), but they were not seen to be documented. No participant was observed in practice using continuous monitoring and no participant interviewed reported that this occurred or that they had considered it as part of ward care.

e) Making the link / Not making the link

Thus far, the evidence has shown that patient surveillance was carried out through a number of different sources with different levels of vigilance. While some participants collected the data themselves (primary vigilance), others relied on information provided by another (secondary vigilance). This could be a professional colleague, but in some cases a layperson (the patient or their significant other).

An observation session with RN Betty (1B1:12-13) illustrated these findings clearly; where members of each professional group offered a perspective on the patient, focussing on different types of cues and signs in accordance with their own skill-set, level of knowledge and understanding. A reflective memo (in Box 1 below) from the observation indicates that while the nurse was clearly the common denominator in all communications, there was no formal way in which this information was shared or linked together.

Box 1. Memo (1B1 – 20/11/10 Sharing information)

Doctors focussed on the objective measurable signs, directing others in obtaining blood samples, ECGs and chest x-rays. The nurse focussed on vital signs and drug treatment (in this case oxygen and IV fluid administration). The HCSW measured the vital signs and urine output, and gathered equipment. The family, aware of the patient's decline, were seen to be vigilant at the bedside throughout. There was however no visible method observed whereby all sources of information were clearly shared. Prospective documentation was scant and verbal communication was brief.

4.2.3 Enhancing and inhibiting factors

Factors that enhanced being vigilant through surveillance included being with the patient in close proximity. Vigilance was inhibited by poor visibility and competing priorities, including paperwork and checklists, illustrated in Figure 9, in the summary of this section.

a) Visibility

Ward design and geography meant that half of the patients on all wards resided in single cubicles, out of full view of the ward-based staff (see Figures 5 and 6 above). Patients in cubicles were not clearly visible and other members of the healthcare team were difficult to find. The observation sessions highlighted important differences in working practices for nurses caring for patients in cubicles (e.g. 1C1 and 1C2) when compared with those caring for patients in one or two bays (e.g. 2J1), reinforcing poor visibility as key factor that inhibited patient surveillance. Chris was observed moving in and out of the cubicles frequently to survey patients in single rooms (1C1:1-3). Conversely, in a four-bedded bay, John was able to view a group of

patients simultaneously and was observed to move around less. Closer in proximity, he was able to communicate directly with the patients as well as his clearly visible colleagues at the nurses' station (2J1:3-6). Field-notes, including a plan of the bay (see Figure 6 above) indicate that the bay was designed in such a way that all equipment was readily available and most importantly, *the nurse does not have to leave the bay* (2J1:1).

Single rooms presented a barrier to patient surveillance and nurses compared them unfavourably with the open bay system,

You can't see the critically ill patients all the time and I think it is difficult. I liked the old style where you had the bays and you could see them (1S1:27).

Poor visibility could delay the identification of patients at risk,

I think sometimes now it might take a bit longer to pick up. Like on the old wards you'd see them. You'd see them; you could look across and think, oh, they don't look well. Whereas now you have got to go in their room (2N1:20).

In one case a patient deteriorated out of view from the nurse, in a bay where curtains obscured the view, and the nurse was unaware that *he had pulled his oxygen mask off* (K1:2). Visibility therefore stood out as an important influencing factor on being vigilance and surveillance, specifically for the nurse participants (1A1; 1B1; 1C1; 1C2; 2G1; 2H1; 2J1; 2KK1). A field-note reflects the researcher's personal anxiety regarding poor visibility,

This feels difficult to me because I can't see all the patients in the team. They are hidden behind the door in a single room.... It is difficult to see other staff as well (MP in 1KK1:6).

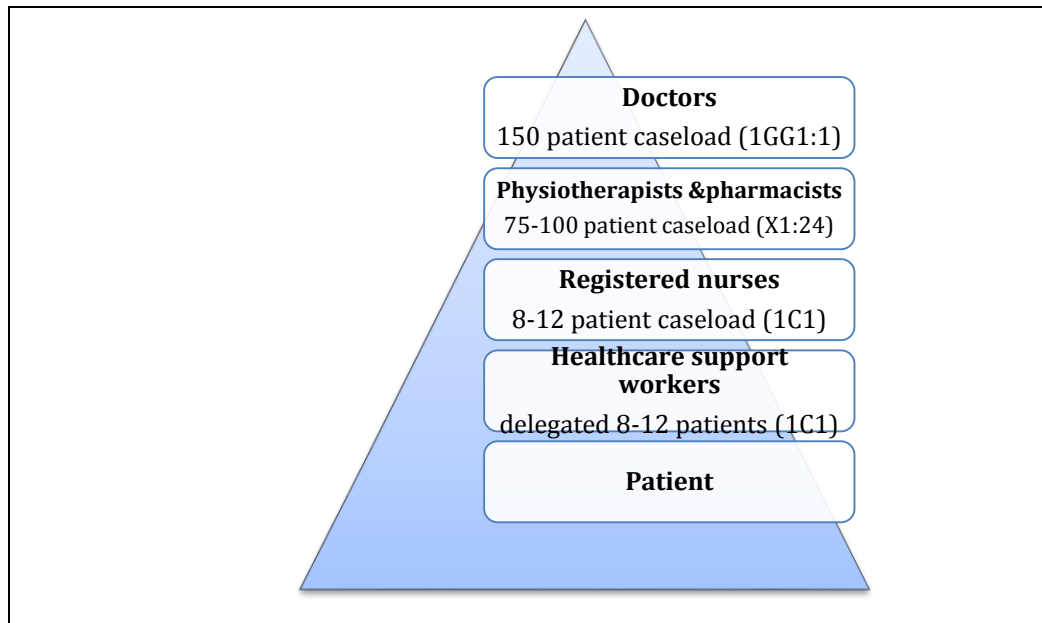
b) Being with and proximity

The opportunity to be with the patient in close proximity enhanced being vigilant. HCSWs were noted to have most opportunity to observe the patients at close quarters for subjective cues, *because they have more hands on care* (2N1:1). Others valued their proximity to the patient. A doctor highlighted a comparison,

They are using a skill set that the rest of us have lost, which is we don't touch patients enough in that way to know that (1JJ1:14).

This revealed a hierarchy of tasks, where those lowest on the professional ladder (HCSWs) were observed to deliver most of the intimate care, necessitating prolonged patient engagement. For example, RN Betty engaged only briefly but frequently with each of her eight patients, as field-notes indicate (1B1:2-5; 7-9; 10-11; 14-15). In comparison, the HCSW working alongside her (unobserved) spent more concentrated time with the patients, having been delegated specific hygiene-related tasks to complete. Reflecting on the observations as a whole, doctors were noted to have less contact time with the patients (Memo: X1- 08/09/12 Staffing ratios and proximity). Thus when this was interpreted in respect of caseload size for multi-professional participants, a pattern emerged illustrated in Figure 8 below.

Figure 8. Professional group, caseload and proximity to the patient.
This figure shows how as caseload increases, time spent in close proximity with the patient has the potential to decrease.



Those lower in the hierarchy with the smallest caseloads were closest in proximity and had more opportunity for being with the patient. Those higher up the gradient relied on others' secondary vigilance for information.

c) Competing priorities: Caseload and patient acuity

Limited visibility of patients (as a result of ward geography) was exacerbated by large patient caseloads and patient acuity. Cumulatively, these factors negatively influenced nurses' surveillance opportunities. Caseload influenced the time they had available to observe each patient, and lower nurse to patient ratios at night exacerbated this. For example, Chris (1C1:1) was observed to care for 12 patients on the night shift and eight on the day shift (1C2:1). Nurses needed to prioritise urgent and emergency

work and this generated conflict for them, particularly at night. If one nurse was occupied with a deteriorating patient, the second nurse was left to watch over 23 patients. When one or more patients deteriorated, vigilance was decreased for the majority on the ward,

It's the lack of staff at this hospital. And that's something no one is going to address. But when you have eight or 12 patients, you only need one to start deteriorating and the other seven or 11 have to be put on the back boiler because you cannot be in two places at once. You just hope your colleagues are keeping an eye on them.... The problem is while you get a patient 'go off' for want of a better word, I do think that other people have to wait in the background, and if a second patient goes off, we're in trouble (F1:20).

Comparison between different wards raised the issue of nurse-patient allocation. On ward 1 and ward 3, nurses were allocated an equal numerical share of the patients, based on ward geography, regardless of acuity (e.g. 1C1:1 and 3AA1:5). In comparison, a different approach to patient allocation was observed on ward 2. When patients were more acutely ill, they were grouped together in one bay and a smaller caseload was allocated to compensate for the extra work generated from that acuity (2J1:1 and 2H1:1). John was observed caring for just four patients (rather than the usual eight) on a day shift, but these patients required a higher level of care as the field-notes reflect,

They are all acutely ill. Other nurses have been allocated eight less acute patients. The nurse in charge has no patients (2J1:1).

Where patients with high acuity were grouped together in one bay, this facilitated allocation in a more thoughtful and resource-efficient way and enhanced vigilance for the sickest cohort of patients on the ward. Thus greater vigilance was apportioned to those perceived to be at highest risk and vigilance for this acute patient caseload continued when the nurse left the ward,

J hands over to the senior nurse in charge (H – my participant from yesterday), so he can go to break. She does not have a patient caseload this morning and comes into the bay to watch all of the patients (2J1:2).

This was not observed in the main. When Chris (1C1) had a caseload of 12 patients at night, two of which were acutely ill, surveillance was problematic during breaks when human resources were minimal, reinforced by a senior nurse on the same ward,

...because there is only one nurse and one carer. I mean, they have got the support of the other nurse [on break], but obviously with the layout of the ward, you have got to have eyes everywhere on nights (1CC1;8).

There was also concern with regards to the disparity in 24-hour nurse staffing. Surgeon Harry, concerned for the safety of his patients at night said,

So what's the difference between daytime and night-time? Why does the same ward run with three trained nurses during the day but two at night? (1HH1:21).

Other groups of participants were also affected by rising caseloads. Xander explained that physiotherapists in surgery covered three wards (up to 72

patients) with one senior, one junior and a physiotherapy assistant. In medicine, physiotherapists covered eight wards with up to 192 patients (X1:24). Not all patients on each ward however would be referred to physiotherapy at one time, but there was no ceiling to the number of referrals and the subsequent workload each ward provided. More serious concerns were highlighted regarding the workload of a junior doctor at the weekend however, suggesting that *it is borderline dangerous on weekends*. (1FF1:10). Routinely junior doctors covered six wards [144 patients] (1GG1:1). Neither of the two consultants talked about the size of their caseload.

d) Checklists and paperwork

During observation sessions, nurse participants were unavailable for observation, sometimes over an hour during the shift (e.g.1KK1:13), because they needed time to complete their paperwork, including a large number of risk assessment tools (checklists). The researcher used this time to complete field-notes, talk informally to patients or take a break. A memo from an observation listed their multi-factorial nature, shown in Table 13 below.

Documentation (or paperwork) could either enhance or inhibit vigilance. It supported communication,

If I reposition them and I write it down, I know he has been repositioned. And you know, carer or nurse will follow round and look and see – oh, this person has been repositioned (1W1:10).

It also provided assurance for the organisation that care had been given, and the legal requirement to document was emphasized,

I am confident that the patients out there are being looked after. To me that is the priority. What worries me is that in a court of law, if it is not written down you have not done it (3EE1:6).

Table 13. Checklists in use (1KK1 06/01/13 – Risk Tools)

Nationally recognised tools	In-house tools
<ul style="list-style-type: none"> • Waterlow score [Waterlow 1985; 1988; 1991; 1996] • MUST score [Malnutrition Universal Screening Tool, Malnutrition Advisory Group, 2003] • AUKUH acuity and dependency level of care score (AUKUH, 2007) • Visual Infusion Phlebitis (VIPS) score (Jackson, 1998), • Bristol stool bowel action chart (Lewis and Heaton, 1997) • Glasgow Coma Score (Teasdale and Jennet, 1974), 	<ul style="list-style-type: none"> • SKINS tool for surveillance of the integument • food chart for recording dietary intake • observations and track and trigger score chart including the pain score • fluid balance chart • falls risk assessment tool • moving and handling risk assessment tool • bed rails assessment • infection screening tools <p><i>Extract from a memo in which researcher was prompted to list all tools seen in practice.</i></p>

In a system where checking has been identified as a key component of nursing surveillance, the benefits of a checklist as an *aide memoire* were highlighted. For doctor Harry, the use of a *mental* (rather than written) checklist was helpful when reviewing patients on a ward round (1HH1:9) and for doctor Jim, risk scores such as CURB65 (British Thoracic Society Standards of Care Committee, 2001) for pneumonia ⁸ and the in-house track and trigger score, Augmented Care Assessment Tool (ACAT, unpublished

⁸ CURB 65 - Confusion of new onset; Urea >7mmol/L; Respiratory rate >30 /min; Blood pressure<90mmHg; age 65 or older

local tool) for identifying deterioration empowered those with less confidence in their own clinical judgement to escalate to a more senior colleague (2JJ1:5). Likewise, interviews with physiotherapist participants Dawn (D1, D2), Kate (K1), Una, (U1), Val (V1), Xavier (X1), Yvonne (Y1) and Zoe (Z1) highlighted their structured approach to surveillance too. A formal checklist was used to support junior physiotherapists and on-call staff at night. Described as *a bit of paper with all the prompts on* (D1:11), the tool was a memory aid for communication,

When the phone goes off you can just go down the sheet. You don't forget anything; it's all there (U1:24).

For some nurses however, while checklists were seen as helpful reminders during a busy shift, some ambivalence remained,

They have got to help. They trigger thoughts don't they? Whereas years ago when we didn't have them, it was sort of in your head already (1CC1:51).

The benefits of checklists were outweighed in some cases by the amount of documentation required, particularly for the nurse participants, as evidenced by time away from the direct patient interface while writing their records (e.g. 1KK1:13).

Experienced nurses considered that the volume of the paperwork and workload generated by it, inhibited vigilance (1CC1:12; 3DD1:3; 3EE1:5), captured in this example,

I think mainly the job is getting busier - but I think, that is because each patient needs so much doing - and that's not necessarily nursing care..... That's documentation (3DD1:3).

Not completing the paperwork was recognised as a serious omission in practice within the organisation and the fear of retribution from non-compliance was strongly conveyed,

So....what do you do? If the paperwork is all right, the patients do not get looked after, or the patient is absolutely spot-on and the paperwork is crap, you get hammered (3EE1:6).

While the nurses' attitude was seemingly one of acceptance, a doctor challenged the situation thus,

As long as they turn the patient and check, why do they have to write out a form every time? (2H1:22)

One nurse participant highlighted that nurses were easy-targets for criticism with regard to vigilance-related documentation. She cited a case where nurses had been chastised for not completing a fluid balance chart while another serious problem went by unchallenged, suggesting the possibility of an authority gradient based on salary or role-value and an organisational focus on processes rather than outcomes,

.....but it annoys you, because even though I tried to get a doctor numerous times, the big issue is that we didn't do the fluid chart, even though she wasn't on fluids, so it was like, let's forget about that situation; let's just blame the nurses (3AA1:21).

4.2.4 Summary of *being vigilant through surveillance*

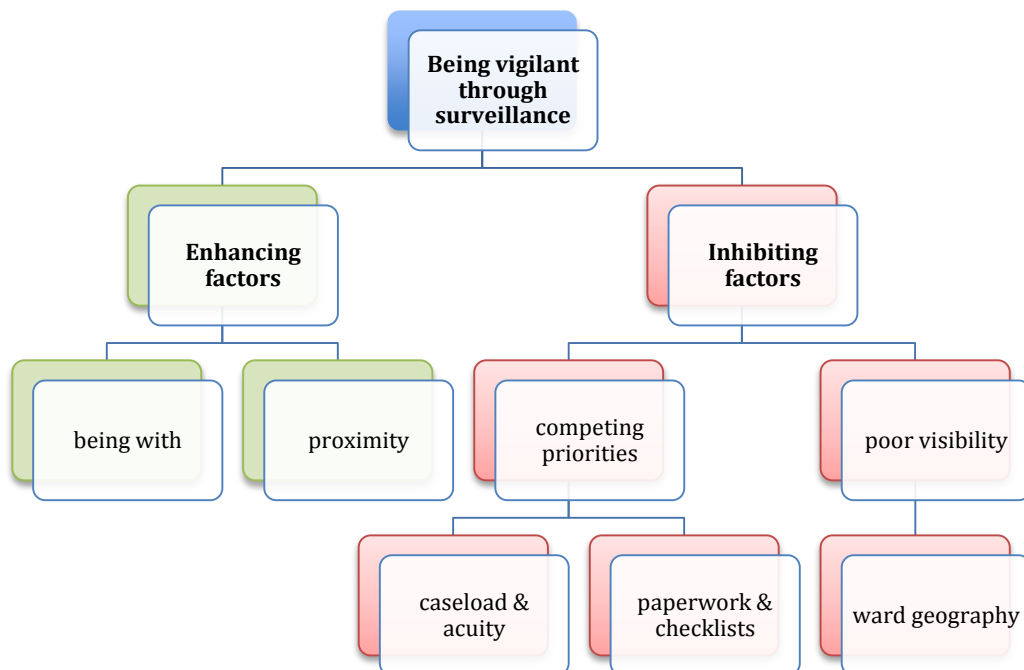
Vigilance through surveillance highlights a valuable phase, which formed the starting point in a trajectory of care for the deteriorating patient. *Being vigilant* involved systematically *checking* on or observing patients for any subjective or objective changes in condition, supported for some participants with a checklist. The conceptual process was defined by the organisation of care, a combination of primary vigilance (intelligence gathered personally) and secondary vigilance (gathered by another).

Multiple sources of intermittent data collection included objective signs (such as the vital signs, investigations and blood tests), but also the subtle, early, subjective cues or patterns of behaviour identified through listening, feeling, touching, watching and observing, that provided forewarnings of deterioration. Maintaining vigilance at this level, through careful patient surveillance, required visual observation at close quarters. HCSWs worked in closest proximity and knew the patients well. When present, visitors or relatives supported this with further surveillance. Large caseloads, rising patient acuity, limited visibility and a plethora of paperwork all impacted negatively on the *being vigilant through surveillance* process. Continuous monitoring was not observed in practice and was not considered by any of the participants. The factors influencing being vigilant through surveillance are summarised in Figure 9 below.

All members of the team observed the patient and were vigilant to changes but over different time frames, in different ways and each from a different

perspective. These findings link to the next concept on the trajectory of care, where the resultant intelligence was used for *identifying deterioration and recognising urgency*. Where pieces of the jigsaw were assembled and the link was made between the intelligence gathered and any changes observed, deterioration could be identified and stratified into urgent and less-urgent cases. Findings pertaining to identifying and recognising will be presented in the following section, and this is where the core process, making the link, becomes relevant.

Figure 9. Enhancing and inhibiting factors for being vigilant through surveillance. This flow chart summarises the factors that influenced participants' ability to be vigilant



4.3 Identifying deterioration and recognising urgency

4.3.1 Introduction

The findings that support the conceptual process *identifying deterioration and recognising urgency* are presented in this section, which will show how being vigilant and surveillance for subjective cues and objective signs informed participants and assisted them in noting changes over time. Then, where the core process *making the link* was applied, participants identified deterioration and stratified urgency from the intelligence gleaned.

4.3.2 Using subjective cues

In a previous section 4.2.2, the participants revealed that they surveyed patients for subjective cues (mainly patient appearance, appetite and behaviours). When changes were identified, the resultant deterioration was also described subjectively, suggesting that the patient was *not right* (1R1:4; 2P1:7; 1GG1:7; 1HH1:4) or *I can't quite put my finger on it* (1CC1:57). Some participants identified deterioration through subjective cues alone, and Gail demonstrated this when she reported to the doctor,

15:45hrs Bed A3: 'She might be retaining [carbon dioxide]'.Gail states she thinks this because the patient is twitchy (has been all afternoon) and she has slurred speech.....But she's 'not right' (2G1:9).

Sometimes however the subjective changes prompted the participants to look for more objective measureable signs to confirm deterioration, increasing being vigilant through surveillance (section 4.5.4).

4.3.3 Inhibiting and enhancing factors

Three key factors influenced participants' utilization of subjective cues for identifying deterioration; the relevance or importance they placed on subjective cues, knowing the patient and continuity of care.

a) Relevance of the subjective

A range of participants from different professional groups used subjective cues to identify deterioration. All groups demonstrated intuitive-type concerns,

Nursing and medicine involves the sixth sense, having the almost intuitive response to the situation rather than a structured thing (1HH1:22).

Recognising the early subjective cues of deterioration was fundamental to the rescue process,

The subtle signs are the ones to look out for because the barn door signs any idiot can pick up (1HH1:2).

Pharmacists used them, underpinned with gut feelings,

...people who just generally don't look how you'd expect them to look at that time. I think there's an element of gut there (T1:3).

Dawn felt that physiotherapists also *have a good gut instinct*. (1D1:3). One doctor took a gendered perspective on the use of subjective signs, suggesting that *it is easier as a girl* (1GG1:7) to use subjective descriptors about a patient. Where the credibility of subjective cues was questioned however, corroboration from others' added strength to claims of deterioration,

... it wasn't just my gut feeling, there were two other nurses as well, staff nurses, and we thought she looks ghastly (1DD3:12).

But subjective signs were difficult to communicate up the chain of command to a senior doctor,

Then your seniors come and they are not seeing them so much and it is hard to put your finger on what you think, and how you communicate that (1GG1:9).

This captures the importance of being with the patient and getting to know them in order to identify subjective changes.

b) Knowing the patient, maintaining continuity

Knowing the patient enhanced the process of identifying deterioration, supported by vigilance that came from *being with* the patient, but also from *maintaining continuity* of care, which facilitated comparisons over time.

Linda explained about a patient she had known for a long time who *looked different* (3LL1:11). She went on to clarify that he was *chesty*, thinner and poorly, but she was able to identify this because of continuity of care.

All groups of participants alluded to the importance of maintaining continuity. Linda explained that they had regular patients on their ward, so she knew when they became unwell (3LL1:16). The process was similar for nurse Farah, *knowing what is normal for them* and then later knowing *if there is a difference* (F1:9). But while the nurses were closest in proximity and saw the patients for longer, the peripatetic participants were able to

compare the patient's condition from one day to the next. For example, physiotherapist Yvonne said,

So you've seen them before....And you can just see that they are not well today. You can see something not right (Y1:6).

Junior doctors also valued continuity of care,

I think continuity is important. I think, a lot of time, especially in older patients, that is how you spot the patient who is getting on well..... It is so important because you are seeing them so many times, then you can actually see them deteriorate (1G1:9).

Senior doctors who had less direct contact with the patients nevertheless appreciated the benefits of continuity in the process of identifying deterioration,

I mean, how often do you walk in and say, he doesn't look as well as yesterday? (1HH1:15)

Thus it would seem that the process was the same for all professional groups, that is, one of comparison. Where the patient's baseline or 'normal' contrasted with their current state, deterioration would be identified. The time interval for comparison was the variant in each case, which could be minutes, hours or a day, depending on role. Without continuity however the assessment of trends in the broader context was restricted. Farah described the difficulties thus,

..it's like giving one set of obs – that doesn't mean anything by itself, it's the trend we look at.....but we have got to look at the bigger picture, it's not just one set. So continuity of care is vital and I think that's what it lacks really (F1:22).

A number of factors negatively influenced continuity. Harry cited the European Working Time Directive (EWTD), an international ruling that limits the continuous number of hours that healthcare staff can work, with what he saw as the resultant *...clock watching generation* (1HH1:25). Under these regulations, doctors experienced difficulty following patients through their pathway of care and hence they did not *...get to learn from mistakes or successes* (2JJ1:26). Dawn suggested that patient allocation and the nursing handover might, in part, contribute to some difficulties because *nurses don't always have the same patients* but she also highlighted *the small things* that are noticed through continuity of care were not passed on in the handover (D1:5). Patient allocation was cited as a contributory problem too. Farah noted that even when the same nurses on were on duty on consecutive days they were allocated different patients, creating difficulties for nurses and patients alike (F1:9).

Opinion was divided on the effect of long shifts (12 hours) on continuity. For some, they reduced continuity because of the resultant time off in between,

So you have got a big gap in that space of time. A lot can have happened in that time (3EE1:14).

Conversely, Wanda felt she could pick up changes in a patient's condition more easily on a longer shift,

You know because you are with them all the time... through that shift period, you do see changes in them (1W1:9)

c) Being interrupted

Continuity was negatively influenced by frequent interruptions. Observing nurses in practice provided a sense of the constant interruptions they were subject to. For example, one field-note identified Helen was interrupted many times, *trying to do several jobs at once*; a telephone call from Infection Prevention and Control, a requirement to print off some new care plans, a doctor who required a blank prescription chart, a message from the receptionist about a staffing issue and the ward round starting in Bay B (2H1:2-3). Norah reinforced what had been observed in practice with Helen, highlighting how she could be checking up on a deteriorating patient, *then somebody can stop you on your way* (2N1:20). This unpredictable nature of the workload and constant interruptions for nurses was recognised as problematic by other professional groups. Xavier noted that,

As a nurse you don't know if the dietician's going to walk on the ward, if two consultants, a physio, OT, there's so many variables in that day that can alter your pattern (X1:46).

4.3.4 Making the link: increasing vigilance

The act of *increasing vigilance* was interpreted as a positive signal that deterioration, or the potential for it, had been identified. Rather than generating an immediate call for further assistance, very early subjective indicators led the nurse participants to look for objective signs by *monitoring them a bit more closely* (1E1:4) or *keeping an eye on them* (1CC1:59). RN Nora explained what usually happened,

We will say, right, let's go and get their obs done, let's check. If they've got chest pain, do an ECG. Then talk to patient find out, do their obs, do a blood glucose if they are diabetic, or even if they are not sometimes (1N1:1).

Identifying deterioration resulted in increased vigilance for objective signs with all participant groups. For one RN this involved doing the observations *more regularly for sure* (1CC1:59). HCSW Wanda explained similar, that if *I don't think they look well* she would do a set of observations (1W1:4).

Similarly, physiotherapist Yvonne routinely assessed the patient subjectively *in the first couple of minutes from the end of the bed*, and if this raised concerns, she looked for more objective signs (Y1:5). Doctors would do the same. Harry gave the example where he confirmed his hunch that the patient *doesn't look right* with a more objective computerised tomography (CT) scan (1HH1:6).

Layperson vigilance and the subjective data this provided, was also observed to trigger the search for more objective data. When a visitor identified that a patient's breathing was *not right*, this prompted HCSW Alan to investigate further and check the vital signs (1A1:4). When the receptionist identified a patient as *not right*, again Alan responded by checking,

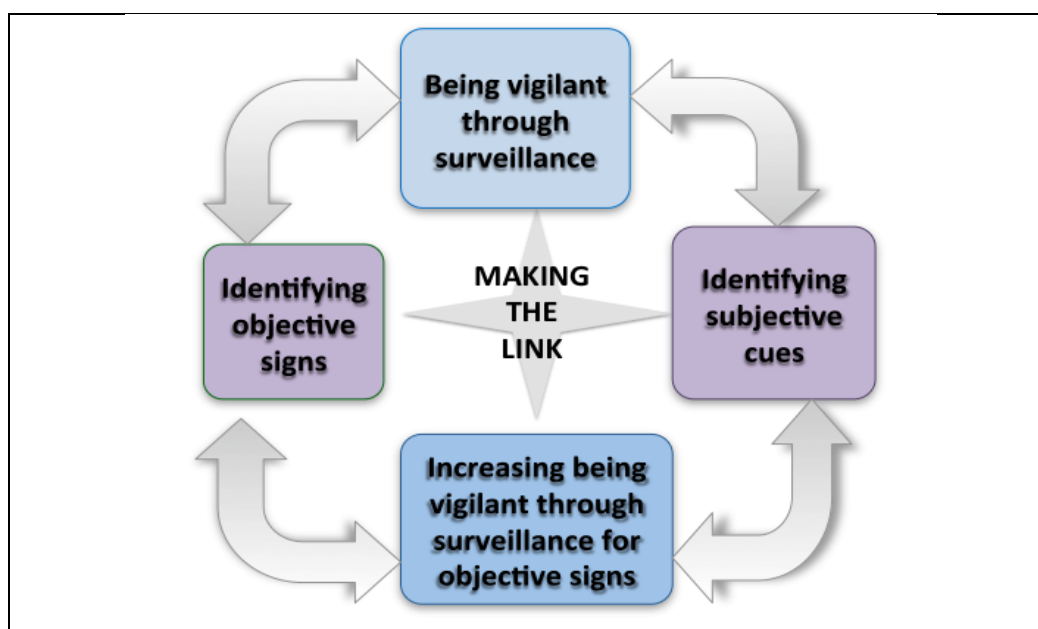
He found there was no fluid balance chart and no record of urine output so he did a bladder scan (1A1:4).

Both examples demonstrate how very early subjective cues, noted by those in close proximity to the patient, triggered increasing vigilance and the hunt

for more objective signs to confirm suspected deterioration. Farah provided a comparative example where, when a patient reported feeling unwell, *because he hadn't got hard facts* no further action was taken and the patient later deteriorated and collapsed in the bathroom (F1:1-2).

Thus, in the main, subjective cues served as a prompt for increasing vigilance and a search for more objective signs, as illustrated in Figure 10 below, but these example cases all highlight a core process in which *making the link* was key. Participants had to make the link between the changes they had found and decide if they amounted to deterioration or not.

Figure 10. Making the link and increasing vigilance. This figure summarises the process where identifying subjective cues leads the participants to increase their vigilance in the search for objective signs.



4.3.5 Using objective signs

Objective signs used by the participants to identify deterioration included changes in the vital signs mainly, but also results from blood tests and other

investigations such as computerised tomography [CT] scan, blood glucose [BG] and electrocardiogram [ECG]. Nine observations with eight nurses on two wards highlighted that in the main (with RNs Betty, Chris, Gail, Mary and Kerry), routine vital signs were carried out for them by the HCSWs.

Nurses used the vital signs to identify deterioration including respiration rate [*resps*] and tachypnoea (rapid breathing), low oxygen saturations [*sats*] and hypoxia, tachycardia (fast heart rate [*tachy*]), hypotension (low blood pressure), pyrexia (high temperature [*temp*]) and altered levels of consciousness. But change in the respiratory status was most commonly used objective sign when nurses communicated deterioration. Sue emphasized this, citing a patient with a respiratory rate of 30 breaths per minute; *I always take the respiratory rate as the main priority* (S1:9).

Another nurse participant identified a patient's respiratory rate as 50 breaths per minute and the saturations as 92%, from which she was able to *make the link* and recognise urgency. Communicating with the doctor, she was brief and succinct. Using a combination of subjective cues and objective signs she said,

A2 is not looking so good, she is breathing fast (2G1:8).

The physiotherapist participants frequently focused on the respiratory status, a decline in which, for them, was key to identifying deterioration. All physiotherapy participants highlighted the importance of respiratory rate and low saturations. For example, Dawn said the following factors were key,

Sats level and respiratory rate and increased work of breathing in terms of muscle activity (D2:5).

The amount of oxygen required to maintain adequate oxygen saturations was another objective indicator and high oxygen requirements signaled deterioration for them,

Walking down the ward and I see a non-rebreath mask [high flow, high dose oxygen]. I need to know, do I need to be involved with THAT patient (X1:23).

Conversely, low oxygen requirements (e.g. two litres per minute) and high oxygen saturations (e.g. 98%) indicated no deterioration or concerns for physiotherapist Dawn (D1:6). Lack of a gag reflex however was an important indicator of serious deterioration identified exclusively by the physiotherapist participants,

If someone can open their mouth and let you put a Guedel [pattern] airway in that's not going to bode well for the rest of their life. They will let you put a Guedel in and you can suction and suction, and you know that's not right (X1:14).

In a peripatetic role, the pharmacist also recognised changes in objective vital signs, looking at the trend from one day to the next as part of their once daily patient review, but they were able to add a further dimension to the picture of deterioration as Bob explained,

...deteriorating kidney function is probably the one where pharmacists can really play an important role because of the importance of the review in the medications, both nephrotoxins and dose (BB1:7).

The data here demonstrates that different participants from a range of professional groups looked for subjective cues and objective signs, but different signs stood out as significant for different groups. Vital signs were key for all groups, but there were also idiosyncratic features that each was vigilant for to identify deterioration from their specific perspective. *Making the link* between the altered signs and potential for deterioration often resulted in increased vigilance and a hunt for more objective signs to confirm deterioration and stratify urgency.

4.3.6 Making the link: recognising urgency

Alice provided a clear example of deranged vital signs in which she recognised deterioration. The degree of urgency conveyed in her voice cannot be reproduced here, but the patient presented with,

...spiking temperatures, had a respiratory rate of 24 and a temp of 39 odd. Slightly tachycardic about 100 odd, BP was fine. He was mainly Acatting on his temp and resps (1AA1:6).

In order to identify deterioration and to prioritise the urgent from the non-urgent cases, participants used deranged vital signs in conjunction with the local physiological track and trigger score (Augmented Care Assessment Tool, ACAT). As indicated by Alice above, the score provided an objective measure that helped participants to *make the link* and recognise urgency of the situation.

a) Prioritising patient status (track and trigger scores)

Different participants used the track and trigger score in different ways in different situations. It could be used to stratify urgency and reduce thinking time, *it tells you straight away, gives you a decent picture of what's happening* (F1:12). Physiotherapist Kate explained how it confirmed deterioration, *if they are Acatting at 5, then I know they are really poorly* (K1:7). In her use of the gerund form of the acronym ACAT, Kate (and other participants from different professional groups e.g. 1AA1:6; 1GG1:1; 1FF1:10; 1E1:3) indicated that the patient had triggered the tool with a high score and was deteriorating. This may be indicative of the integration of the process in the organizational culture, but interestingly, other tools were not colloquialised in the same way and no participant was heard to say they had 'Waterlowed' or 'Musted' the patient. This might suggest the degree of importance placed upon the ACAT tool by the scorers.

There were some cases however in which deterioration was so clear from the very seriously deranged vital signs that a risk tool was superfluous, the *barn door signs that any idiot can pick up* (1HH1:2) referred to earlier. For example,

Unresponsive, sats low 80s, Acatting quite high. We looked at his obs. They were well out. I knew it (ACAT) was above 3. I didn't, like, sit there and work it out, because I knew (K1:1).

Some nurses used the track and trigger score and other risk assessment tools as back up to confirm their clinical judgement, rather than relying on them as primary diagnostic tools. For example, Darcy's use of the Waterlow

score (for measuring risk of pressure damage to the skin) illustrates this point. Based on experience, she knew a degree of risk existed, and the score would be high enough to indicate an air mattress was required, but for objective confirmation, *obviously you tick and get a number* (3DD1:39).

b) Being experienced

Being experienced was a key factor in being able to *make the link*, prioritise patient status and recognise urgency. A senior nurse felt that junior nurses particularly found the ACAT *helpful* (2HH1:4), but those with more experience circumnavigated its use, like Kate (K1:1) above. Senior nurse Helen reinforced this issue clearly. She highlighted how identifying deterioration and recognising urgency was a complex process that could not be simply reduced to a score, there were other factors to be considered. Helen said that she did not use ACAT herself as part of the patient assessment; *it was more of an afterthought* (2HH1:4). Rather for this senior, experienced nurse, *knowing the patient was as important as doing the ACAT* (2HH1:4)

Furthermore, *being experienced* enabled nurses to over-rule a decision indicated by a risk assessment tool when they considered their professional clinical judgement to be superior (or perhaps more sensitive). Mary used the example of the MUST nutrition risk assessment tool, emphasising that a checklist could not substitute her knowledge and experience in respiratory medicine. Mary was able to *make the link* between the intelligence gathered, the problem and the solution, where a breathless patient on high flow

oxygen that could not be removed, could not eat a full meal. She challenged that *the MUST isn't any good for assessing him* because it identified him as low risk, despite his inability to eat. She considered her experience, coupled with common sense, was superior, identified him as high risk and took appropriate action (2M1:2).

These examples from Helen, Kate and Mary have shown how experienced participants felt able to use their knowledge and skill to *make the link* between patient surveillance data and deterioration. This could be supported by a risk assessment tool or regardless of it. There were examples cited however, where healthcare professionals failed to make the link and the following section reports these findings.

4.3.7 Not making the link

If links were not made between deranged cues and signs and the presence of deterioration, if vigilance was not increased, urgency would not be recognised. Participants highlighted several reasons why they thought the link might not be made, and deterioration might be missed. The example cases participants provided during interviews however were mainly those in which they had positively identified deterioration. No participant reported any example cases in which they had missed opportunities, but all groups cited examples of failure to recognise by others.

Missing the early signs was one factor,

...the number of times I get told, oh but the abdomen was soft and the patient looked all right. But he is not (1HH1:2).

Disagreement over what constituted deterioration was another,

The doctors say they are ok, but you just know. One hour later they go off (1D1:3).

Lack of experience was highlighted, using the following example where the link was not made between weight gain and excess fluid,

... she was something like 71kg - and a week later she was 77kg. Where have the 6kg come from? Nobody thought, it might be fluid!It maybe comes just from experience (3DD1:36).

Senior nurse Helen completed her training years before track and trigger scores were introduced, so the tool augmented her existing knowledge. She worried therefore that new nurses, with limited experience, might use the tool to the detriment of thinking for themselves (2HH1:4). This was compounded by Yvonne's suggestion that lack of knowledge and understanding limited the ability of some to *make the link* between surveillance data and deterioration,

... are we fully appreciating why we are writing these numbers down and what these numbers mean? You've got a trend. You've got your BP plummeting, your heart rate going up and sats dipping and resp rate going up. Are the staff taking the obs fully aware of the implications of that?....A lot of the time it is just attention to detail that I find is lacking (Y1:1).

Yvonne's comment, early in the course of the research, followed three sessions in which participants had been observed not making the link between surveillance data and potential deterioration, and this was a key prompt in the development of the core process. Table 14 below contains the précis of field-notes and three case examples of *not* making the link. Each case highlights specific lack of knowledge with regards to oliguria (low urine output) in response to hypovolaemia (low circulating volume) and dehydration.

Table 14. Not making the link

Observations	Researcher reflections
<i>When a patient under the care of Chris passed 800ml urine in 24 hours (36ml/hr) she was initially unconcerned as she thought normal range was 20-30ml/hr (1C1:3).</i>	Normal urine output is 1-2ml/kg/hr. If urine output falls to 0.5ml/kg/hr for two hours local policy required the nurse to call the doctor.
<i>Following an episode of hypotension (low BP) and hypoxia (low oxygen) a patient under the care of Betty, became oliguric (330ml in 14 hours – 24ml/hr). The doctor instructed a trial without catheter. The patient failed the trial and was re-catheterised. (1B1:13).</i>	Neither doctor nor nurse had considered that the patient was destined to fail the trial without catheter, not because he was in urinary retention, but because he was hypovolemic and anuric.
<i>12:50hrs Alan recorded a high specific gravity following urinalysis on the patient in room 11. 17:00hrs Alan was asked to commence the patient on a fluid balance chart (1A1:6)</i>	High specific gravity indicates the potential for dehydration. Alan did not <i>make the link</i> between this and a potential negative fluid imbalance. Failure to identify deterioration delayed increased vigilance through surveillance by four hours.

4.3.8 Summary

In order to move safely through the trajectory of care from a process of vigilant surveillance to one of identification and then to a position of

recognising urgency, participants needed to make the link between available information and the required action. *Making the link* was therefore a key process in moving on to the next phase of the trajectory (*escalating and responding*). Surveillance data coupled with knowledge, skills and experience, with or without the support of a risk assessment tool and checklists were used to *identify* deterioration. The concept, categories and subcategories are summarized in Table 15 below which aims to provide transparency to the decision making process regarding the development of the concept and how it connects to other concepts.

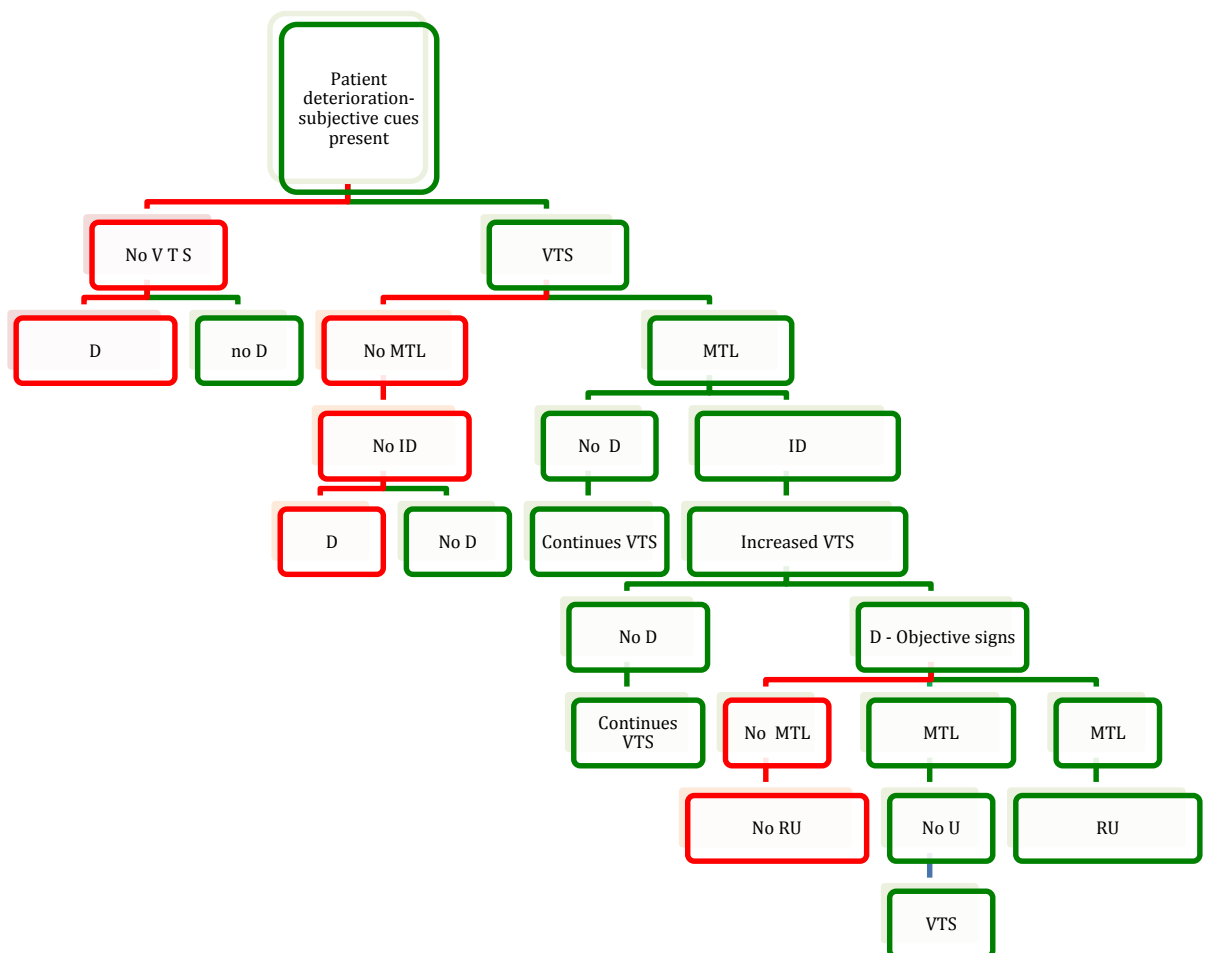
Table 15. Summary of concept, categories and subcategories for identifying deterioration and recognising urgency.

Concept	Categories	Subcategories and codes
Identifying deterioration and recognising urgency	Using subjective cues	Relevance of the subjective
		Knowing the patient
		Continuity
		Being interrupted
	Using objective signs	Prioritising patient status
		Track and trigger scoring
		Being experienced

Intuitive or subjective indicators provided early warnings that led to increased vigilance and a search for more objective, measurable confirmatory signs. An outward sign that identification had occurred was therefore increased vigilance, manifested as more frequent, closer patient observation. Escalation to another professional, further up the authority gradient or with the requisite critical care skills, was interpreted as a sign

that urgency had been recognised. Thus positive identification of deterioration and recognition of urgency were interpreted through specific the actions of the participants, responding to both subjective cues and objectively measured changes in the patient.

Figure 11. Alternative routes of care for the deteriorating patient.
VTs = vigilance through surveillance; MTL = making the link; ID = identifies deterioration; RU = recognises urgency; D = Deterioration
'No deterioration' (No D) is included in the trajectory for completeness but this was not highlighted by the participants in the study.



The flow chart in Figure 11 above summarises the process thus far and

provides visual representation of the potential decision making routes made by research participants as evidenced in the data, including vigilance through surveillance, identifying deterioration and recognising urgency. The data is presented in flow chart and this will be built upon in further sections with findings added for each key concept (see Figures 15, 17 and 18 later in this chapter), but ultimately the framework will be presented as cyclical in nature (see Figure 19 at the end of this chapter).

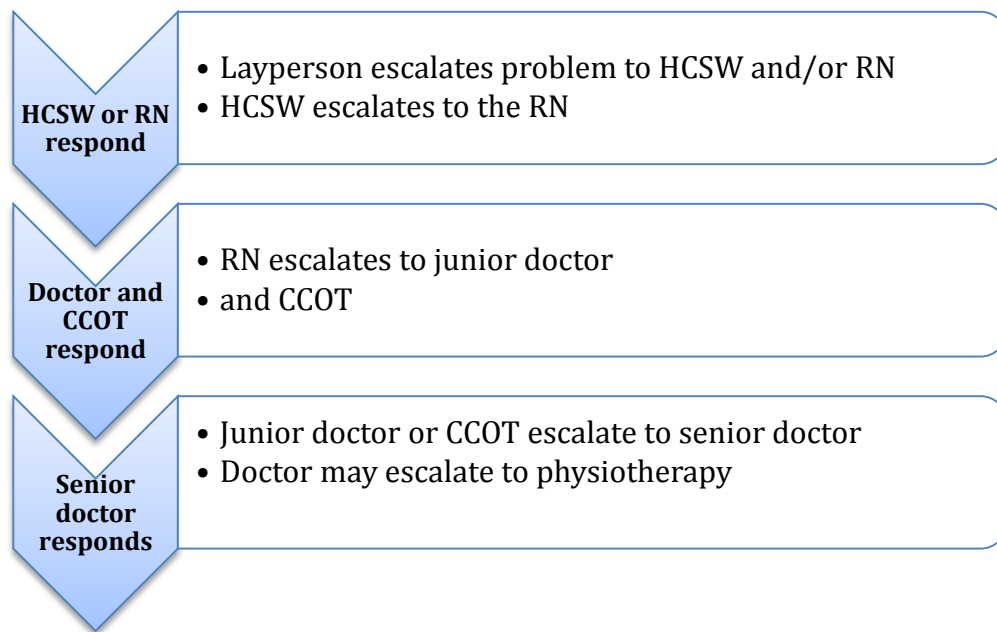
4.4 Taking action: escalating and responding

4.4.1 Introduction

Participants defined *taking action* in three stages: *escalating* (calling for help), *responding* (to provide help), and *treating* the deteriorating patient. This section will report the findings regarding the dual or reciprocal process of escalation and response and will incorporate two perspectives, that of the caller-escalator and that of the responder. Treating the patient will be addressed in the next section.

An overview of the data exposed an authority-skill gradient of escalation and response and is illustrated in Figure 12 below. This will provide the structure for presentation of the findings, alongside the enhancing and inhibiting factors to the process.

Figure 12. Authority-skill gradient of the escalation-response process – a structure for presentation of findings in subsequent sections



4.4.2 The escalation-response process

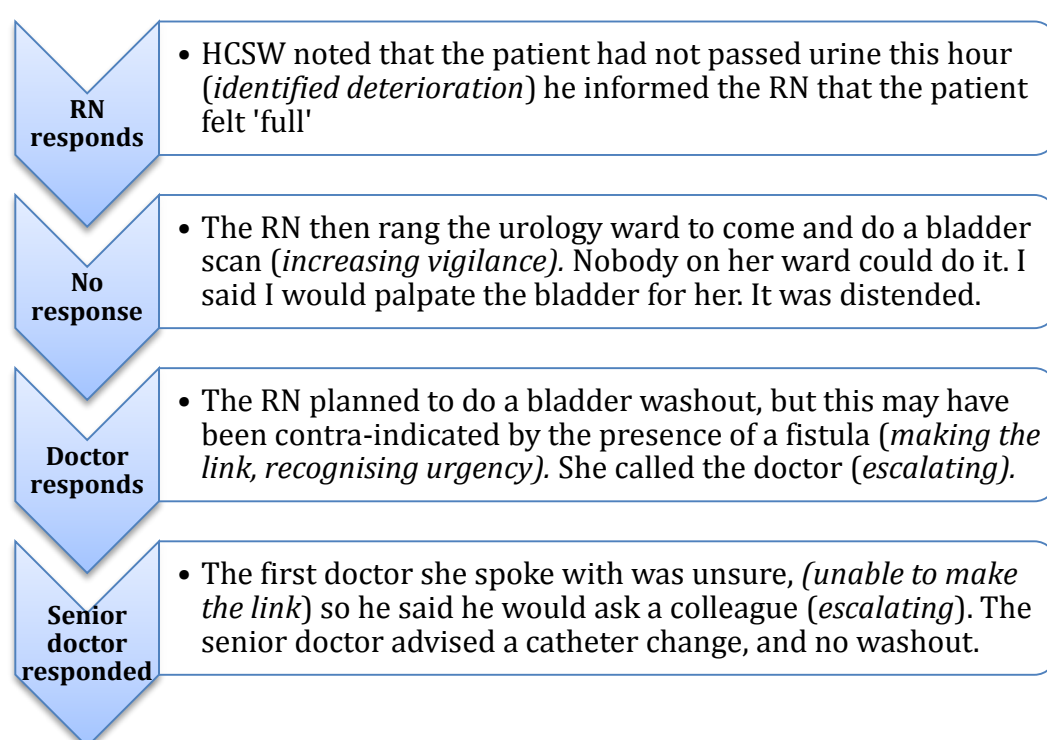
The escalation-response process was dependent upon completion of the earlier stages within the trajectory of care for acutely ill patients. That is, once deterioration was identified and urgency recognised through vigilant surveillance, the participants faced the option to escalate the situation to a more senior or more knowledgeable, skilled colleague, or not. Thus some participants could act as both caller-escalator and responder in a single case. For example, an RN might respond to escalation from a HCSW and then in turn, escalate to the doctor,

If there is anything out of the ordinary a carer will come and tell you that sort of thing. And obviously escalate it to the doctors (3DD1:1).

At ward level, between HCSW, RN and junior doctor, escalation could be made face-to-face. Peripatetic team members (CCOT, physiotherapy, Night

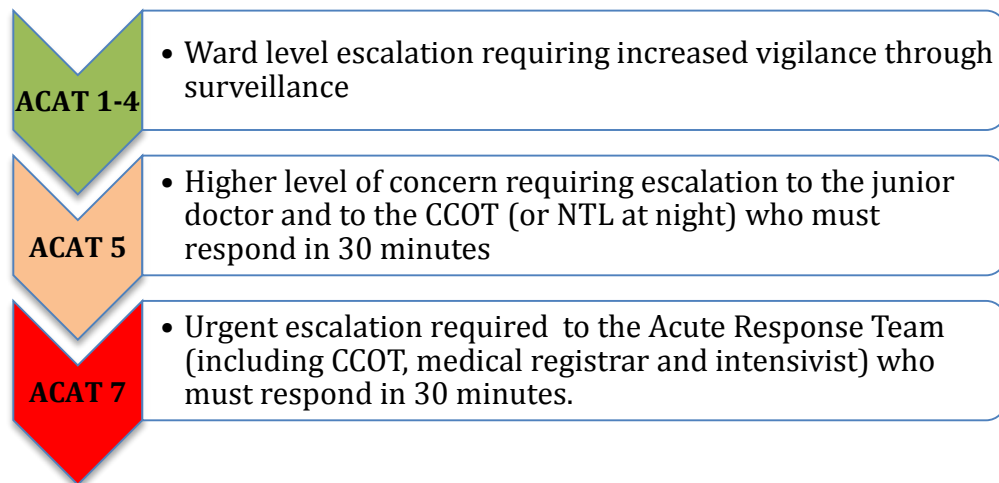
Team Leader [NTL] and doctors) were contacted via telephone or the wireless Vocera communication system (a pendant worn around the participant's neck). The field-note in Figure 13 below (presented using the authority-skill gradient from Figure 12 above) provides an example of the staged approach to escalation and the complexities involved in escalating an early sign of deterioration. Coding is added in italics.

Figure 13. Field-note (1C2:6) This figure combines a field-note with the super-imposed trajectory of care for the escalation-response process (blue arrows) to illustrate the process as experienced by the participants.



In addition to the escalation that could occur at ward-level (between HCSW, RN and junior doctor), there were two additional levels of escalation available to the participants, dictated by hospital policy. Figure 14 below demonstrates the tiered escalation process at the research site, based on recognising urgency as indicated by the track and trigger score (ACAT).

Figure 14. Escalation protocol at the research site. This process is reflective of the policy that guided participants' practice during the study.



4.4.3 Enhancing and inhibiting factor

The escalation-response communication process essentially related to the caller-escalator (message sender) communicating information about patient deterioration to a potential responder (message receiver). Findings presented here will show that how, what, when and to whom that information was delivered were important factors in evoking a response. Participants identified several factors that could either enhance or inhibit the escalation-response process from both the message sender and receiver perspective. These included being assertive, conveying urgency, timing and frequency of calls, quality and type of information provided, using objective signs to back up subjective cues, caller credibility, the escalator-responder relationship, appropriate calling and competing priorities.

a) Being assertive

The way in which a caller escalated the situation was important. An assertive approach helped to elicit a response. According to Ellie it depended *how you put your case across* (E1:7) and being *forceful* resulted in a positive response for her (E1:2). Similarly, a HCSW reinforced how an assertive nurse always achieved positive results by getting her point across clearly, *so they do come and sort the patient out* (3LL1:22). The alternative approach, being *tentative* (3DD1:21) as Darcy explained, was less successful in evoking a response. From the other side of the escalator-responder relationship, Jim suggested that some responders might prefer the more direct approach. He described reluctant apologetic callers *being terribly British about it*, and expressed his frustration thus, *no sh*t Sherlock. It's my f***ing patient, so what do you expect?* (2JJ1:8). Thus there appeared to be some potential dissonance between how the caller-escalators and responders felt about each other, sending and receiving the message, how to approach and how to be approachable. No cases were observed in which a responder refused to attend, rather it was the delayed response that became apparent. The findings below extrapolate this point further.

b) Conveying urgency

Conveying urgency was a key factor in eliciting a response. A sudden rise in the early warning score (7 or more) and an urgent Acute Response Team (ART) call would evoke a rapid response from *loads of people* according to Darcy and Alice (3DD1:17; 3AA1:17). Conversely, an insidious rise in score, signalling slower decline, required more frequent calls to obtain assistance.

In one example, Dawn made several unsuccessful escalation attempts, and only when the patient deteriorated to the point where he needed ICU admission could she evoke a medical response (D1:5). Similarly, the normally tentative Darcy, could be assertive when required, telling a doctor, *you need to go in there, he is about to arrest* (3DD1:5). Thus the caller-escalator's sense of urgency in a potentially more serious situation influenced their style of escalation, and in turn, their style may have influenced the responder's reaction, as demonstrated by some *being assertive*.

c) Timing and frequency of calls

Timing of the call by the caller-escalator in relation to the level of urgency was important to the responders. Being called too late in the patient's decline was problematic for the responders, for example, where the track and trigger tool was insufficiently sensitive. As Fabio explained, *it only seems to pick up end points that are urgent markers, like oliguria or hypotension* (1FF1:1). Conversely over-cautious behaviour could be defined as *crying wolf* (1FF1:12). Doctor Gill explained that she very quickly identified nurses who *will call you about absolutely anything* (1GG1:9). Calling for help at an appropriate stage in the patient's deterioration was therefore a difficult balancing act; too soon and the escalator was being over cautious, but too late risked failure to rescue.

In the face of clear deterioration, doctor-responders viewed frequent calls positively. Fabio said he appreciated this, *they will keep bugging me and I*

think that is great (1FF1:10) and Gill was grateful to *keep being reminded that actually this patient is unwell* (1GG1:1). Conversely, caller-escalators viewed the need for frequent calls negatively because this was time-consuming work. Nurse participants did not like *badgering* the doctors (3DD1:25), like *a gramophone record goes on and on* (3EE1:2). The need to make more than one call was problematic. Three reminders were needed in this urgent example,

I stated they were 70 [% saturation] on 100 [% oxygen] and was in respiratory distress. I needed immediate review. But they didn't come quick. I phoned again. They were doing a ward round next door. I told them to come ASAP. Ten minutes later I rang and said, I need you now for an ICU review. The doctor came straight away then (D1:5).

Thus it would seem that persistence combined with urgency helped elicit a reaction. Delayed responses were problematic and stressful for the caller, resulting in *a mad rush, a mad panic* (2N1:2).

Urgency alone did not guarantee a response and comparison of case examples did not demonstrate any consistency between degree of urgency and the speed of the response. For example, a rapid response was observed when RN Chris reported a patient who was *very unwell and appeared very shaky* with a severe tachycardia (145 beats per minute) to the NTL, who in turn escalated immediately to the doctor, with a subsequent rapid response and urgent treatment for sepsis instigated (1C2:8). Conversely, the response was protracted when RN Gail escalated a severely tachypnoeic, hypoxic patient directly to a doctor face-to-face. In response to the doctor's

lack of concern, Gail became more assertive and told him she was going to *turn the oxygen up* (2G1:6). This response is particularly interesting because even in the face of objective evidence of urgency, no patient review was forthcoming from the responder. In another comparison, when the same nurse-escalator and doctor-responder met briefly in the passageway a short time later, Gail escalated another seemingly less urgent case to him saying, *She is not right. She is more shaky* (2G1:6). The doctor agreed, and despite the subjective and limited amount of detail and less urgency, he reviewed the patient immediately (2G1:7). Thus consistency was not in evidence even between the same caller-escalators and responders, and any response activity might be serendipitous or context dependent.

These observed scenarios highlighted another issue however. Sometimes what is not seen is as important as what is seen. There was no consistency in style of message delivery by the different escalators and there was no standardized structure observed in their communication, and no evidence of a communication tool in use.

d) Communicating intelligence

The way in which intelligence was communicated by the caller-escalator could influence a response. The following example and subsequent reflective analysis illustrates this key issue. Chris (the escalator) called the NTL (the potential responder) but despite inaccuracies and scant data, she evoked a positive response,

He has had low BP before, but not as low as this. Normally 103/70. She gave the past medical history. This man is very slight. He has an NG – only having 30ml orally an hour. His fluids have been increased. He needs one litre going over six or eight hours rather than 12. He has good urine output. [Chris listens to response on the phone]. Ok, will increase to eight-hourly bag (1C1:3).

Chris provided incomplete information (vital signs were omitted and only hypotension was reported). There was no systematic approach or use of a recognised standard handover tool such as SBAR (Situation, Background, Assessment, Recommendations). A structured patient assessment had not been carried out, namely ABCDE (airway, breathing, circulation, disability, exposure) and was therefore not reported. Furthermore, the caller misled the responder with incorrect information, reporting the urine output as *good* despite presence of oliguria (urine output was low at 20-30ml per hour). The responder agreed to the caller's recommendation to increase intravenous fluids, despite the limited quality of the information provided. Chris had recognised deterioration (the patient was dehydrated), made the link (the patient needed IV fluids) and escalated accordingly to the senior nurse. With incomplete information provided however, the responder was unable to fully make the link, and agreed with the caller-escalator's assertive but potentially faulty recommendation. A moderate increase in IV fluids, rather than the required fluid challenge (250ml of crystalloid solution over 10 minutes – standard practice at the research site) ensued. A doctor-responder reiterated this process describing a nurse-escalator who tried to persuade him to write up fluids,

When you are busy as an F1 and somebody comes to you and says they need this, this and this, it depends on how that information is given. I feel that it has to be balanced with not being coercive towards an F1 (1FF1:4).

This was said in the context of another case in which this junior doctor had also played the role of escalator and reflected that he should have *been a bit more up front and demanding* when speaking to his senior colleague (1FF1:3).

The caller-escalators adapted their approach according to the responder. For example, when compared, the style of escalation used by Chris with the senior nurse above (1C1:3) was different to that used with a doctor on the ward (1C1:6). She used more tentative language with the doctor, making suggestions rather than directions regarding IV fluids, that *perhaps it could do with speeding it up* (1C1:6). Again, the information provided by the caller-escalator was incomplete and unsystematic, but the responder followed the recommendations proffered and prescribed an increased rate of fluid delivery (250ml per hour for four hours). Comparing these two cases demonstrated how a greater authority gradient could influence the language used in escalation.

e) Subjective cues or objective signs

The subjective or objective nature of the information provided by the caller-escalator could influence a response. While subjective cues might be all that

were required for some, others required more objective signs to evoke a response.

The layperson had only subjective cues to report from their bedside vigilance, but these were valued by the nurses because the patient's visitors *keep you informed what's happening* (2N1:19). The more frequent triggers that this approach could generate however, bombarding potential responders with excess information, could become overwhelming and

... make a bad situation worse, at times. They don't seem to give you a minute before they are at you to do the next thing (2N1:19).

Subjective information (sometimes with high sensitivity and low specificity for deterioration) had high potential for false alarms, and as such, made it difficult for some to escalate the situation beyond the nurse-patient interface. This is reflective of the pattern Fabio labelled as *crying wolf* (1FF1:12), where over-anxious nurses reported too frequently and too early in the course of a patient's decline.

Patients had only subjective cues to report, but when escalated to the HCSWs their response was to routinely escalate to the RN, not necessarily because they were convinced of deterioration, rather it was their responsibility to report any changes in the patient's condition as HCSW Wanda explained,

They will say, I've had a rough night, and I will say – Have you told anybody? And they will say – No I'm not bothering about it. But I do, because I don't want to go off shift and something to happen and I haven't said something (2W1:5).

In turn, RN Nora said, *we do always react to what the carers say* (1N1:1) and, as previously indicated, this would prompt increased being vigilant through surveillance for more objective signs. No HCSW participant reported an RN's failure to respond to his or her escalations and there were no example cases found in which an RN ignored the concerns of a HCSW. This key finding showed that the escalation-response process at ward-level between HCSW and RN was relatively easy, more direct and rapid when compared to the escalation process further up the authority gradient and across different professional boundaries.

Sometimes a problem could not be escalated further up the authority gradient however if deterioration was not clearly identified, and the evidence suggests that there was some requirement for the escalator to persuade the responder to act. So, when a patient told the nurses he was feeling *out of sorts* and not *as well as the day before* he failed to convince them he was deteriorating because according to Farah, *he hadn't got any hard facts... just a feeling* (F1:1-2). His vital signs were not deranged, and in the absence of any objective signs the nurses were unable to escalate further. Without clear evidence, they would not be able to persuade doctors to review him. Unfortunately, the patient continued to deteriorate unnoticed and later collapsed in the bathroom.

Some nurse-callers were able to escalate problems to doctors with subjective information alone. Darcy gave the example of a patient who was *a bit drowsy, not his normal self* who she felt was failing to improve (3DD1:1)

and elicited a response based on this information alone. Carole told how doctors on her ward would respond to a nurse who said, *I just don't think she looks right* (1CC1:59-60). Nora told how physicians would respond to her suggestion that patients were *not themselves, they are not well* (2N1:2). Surgeon Harry confirmed this with an example case,

The XXX nurses have been there for donkeys' years and she said, Harry, she just doesn't look right to me. And that is all she said. So I said, put the patient in a blue light ambulance, send her across (1HH1:4).

Some caller-escalators struggled to prompt a response with only subjective signs however. Junior doctor Gill found it hard *to go up to someone and say he's just not right* (1GG1:6). Senior doctors had similar difficulties too.

Harry explained how he frequently thought this patient *doesn't look right so I'm going to do a CT scan* (1HH1:6), but despite consultant seniority, the escalation process was difficult without objective signs, particularly out of hours,

Every CT scan I ask for out of hours, why should it be, when I have seen the patient and I think the patient needs a CT scan, why do I have to justify to the radiologist? (1HH1:17).

The presence of objective signs clearly enhanced the escalation process. The physiotherapy responders needed objective information to justify call-outs during their on-call. They wanted *facts and figures* (X1:30) and most referred to the objective checklist in use, which guided their decision-making process and acted as a memory aid that *prompts you to ask the*

question if they've not told you. (U1:2-3). Objective signs were needed in order to make the cognitive link and recognise urgency, to prioritise visits and justify their response. Xavier wanted to know about the oxygen saturation, arterial blood gases, the medical review, objective signs rather than colloquial descriptions, *That sits better with me rather than, 'my patient's chesty'* (X1:30). Sufficiency of objective information was also important. For example, a raised track and trigger risk score was insufficient information for a doctor and more detailed information was required. When Gill was informed of a patient triggering on a score of 6, the nurses were unsure of the specific vital signs, but the doctor needed to know, *what are they Acatting on?* (1GG1:1).

A key finding from this study has been demonstrated here that while some intra-professional communication was difficult when only subjective intelligence was available, only at the HCSW-RN interface were there no examples of failure to respond to subjective cues. Conversely, at the RN-doctor interface, failure to respond was an issue and the data provided examples of this aplenty. The doctor-nurse relationship played an important part in this process and credibility of the caller was a key factor, as will be shown in the next section.

f) Escalator-responder relationship

Findings indicate that the relationship between the caller-escalator and the responder was a key influencing factor. This became apparent when the data on responding to subjective cues across professional boundaries were

compared. For example, where an experienced, knowledgeable escalator was well known to a skilled, well-informed responder, the result was positive. Ellie, who knew one consultant very well said,

If I'd said, he would send them straight away....I had his home number and he used to say to me, you ring me, you know (1E1:6).

A rapport with the potential responder was a notable advantage. Sue cited an example of such where, if ever she rang the doctor, *she would always come up straight away (S1:7)* because of their trusting relationship. In the nurse-doctor relationship *getting their trust (S1:28)* was therefore important, but it took time to build up, and new doctors starting every six months inhibited this process,

...when the doctors first start, you don't know them and they don't know us, but by the end of the time on the ward, you've got to know them and they probably do trust, or believe us more (2N1:2).

This principle was applicable to the responders too. Physiotherapist Dawn knew which nurses were good at identifying patients for treatment and those who just asked her *to see everyone (D1:5)*.

Unlike the nurse-doctor relationship, at the HCSW-RN interface, escalator and responder knew each other, worked in close proximity, were geographically close and shared a caseload of similar size. Linda highlighted how she referred a patient who she was worried about to an RN, *you can't fault them, they come straight away (3LL1:29)*. The process, observed in action, appeared simple in comparison to other observed nurse-to-doctor escalations reported earlier. For example, Chris responded immediately and

without question to assistant nurse practitioner Alan's report that the patient had not passed urine for one hour (1C2:6).

Approachability of the responder and how they reacted to the escalator was an important factor. Jim suggested that the use of first names helped to overcome hierarchical barriers (2JJ1:7). Another doctor explained how he valued nurses and the researcher considered how comfortable it might feel to escalate to someone who said,

I would like to think the ward nurses would never hesitate to call me, whatever the time of day or night, if they needed me.....It's not that I am high and mighty because to be honest much of our work we couldn't do without the nurses (1HH1:18).

All levels of caller reported how the CCOT, as a group of responders, were both approachable and responsive. A nurse acknowledged how much support they provided and called them *brilliant*, in appreciation of their rapid response when called (1CC1:16). Doctors agreed and Jim emphasized the importance of a positive attitude of one CCOT nurse and the confidence he instilled in people,

He looks calm.....he smiles. And he laughs. And I think that makes a real difference, but it's also a bit like, come on guys, this is every day stuff, we see this all the time. It's my job. And I enjoy my job (2JJ1:18).

Comparatively, not being approachable was seen to inhibit escalation. Jim highlighted how people maybe fail to escalate for *fear of approaching a senior or bothering somebody* (2JJ1:7). He also expressed concern that the

act of escalation in itself was, for some, *a sign of weakness* (2JJ1:8) seen as a failure to cope, reinforcing what he said about the caller-escalator apologizing for contacting him (2JJ1:8). Thus how the responder made the caller-escalator feel, sometimes engendering negative feelings, might influence future requests for help. It was also important to *give the patient permission to call a more senior person* (2JJ1:9). There was criticism for the NTLs in this respect. Ellie described how they had not responded and made her feel *a bit of a pain* (E1:10). Similarly, Chris indicated difficulties at night where she felt the NTLs would only come in an extreme emergency and was made to *feel like you are not doing your job right* (1C2:8-9).

g) Caller credibility

The credibility of the caller could also influence the reaction of a potential responder. The way in which doctors responded to senior peripatetic nurses, compared to juniors, indicated that position and role might play a part. Specialist nurse Rita said that she felt that consultants valued her opinion (R1:7). Similarly, several participants appreciated the specialist knowledge and skills of the CCOT nurses. Credibility of the CCOT meant that they were sometimes able to evoke a response where ward-based nurses were unable to do so. Perhaps due to a reduction in the authority gradient, the CCOT seemed to act as a go-between from nurse to doctor. Nora pointed out that CCOT gave doctors an *extra kick* to help them realise that they needed to respond (2N1:14). Physiotherapist-responders confirmed this; Kate always responded to a CCOT-escalation because *when I get there, it's normally appropriate*. (K1:9). Dawn said similar,

If they just say the patient is 'going off', then I would respond (D1:5).

Thus, from a credible source, subjective intelligence was all that was required. This principle was also applied to others with critical care expertise. When members of the ICU team requested *urgent chest physio*, Una said she would respond without question (U1:16). Similarly, Val valued some highly experienced ward-based nurses as credible sources, because they would only escalate when they had run out of ideas themselves, *I've tried this, I've tried that and you are more inclined to go (V1:17).*

In comparison, staff with less knowledge or less experienced however could make escalations that did not justify a response. A physiotherapist said they were called about *loads of situations where we've not been needed (V1:18).* More information was therefore required from those with less experience in comparison to those with expertise. It was particularly important with new doctors, *just because they are now a doctor does not necessarily mean they know everything (Y1:20).* From a caller-escalator perspective however, ward-based nurse Darcy did not feel that doctors *particularly take into account a nurse's knowledge and experience (3DD1:30).* Rita reinforced this for her, suggesting that nurses on the ward *don't feel listened to (R1:7).*

h) Appropriate calling

Responders had to use knowledge and experience to make the link and decide if it was appropriate to call for help. This factor was significant amongst data from the physiotherapist participants. For them, an appropriate call would elicit their response; a call deemed inappropriate

was met with refusal to attend and the process was rendered straightforward by a checklist. Unlike the juniors, a senior physiotherapist had the confidence to refuse to attend inappropriate cases because she felt that with nine years' experience she was confident to judge. Dawn said that she saw only 20% of the call-outs she received, conversely the juniors went to them all because, *they don't have the confidence to challenge, they just come in* (D1:12). But Yvonne emphasized the importance of giving advice where attendance was not appropriate (Y1:10).

Acuity (or urgency) was a key factor in influencing a decision to respond, again highlighted in the physiotherapy data. In an on-call situation, the reports received by them from the escalators sometimes indicated that the patient might not be sufficiently ill to warrant a visit. Dawn gave the unambiguous example of a patient with oxygen saturations of 98% on room air (21% oxygen) with an elevated respiratory rate (22-25 breaths per minute), *but no indication that he is clinically deteriorating* (D1:12).

Furthermore, an understanding of the physiotherapy role was key. Some inappropriate referrals could be made for conditions that they were unable to treat such as pulmonary oedema, pleural effusions or pure consolidation with *no crackles* for example (U1:21). Again, the importance of advice was stressed, emphasizing the callers' need for support. Vera provided guidance on humidified oxygen, mucolytics and anything *to break down that consolidation* (V1:11). Yvonne could not physically treat pulmonary oedema but she could recommend *what you need to do in that situation* (Y1:17). She advised on positioning, upright, comfortable and supported and managing

the oxygen therapy appropriately because, in her experience, these basic things were often overlooked, *a massive oversight* (Y1:20).

Thus far it has been shown that a caller-escalator could influence a response by their communication style and approach, the type of information provided and the urgency of the situation, the frequency of their calls, their personal credibility and relationship with the responder. Contextual factors also influenced the response, where competing priorities and the time of day impacted on participants' ability to respond.

i) Time of the call

Participants in the role of either caller-escalators or responders identified the night shift and weekends as difficult times. Escalators said getting a response from a doctor at night was *more difficult* and a *struggle* and *it could be delayed* (S1:16), sometimes for up to five hours (1C1:5). The responders corroborated this and junior doctor Fabio expressed concerns that it was *borderline dangerous on weekends* (1FF1:10).

At night the authority gradient was in greatest evidence, where the NTL presented an additional layer for nurses to circumnavigate to obtain assistance for a deteriorating patient (1C1:2). They acted as an intermediary to support the doctor, seen as helpful by the doctors to filter out *a lot of the rubbish...the trivia* (2JJ1:10), but they were perceived as an unnecessary barrier and Darcy pointed out, *this seems to delay things* (3DD1:2). The NTL response was reported to be variable, depending who was on duty and

sometimes it is a bit hit-and-miss (S1:26). Some nurses bypassed the NTL, and used the emergency call-out system for the ART team so somebody came to review (3DD1:3). Others would escalate directly to the consultant, or threaten to do so,

If you're not here in 20 minutes I'm going to ring the consultant (E1:2).

j) Competing priorities and being alone

Participants indicated that human resources were lowest at the weekend and at night because, as Elaine explained, *they are limited in the number of doctors they can have on at a weekend (3EE1:1)* and this inhibited the escalation-response process. Doctors said, *I'm in theatre or I'm already with a sick patient* and therefore, as Elaine suggested, *there is nobody (3EE1:1)*. This highlighted a sense of being alone.

Where the potential responder was geographically close, this facilitated their ability to communicate and respond,

If they are on the ward it's easy. If they're not it's a nightmare (2N1:1).

The responders offered a similar perspective. The workload on call was too great. Being alone was stressed again, where in an on-call, Fabio said he was able to do *about 30-40% of my jobs (1FF1:10)* and additional support was urgently required,

When you have got a list [of jobs] that is three to five pages long, I don't even know a patient's name, I don't know who they are, so anything would be good (1FF1:9).

The worse case scenario occurred when several patients deteriorated simultaneously and there was no perceived support,

So I was having phone calls, this patient is Acatting at 5 and I wasn't able to get to them for two to three hours because I was with someone who was Acatting at 8 and then another Acatting at 8 (1FF1:10).

This is reflective of the nurse participants' comments that highlighted when one patient deteriorated on the ward at night, the second nurse had 23 patients to care for on his or her own. The need for support was raised again and it is hypothesized here that the physiotherapy service was sometimes used to fill the gap left by the short fall. Dawn suggested that the physiotherapists *might come quicker than the doctors do* (D2:14) and Zoe explained,

Nurses can't get hold of a doctor quick enough and they know the next step and they will just come down and say, call the on-call physio (Z1:17).

A key finding, using data from both escalators and responders highlighted that limited human resources and competing priorities were a problem.

What was missing from the data however, was any comment on the participants' resultant action. No participant suggested they had escalated their concerns within the organisation. Some groups tried to apportion blame to others, but noticeably there was no sign of overt challenge towards the organisation. One of the most powerful messages came from Alice, who described how non-response and being alone felt for her,

...frustrating, because you have seen someone going off and you couldn't get hold of a doctor, or you couldn't do this, or you was like forever waiting (3AA1:22).

This was juxtaposed to Jim's experience of being alone, which for him was an unusual feeling, because as a consultant *by and large, when I see people, I have got somebody with me.....(2JJ1:17)*. When he was alone, he missed the other people around him and the clues their behaviour provided, because *you begin to interpret things through others (2JJ1:17)*. This served to emphasize further the significance of needing support, regardless of the participants' position in the hierarchy.

4.4.4 Summary of *taking action: escalating and responding*

Table 16. Escalating and responding: a summary.

Concept	Categories	Subcategories and codes
Taking action: Escalating and responding	Caller-escalator actions	Communicating intelligence
		Being assertive
		Conveying urgency
		Escalator-responder relationship
		Subjective and objective intelligence
		Timing, frequency and appropriateness of the call
	Responder actions	Competing priorities
		Authority gradient
		Being alone
		Needing support

Table 16 above aims to make transparent the process of concept development and summarises the factors influencing the process of *escalating and responding*. The findings thus far have started to show inter-

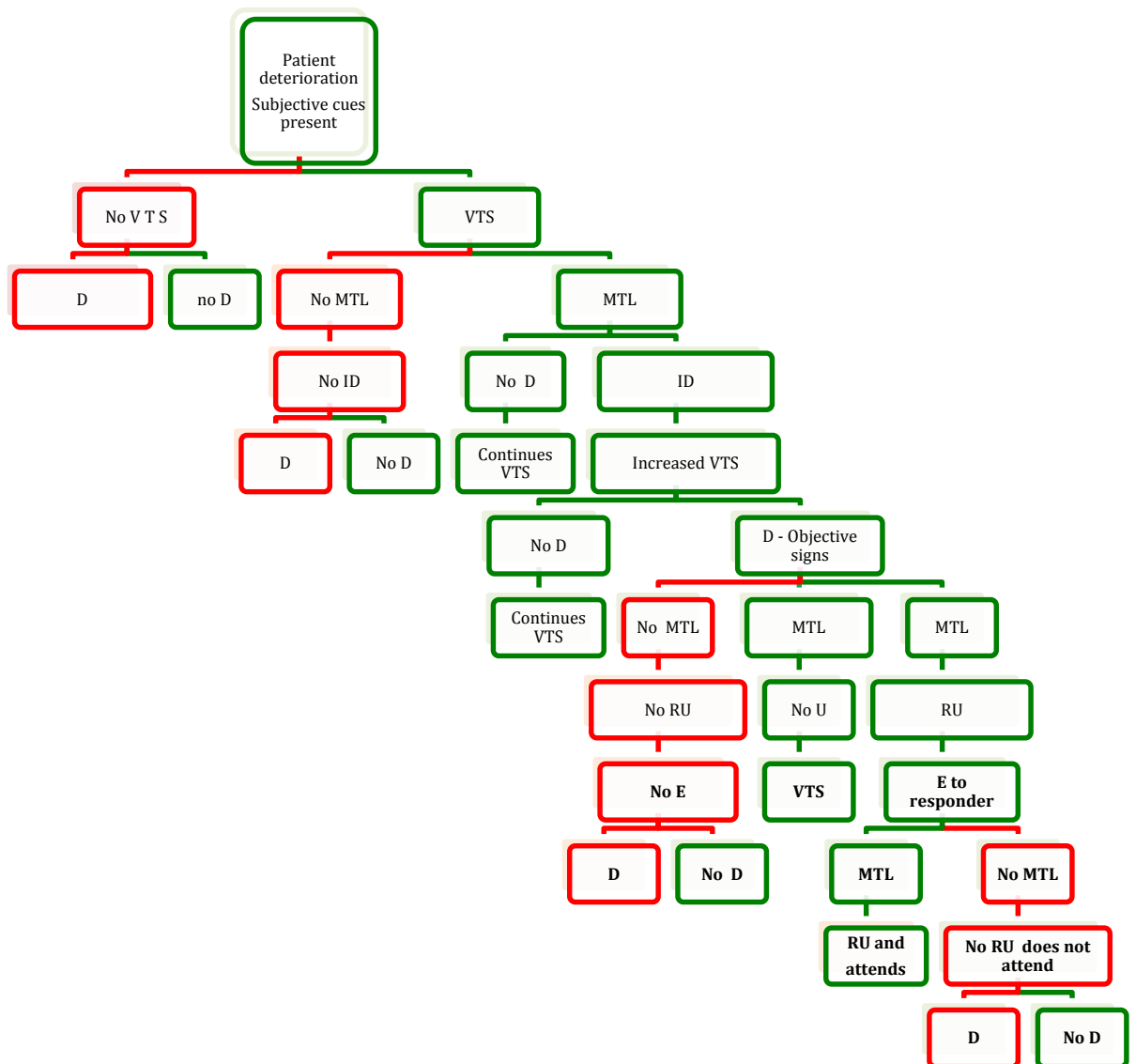
dependency between the concepts presented. Without the proceeds of good *being vigilant through surveillance* there could be no identification or recognition, without recognition of urgency there could be no escalation; without escalation there could be no response. Good communication between the escalator (caller asking for help) and the responder (recipient of the message) was an important component of this process and *making the link* was the key ingredient that facilitated appropriate action.

Some participants responded to subjective cues alone, but this was influenced by the credibility of the caller-escalator and the escalator-responder relationship. Other participants would only respond to more objective measurable signs, particularly from an over-anxious caller with over-sensitive triggers and a tendency to cry-wolf, or when resources were severely limited. The CCOT and physiotherapy services were seen as a positive and useful source of support that responded positively in the main, but the NTLs were identified as a barrier to accessing required expertise that had to be circumnavigated. The importance of communication style however was a key finding. An assertive caller, conveying a message with clearly articulated urgent objective signs was most likely to achieve a positive response. The use of a structured communication tool that could have enhanced this process was not in evidence. When overwhelmed by frequent triggers, responders were unable to attend every call, and therefore had to prioritise in a resource-limited environment, so speed and efficiency was important.

Escalating conceptualises a process that aimed to intensify the level of care delivered to deteriorating patients by obtaining support from other members of the multi-professional team. In order to generate a response, the escalator had to first make the call for help. On receipt of the message, the responder then had to *make the link* and decide whether to respond (or not). On arrival at the scene the responder would then have to make further links in order to decide what other action was required, to do nothing, increase *being vigilant through surveillance*, treat autonomously or escalate further.

Figure 15 below builds on Figure 11 from page 172 above in Section 4.3.8. New elements are shown in bold print. The flow chart summarises the process thus far and provides visual representation of the potential decision making routes made by the research participants as evidenced in the data, including vigilance through surveillance, identifying deterioration, recognising urgency escalating and responding. This flow chart is built upon further in the next sections as other key concepts are added (see Figure 17 and Figure 18).

Figure 15. Alternative routes of care for the deteriorating patient.
VTs = vigilance through surveillance; MTL = making the link; ID = identifies deterioration; RU = recognises urgency; E = escalation; D = deterioration 'No deterioration' (No D) is included in the trajectory for completeness but this was not highlighted by the participants in the study.



4.5 Taking action: treating

4.5.1 Introduction

The findings relating to intervening and treating the deteriorating patient and the influencing factors will be presented in this section.

4.5.2 Overview

Following identification of deterioration, recognition of urgency and a decision to escalate or respond to a call and provide support, participants were subsequently faced with a decision related to further action; to treat or not to treat and, if so, what was required. The participants identified two key interventions that stood out as important to them, oxygen therapy and intravenous (IV) fluid administration.

Table 17. Summary of the process *taking action: treating*

Concept	Categories	Subcategories and codes
Taking action: Treating	Treating urgently	Maintaining situational awareness
		Applying knowledge and skill
	Delaying or omitting treatment	Loss of situational awareness
		Fearing harm
		Handling complexity
	Proceeding with caution	Managing risk

Three common issues emerged regarding treatment, treating urgently, delaying or omitting treatment, and proceeding with caution (managing the risk). Organisational factors (competing priorities and the need for support)

and individual factors (knowledge and understanding, and an ability to make the link) impacted on ability to act and deliver timely treatment, summarised in Table 17 above. This table illustrates the alternative approaches identified – urgent, cautious, delayed, omitted treatment

4.5.3 Treating urgently

Participants prioritised *fluid and oxygen* (1HH1:32) as key interventions. These were two common interventions most participants talked about in the interviews and they stood out as significant in the observations. When urgency was recognised there was a need to *get the fluids in, the oxygen in* (1GG1:13) and early preventative intervention with such meant that patients did not *to get to the stage where they need intubation and central lines* (1HH1:32).

All groups prioritized oxygen. Nurses indicated that oxygen, when required, would be given without hesitation, *just whang the oxygen on* (1CC1:37). Specialist nurses would do likewise; *first thing I did was went for oxygen* (R1:1-2). Physiotherapists would not hesitate to administer it in a patient with low oxygen saturations, as Xavier indicated, he had *no problems with that* (X1:2). Similarly, a junior doctor provided an example where he administered a high dose of oxygen to a hypoxic patient, *just kept giving more and more* (1FF1:6). A consultant would *increase his oxygen* (2JJ1:2) and then escalate to the ICU for an expert opinion if required.

Seriously deranged objective signs of hypoxia (low saturation and tachypnoea) indicated urgency and were used as a prompt for rapid oxygen administration. A patient's limited response to oxygen therapy could act as a further indicator of severity,

Sats 78% [low], RR 40 [high] – I could see that they were getting worse. Using their accessory muscles. 100% oxygen made no difference (D1:3).

It was purported that higher doses of oxygen would be given in response to low saturation levels,

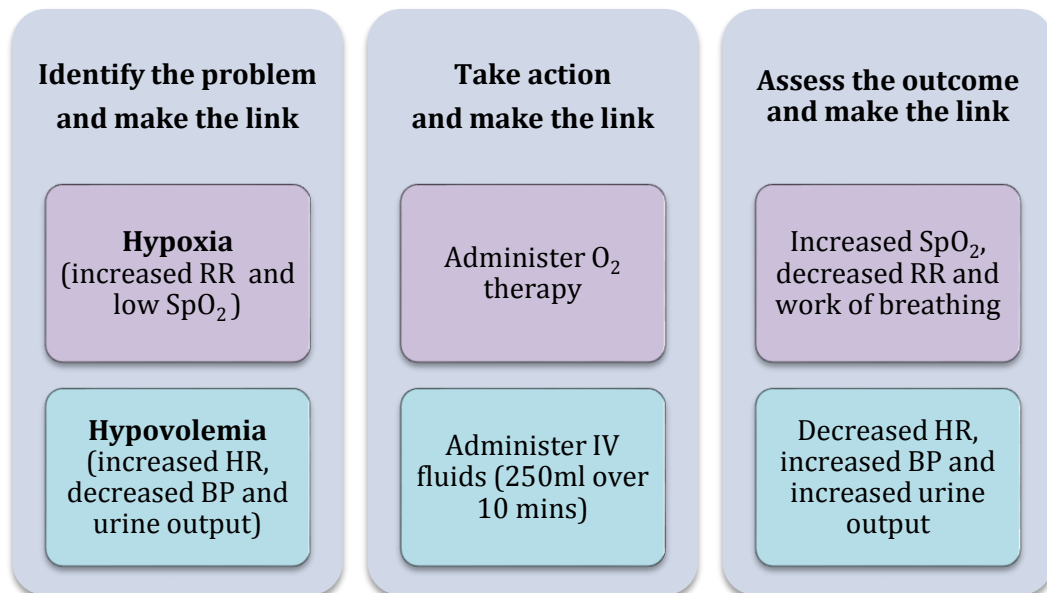
You've done their obs and their blood pressure is in their boots. And their sats are way, way down. And you switch their oxygen up (1N1:1).

Fluid management was prioritised similarly. Rita said that *the first thing we do is fluid* (R1:3). She indicated that a fluid challenge would automatically be administered and others cited the use of a standard bolus of 250 millilitres of IV fluid. Harry said that he would give *250mls fast or 250 of gelofusine and see what happens* (1HH1:12). With no improvement he would do as Jim said about oxygen, and refer on to the critical care team. Alice highlighted how some doctors were *on the ball* and fluids were given in a timely manner (3AA1:1). For example, in an urgent situation they told her, *I'm coming, but get some gelofusine up* (3AA1:22). As with oxygen therapy, IV fluid was purported to be administered rapidly, described by Ellie below as a *fluid challenge*, where objective signs clearly indicated dehydration and hypovolemia (low circulating volume in the intravascular compartment),

He was tachycardic, blood pressure was low, a bit clammy, but in the end he did sort of get up. He passed urine. I got him a fluid challenge (E1:6).

4.5.4 Making the link

Figure 16. Making the link between deterioration and treatment
This figure summarises how the link was made for the two major patient problems identified, hypoxia and hypovolemia – how they identified it, made the link to the action required and made the link to assess the outcome



Oxygen administration was an action that clearly reflected participants' use of the core process, *making the link*. First they had to recognise tachypnoea and low saturations and link them to the condition hypoxia. A further link connected them to the action required to resolve the problem (e.g. oxygen administration) and a further link enabled them to recognise improvement (e.g. reduced respiratory rate and increased saturations). Similarly, with the administration of IV fluids, participants had to link hypotension and oliguria

to hypovolemia. A further link was required to connect them to the action required (administration of IV fluids) and assess the outcome with further surveillance. Increase blood pressure and urine output provided the link to improvement. Figure 16 above summarises this process for treating hypoxia and hypovolemia.

4.5.5 Delaying or omitting treatment

Contrary to what these participants all said however, fluid and oxygen were also areas of practice where omissions or delays could arise. The observation sessions provided evidence that conflicted with the ostensible speedy interventions. No patient was observed to receive the standard fluid challenge of 250mls over 10 minutes as purported (1HH1:12) and an example previously cited (1C1:3; 1C1:6) highlighted where fluids were given tentatively, rather than the rapid bolus probably required. Some participants interviewed highlighted examples of treatment delay and omission. Junior doctor Fabio indicated there were *some very serious problems* related to oxygen and fluid administration (1FF1:4). For example, Zoe explained how a cardiac arrest ensued when the link between hypotension and a requirement for IV fluids was not made and therefore not prescribed,

It could have just brought that BP up enough to prevent them arresting
(Z1:8-10).

Dawn highlighted occasions where nurses did not administer oxygen in serious cases of hypoxia,

And we'll say, how much oxygen are they on? And sometimes the answer will be, they're not (D2:10).

4.5.6 Maintaining situational awareness

Alice described a case where loss of situational awareness resulted in an act of omission, that is, administration of high-flow oxygen was delayed. She walked into a patient's room and rapidly surveyed the patient, and knew, by looking at the patient (grey, gasping, hypoxic, clammy, hypotensive and peripherally shut down) that he *was going to arrest (3AA1:17)*. Alice was able to see the patient with fresh eyes, to take in the whole, rapidly making the link from deterioration to urgency and subsequently identify the need for high-flow oxygen from clear visual signs of hypoxia. But the doctors, who were described as *dilly dallying around him trying to get blood gases (3AA1:18)*, had not moved on, had not made the link, and were trapped in the surveillance stage. The results of the blood gas would have provided valuable information about the patient's respiratory status, but no more than the experienced nurse needed from her intuitive grasp of the situation that informed her immediate actions.

In another case, Yvonne described similar concerns, but this time with regards to an act of commission. In this case, she described how a doctor actively removed the oxygen in a hypoxic patient prior to obtaining an arterial blood gas sample. This is unsafe practice that can put the hypoxic patient at serious risk of cardiac arrest, which Yvonne facetiously rationalised was

...to see how low it can get. Take the non-rebreath off. To see what it is on room air. Oh (sigh) - because they thought they had to (Y1:21).

Again, treatment was seemingly delayed due to reduced awareness of the relevant elements of the situation. Both of these scenarios might be underpinned by another process that stems from the fear of harm that oxygen can potentially cause.

4.5.7 Managing risk and *fearing harm*

The findings also highlighted several cases where a tentative approach to treatment with oxygen and IV fluids was adopted out of concern that the associated risks might outweigh the benefits of administration. Rationale for caution may be multi-factorial, but in this study several participants focused on the fear of harming patients by acts of commission with both oxygen and IV fluid. Fabio described how he noted an inappropriately cautious approach with oxygen therapy in an acute situation,

He'd got sats of 80% and they put two litres through a nasal cannula. I said, well that's like 'a drop in the ocean' (F1:1).

Harry cited another case, highlighting reluctance to increase oxygen,

But you can't just say I am giving four litres so therefore 92% [saturation] is alright. It's not. If they are still only 92% on four litres, so what? Then give them more (1HH1:13).

In both of these cases, knowledgeable and experienced support was required to ensure implementation of urgent treatment, that is, permission was given to administer more oxygen. Similar caution was noted with IV

fluid administration in a previously cited observation (1C1:3; 1C1:6) and this was compounded by a senior doctor's self-reported guarded approach, *....put me on a ward and maybe want to prescribe a bag of fluids faster than four hours and I get twitchy* (2JJ1:25).

In the case of both oxygen and IV fluid administration, participants provided extreme examples where over-administration had been a problem and used this to rationalise their resultant caution. In some cases over-oxygenation could result in loss of hypoxic drive in the patient with chronic obstructive pulmonary disorder [COPD], resultant rising carbon dioxide and altered level of consciousness. Jim described a 50-year-old lady, newly diagnosed with COPD, given high-flow oxygen, who subsequently developed high levels of oxygen in her arterial blood and subsequent carbon dioxide narcosis, *So you know, a pO_2 of 50.... Maybe why she was a bit drowsy* (2JJ1:21). In a similar process, over-administration of IV fluids could result in fluid overload and pulmonary oedema for some patients. Carole expressed concern for *all this fluid, that's going to their chest* and the patient's subsequent requirement for diuretics (1CC1:24) and Harry described how a patient received six litres of resuscitation fluid and became grossly oedematous,

And in the morning she was like that (pulls face) – you know, stretched tight. I felt really annoyed. Because it took us forever, literally we had to hang her out to dry (1HH1:11).

Fearing harm, in particular, concern for over-administration and managing the risk of it occurring, was highlighted as a significant factor that could lead to delays in, or omission of vital treatment. In the quotation below, Fabio described his feelings of hesitance when prescribing fluids (note however his use of both the first and third person in the phrasing here, suggesting some reluctance to own such feelings of caution himself),

... they don't want to give more than this as a fluid challenge because I am worried about this – when in front of you, they are evidently dehydrated..... I think it causes huge trepidation with people (1FF1:6).

The worry of doing the wrong thing was therefore a strong message that came through from the data. Pharmacist Bob encapsulated these principles clearly to explain what might be happening,

.....if I do something, then the outcome is my fault, whereas if I don't, the outcome just occurred.....Whereas actually not doing something is as meaningful.....Any intervention you make, whether you stop or start, has a consequenceWhich sums up pretty much everyone's response to fluids and oxygen - they are actively doing something, but actually you do one of two things, and there can be risks and benefits of both (1BB1:24).

This process in which *fearing harm* played a significant part was reinforced by other different practice examples. Jim highlighted how some of his colleagues would rather that someone with heart disease smoked than *give them a patch that might make their angina worse (2JJ1:20)*. Holding a dose of vancomycin (an antibiotic) until the blood levels are known for fear of

harming the patient with over-administration is presumed by some to be good practice, but as a pharmacist explained, *actually in most cases it's not* (1BB1:23). Bob explained that delaying required treatment for fear that it might harm the patient was itself harmful behaviour. In the case of this antibiotic, it risked under-treating the patient with sub-therapeutic drug levels, further sepsis and contributing to drug resistance. Similarly, he cited the example of patients not receiving hormone replacement therapy in cancer treatments because of the fear of harm, a *theoretical risk, one or two in ten thousand* (1BB1:23) of venous thrombo-embolism (a blood clot). He explained the thought processes thus: *I gave them VTE, they got the cancer – it's the same principle as – I overloaded them* (1BB1:23).

Fear of error was an over-riding concern. Fabio suggested it was the influence of early medical school that gave birth to his anxieties around oxygen; *it is so ingrained in you that it is potentially dangerous* (1FF1:6). Doctor Jim concluded generally that NHS professionals were *filled with this fear of making a mistake...we dare not be wrong for the consequences of being wrong* (2JJ1:26). Farah explained similarly that nurses were *so frightened to do something that might come back and bite them, that they would rather not* (F1:19). Thus, with both oxygen and IV fluid administration the underlying principle was, *primum non nocere* [first to do no harm] (2JJ1:20), but *fearing harm* and the concern for over-administration was seemingly deeply embedded in practice.

4.5.8 Making the link

Experienced participants gave context and some explanation of the concerns about IV fluids and oxygen administration. Consultant Jim explained that uncontrolled oxygen therapy in severe COPD is associated with harm and death, so this was an important link that needed to be made,

Can oxygen do harm? Well hell yes. But you have got to think carefully about what you are doing (2JJ1:20-21).

He cautioned a similar approach to making the link with fluid therapy,

The fluid thing is incredibly simple isn't it? It's about knowing what to look for and saying this patient needs fluids, let's give it a go (2JJ1:25).

Handling complexity

Making the link assumed even greater importance however in more complex cases. In gastro-intestinal surgery for example, there was concern for a potentially oedematous bowel because it *does not peristalse very well* (1HH1:10), IV fluid was prescribed with caution and standardised practice or rules that could be applied in routine cases, were not appropriate in the complex. Harry explained the balance required,

You don't keep them dry, but you don't give them more fluid than they need (1HH1:10-11).

In the case of oliguria it was important to investigate the underlying cause before giving fluid indiscriminately (1HH1:12). Consultant Jim agreed,

As rules go, it's ok - hypotension equals fluids, but in certain situations it might not be the best thing (2JJ1:23)

While the use of the 250ml bolus however was considered *to sort of kick start things* (1CC1:27), this was not seen during observation sessions in practice on the ward.

This section has shown *fearing harm* to be a key finding and a key influencing factor. In particular, the fear of over-treating identified here, is a potentially inhibiting thought process that can prevent appropriate intervention. The findings in the next section show how the ability to make the link through the application of knowledge in complex and different situations is therefore paramount.

4.5.9 Applying knowledge and skills

Findings highlighted how knowledge, skills and experience as well as being able to apply them in different and complex situations were sometimes lacking (e.g. 1C1;3; 1C1:6; Z1:8-10). Junior doctor Fabio needed advice at *times when you feel uncertain* as he was unsure when to prescribe *eight-hour, six-hour or four-hour bags* of IV fluid (1FF1:14). Harry expressed concern regarding doctors' lack of knowledge and understanding citing a survey of 200 doctors in 25 local hospitals where only 9% knew the content of the colloid, gelofusine (water, sodium chloride and gelatine). *It's that bad*, he commented with an exasperated tone (1HH1:14). Senior doctors also had anxieties themselves with fluid administration. For example, Jim cared for a complex group of patients; a lot of *frail, older patients* who were oedematous with *knackered hearts* and *knackered lungs* and this influenced his judgement on fluid administration (2JJ1:23). Subsequently he felt *nervous*

prescribing them fluids (2JJ1:25) as this group are at high risk of fluid overload.

A limited knowledge and understanding regarding oxygen was also found, where hypoxic patients had low or no oxygen administered (e.g. D2:10; 3AA1:17; Y2:21; F1:1; 1HH1:13). Understanding about hypoxia was sometimes limited and oxygen was not increased when required causing Yvonne to pose the exasperated question, *Why can we see this trend [hypoxia] and nobody's done anything about it?* (Y1:9). This might be explained by a basic lack of understanding about oxygen percentage and delivery, as Vera highlighted,

So when someone is on 24% that isn't much more than in the air, but you know, they [nurses] will say, ooooh they are on 24%, as if it is really high. I think maybe they all think we are on 0% (V1:17).

4.5.10 Competing priorities

Inability to make the link due to limited knowledge and understanding in relation to the administration of fluids and oxygen may have inhibited some participants' ability to take action. It would be wrong however to assume ignorance in the face of the extreme work pressures, such as those seen during the observation sessions with some participants (for example, Chris [1C1;1C2] and Helen [2HH1]). When oxygen is not increased in urgent situations, it could be related to training, as Xavier suggests in the example below, but an alternative perspective of being busy fits equally well in this scenario,

... you can walk into a room and someone is slumped in bed with low sats and an oxygen mask stuck on the top of their head. It's not rocket science to get the oxygen on, sit them upright, ooh look, their sats have come up.....I think a lot of it's got to come down to teaching, training or..... (X1:44).

Poor visibility and competing priorities identified, as inhibiting factors to *being vigilant through surveillance* earlier in this chapter, may have limited the nurse's ability to identify deterioration and to respond to patients' needs in this scenario.

Prescribing IV fluids was a source of treatment delay and nurses complained that doctors did not prescribe routine fluids. For example, Elaine asked the doctors, *why can't you just write up the fluids* (3EE1:2) and Harry confirmed that this was a problem, citing an occasion when he discovered half his patients had no IV fluids prescribed. The nurses had informed the junior doctor, *but nobody came to write up any fluids* (1HH1:3). When challenged, the junior doctor cited competing priorities, predominantly a high number of patient admissions. One doctor used not prescribing fluids as a strategy to ensure patient review over a weekend, by prescribing just one bag of fluid *the nurse will bug the on-call to come and check* (1FF1:15) and the patient would be reviewed by default.

4.5.11 Needing support

Evidence of limited knowledge and skills and competing priorities faced by the participants, however, highlighted the importance of skilled support in

clinical practice. The critical care outreach team (CCOT) and the physiotherapists were two major sources of support identified by participants in this study. Physiotherapists provided a *lot of guidance* and were *very good* (1CC1:37). Similarly CCOT *can give us advice and support* (N2:15). Speed of response however was very important to the participants. For example, with CCOT, *you have only got to ring them – and they are really supportive* (1CC1:16), and *as soon as you ring them they will come* (E1:7). The same was said about the physiotherapists in acute deterioration *they are the first point of call* (X1:44). Support came in the form of guidance and teaching (Y1:13) as well as practical help, *get them up the bed or maybe put that oxygen back on* (Y1:21-22).

Being reciprocal

There was evidence that support was a reciprocal process. Specialist nurses and the CCOT liaised closely with each other, *they will contact us if they are worried about somebody not doing well, so we will do the same* (R1:16).

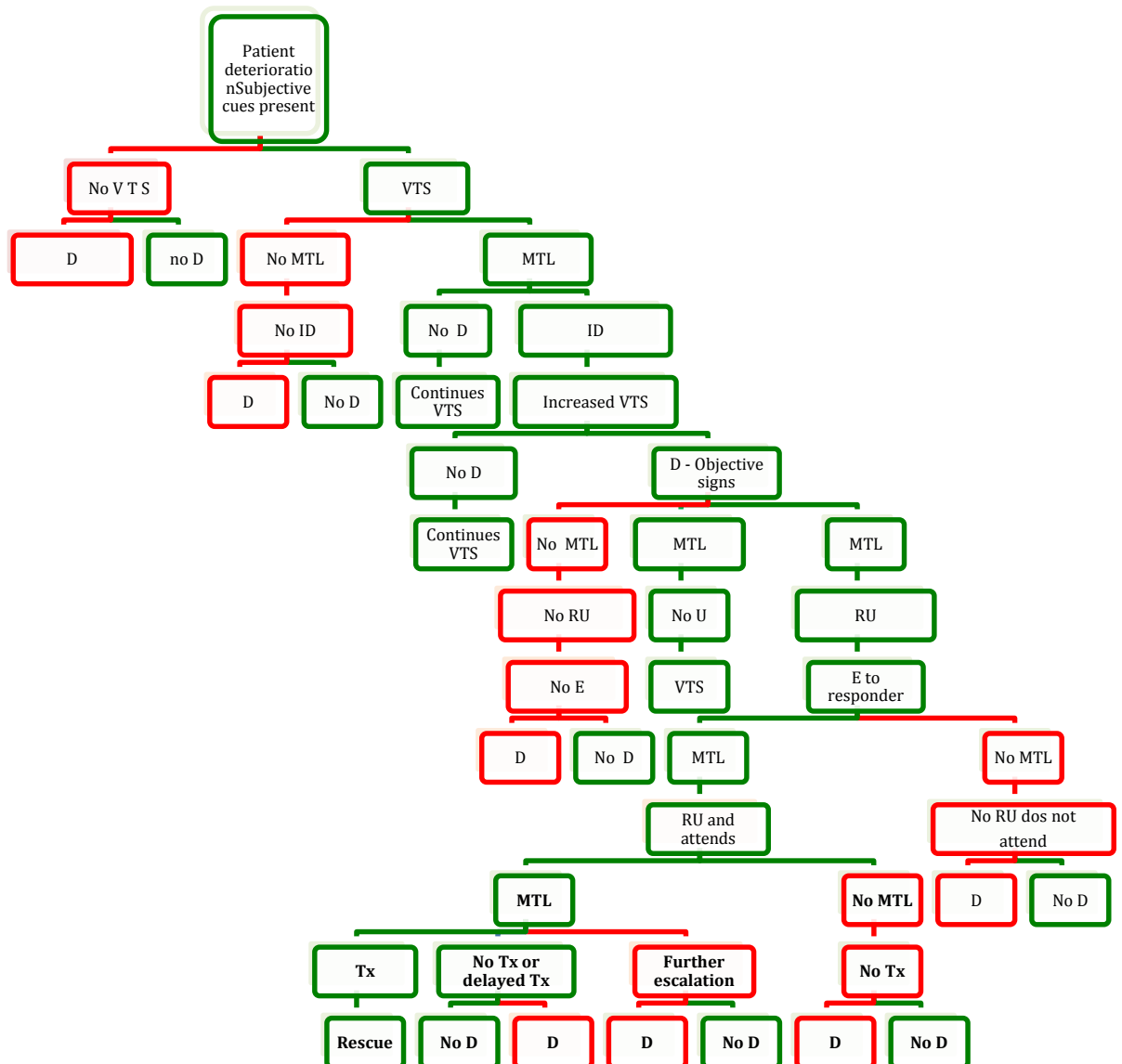
Nurses identified the doctors as a means of support, *getting them to come and look at the patient and see what they need* (3EE1:1). Again, reciprocity was in evidence when a junior doctor was supported by senior nurses who were *good at guiding you with deteriorating patients* (1GG1:9), but support from their senior doctors was not always forthcoming, *just in times when you feel uncertain* (1FF1:14). Conversely, lack of support could be very isolating,

So that level of anxiety, am I going to get help here, which I think I remember as a junior, that feeling of isolation is actually a very powerful feeling, I have no support at all (2JJ1:18).

4.5.12 Summary of *taking action: treating*

This section has shown that in the presence of deterioration and recognition of urgency with appropriate escalation, the responder had to make the link between what was happening with the patient and the remedial action required. This was demonstrated through the administration of oxygen therapy for the hypoxic patient and IV fluids for the hypovolemic patient. Not *making the link* at any point in the trajectory of care could result in delay or omission of vital treatment, influenced by several factors including knowledge and understanding, the need for support and the impact of other competing priorities. The process of *fearing harm* was a novel finding that relates to the perceived risks associated with treating a deteriorating patient, and might explain why IV fluids and oxygen are omitted or delayed in some cases. Influenced by an underpinning fear of error and potential harm from over-treating, hypoxic patients did not receive the high dose oxygen required because of an overwhelming concern for the risk of hypercapnic narcosis and apnoea. Similarly, hypovolemic patients remained under-perfused because the fear of fluid overload. Acts of omission were seemingly therefore less concerning to some than acts of commission and this could have significant implications for training and education, where participants highlighted how these concerns had been learned early in their professional preparation. In Figure 17 below, the flow chart summarises the process thus far, building on Figures 11 and 15 previously presented in this chapter. Further additions are highlighted in bold print.

Figure 17. Alternative routes of care for the deteriorating patient.
*VTs = vigilance through surveillance; MTL = making the link;
 ID = identifies deterioration; RU = recognises urgency; E = escalation;
 Tx = treatment; D= deterioration. 'No deterioration' (No D) is included in the
 trajectory for completeness, but this was not highlighted by the participants
 in the study.*



The next section will draw together the findings with regards to the core process, making the link, and the chapter will be concluded with an overview of the findings.

4.6 Overall summary of the findings

This section summarises the findings in respect of the four key conceptual processes connected by a core process, *making the link*. Presentation of the findings as conceptual framework will provide an overall conclusion to this chapter.

4.6.1 Being vigilant through surveillance

This concept formed the firm foundations and the launch point of a trajectory of safe care for the deteriorating patient. Influenced by the organization of care, it involved the fundamental principle checking on the patient, gathering intermittent subjective or objective intelligence either first-hand (primary vigilance) or from others (secondary vigilance), including the patient and their significant others. The use of checklists, knowing the patient and being with them in close proximity enhanced being vigilant for any changes. Poor visibility due to ward geography, multiple competing priorities from an acute, complex patient caseload and sometimes-limited resources, reduced vigilance capacity. A key finding highlighted the different ways in which professionals, with different knowledge, skills and understanding, surveyed their caseload and the varied perspectives this offered, but it was difficult to see how all of this intelligence was shared or linked together.

4.6.2 Identifying deterioration and recognising urgency

The participants used the intelligence gathered in conjunction with knowledge and understanding and a core process *making the link* to enable them to identify deterioration and recognise urgency. Supported by continuity of care, close proximity and knowing the patient and experience, participants were able to compare subjective cues and objective signs to note changes over time. These ranged from the subtle suggestion of something being *not right* to the *barn door* signs, including tachypnoea, tachycardia, hypoxia, increased oxygen requirements, pyrexia, hypotension and oliguria. These indicators were then used to stratify urgency, where for some, measurable objectivity carried greatest weight, and a track and trigger score provided the affirmation required. The participants' subsequent actions served as a positive indicator that identification and recognition had occurred. Increasing vigilance (more frequent checking on the patient) highlighted concern and signaled that identification of deterioration had occurred. The action of escalating through the authority gradient to try to obtain the support required indicated that a degree of urgency had been recognised. Competing priorities, being interrupted, limited knowledge and skill inhibited making the link between the changes that had occurred and associated problems, resulting in failure to recognise and escalate.

4.6.3 Taking action: escalating and responding

By this stage in the trajectory, inter-dependency between the concepts becomes more relevant. Dependent upon successful identification and

recognition, the escalation-response process and subsequent actions were influenced by the participant's role, enhanced by the caller-escalator's credibility and assertiveness, ability to convey urgency, using a track and trigger score, the quality of evidence provided, frequency of the calls and the their relationship with the responder. A good rapport could bring about a swift response and this was noted most prominently between the HCSWs and RNs working closely together in the ward environment. Subjective cues alone could stimulate a response where the relationship between escalator and responder was good and the escalator was credible. Limited knowledge and understanding, competing priorities and crossing hierarchical boundaries however inhibited the escalation-response process. There was no evidence that a structured communication tool was used.

4.6.4 Taking action: treating

Treating was illustrated through two key interventions, common requirements of most acutely ill deteriorating patients, oxygen and IV fluid therapy. These therapies highlighted common patterns and pre-requisites for successful intervention, namely knowledge and understanding, competing priorities, and needing support. Despite many participants highlighting the speed with which they would administer these sometimes urgently required interventions, a key finding demonstrated a perceived need to proceed with caution where treatment benefits might be outweighed by the perceived risks. Oxygen administration presented the risk of apnoea and large volumes of IV fluid could overload the circulation with the potential for heart failure. Such was the degree of concern that

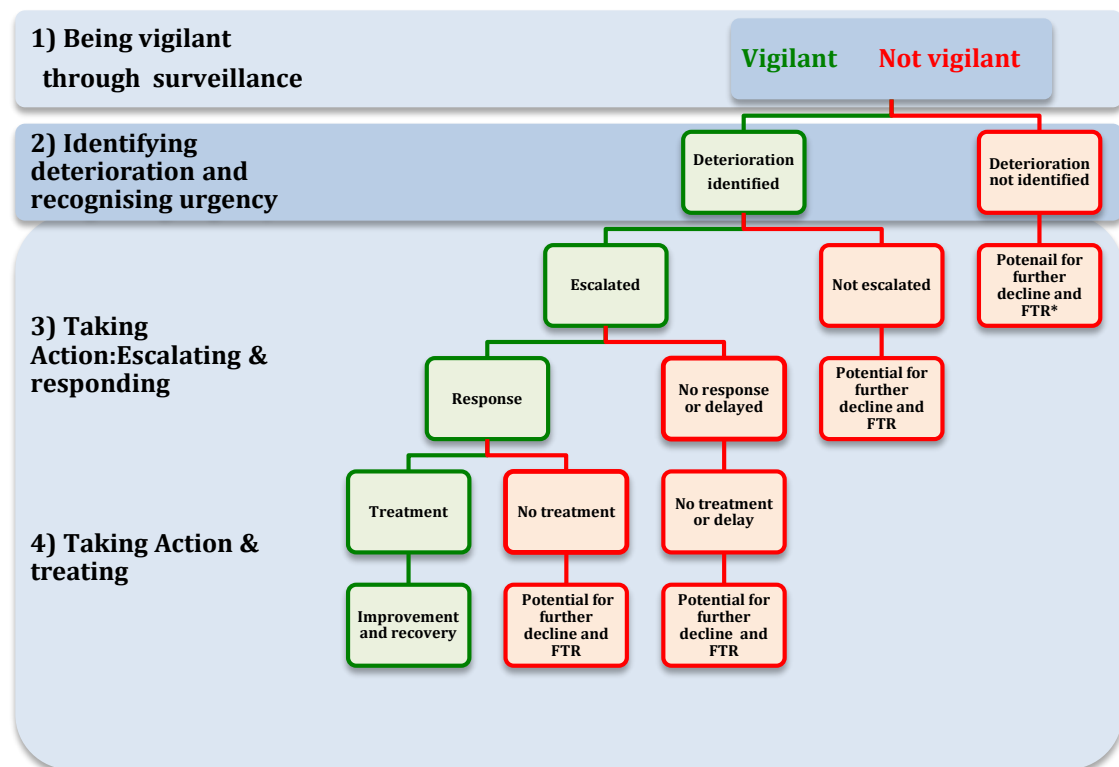
essential treatment could be delayed or omitted for fear of harming the patient, but the consequences of non-intervention sometimes carried more harmful consequences yet were not considered. The importance of *making the link* therefore gathers apace at this juncture and engaging decision-making skills and maintaining situational awareness was key to a successful treatment. While fluids and oxygen therapy might be appropriate for many routine patients, the acuity and complexity of some patients made it difficult for some participants to act in a rule-governed way and their ability to apply knowledge and skills was tested to the limit. Subsequently, the requirement for skilled support was further highlighted. Physiotherapy and CCOT were identified as two major sources of such on the wards.

4.6.5 Making the link

Making the link was identified as the core process because it connects all four processes, being vigilant through surveillance, identifying deterioration and recognising urgency, escalating and responding, and treating. Progress through a trajectory of safe care for the deteriorating patient (illustrated by the green pathway in Figure 18 below) required application of profession-specific knowledge and understanding within each process in order to make the link. The red pathway indicates where links might not be made, and the potential for failure to rescue. Figure 18 builds on the trajectory presented in Figures 11, 15 and 17 earlier in this chapter by summarising the process and each key concept has been superimposed onto the flow chart for clarity.

In summary, it was essential for the participants to *make the link* through the application of knowledge and understanding in the decision-making process, to effectively connect each stage in the trajectory of safe care for the deteriorating patient.

Figure 18. Key concepts and the trajectory of care. This summarises the contents of Figure 17 presented earlier and core concepts have been superimposed for clarity
**FTR = failure to rescue*



- Surveying the patient with the appropriate degree of vigilance in order to gather relevant subjective and objective intelligence
- Interpreting the findings from surveillance and making the link in order to determine the presence of deterioration and the degree of urgency.

- Dependent on the two previous processes, further links and a decision regarding the course of action followed. This involved either increasing being vigilant through surveillance or calling for relevant assistance through escalation.
- Responders were required to make the link and decide to attend or not
- On arrival at the scene, the responder had to make the link and decide upon the appropriate treatment required.

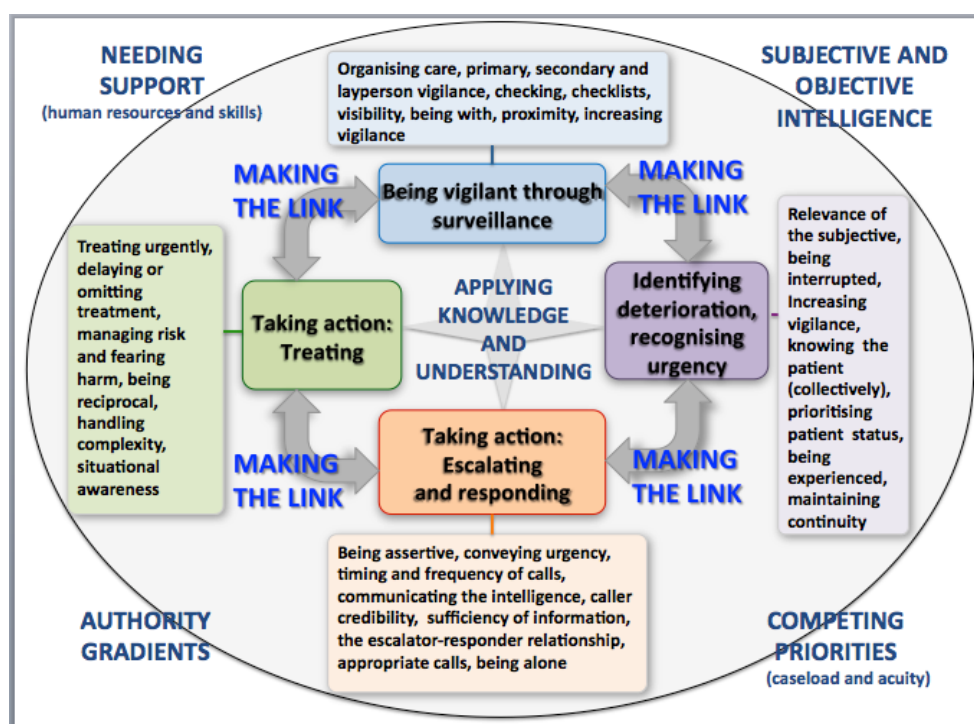
4.7 The conceptual framework: Making the link

Interpretation of the data from 33 participants in this study, which explored the multi-professional care of deteriorating patients, resulted in the development of the conceptual framework, illustrated in Figure 19 below.

Four key conceptual processes were identified; *being vigilant through surveillance; identifying deterioration and recognising urgency; taking action: escalating and responding* and *treating*. For simplicity and clarity, the findings were presented earlier in this chapter as a linear process in flow chart format (Figures 11, 15, 17 and 18 above). This approach allowed each of the four key concepts to be added to the process as the findings were developed in the narrative, but flow charts do not have the capacity to illustrate the ongoing, cyclical nature of the process found in this study. The final conceptual framework (Figure 19), presents the trajectory of care as cyclical where the core concept, *making the link*, connected all the key concepts. The final link brings the professional back to the ongoing requirement for *being vigilant through surveillance* in order to remain alert

to any treatment response and the potential for further deterioration. A linear flow chart would have been insufficient to illustrate this aspect fully. The influencing factors are illustrated as concept-specific in adjacent boxes, but four factors were found common to all: objective and subjective intelligence, needing support, competing priorities and authority gradients. The centrally placed *applying knowledge and understanding* was the common denominator throughout the trajectory. Ideally, the framework encompasses teams working together and moving through each stage at the same time, but in practice healthcare professionals could be at different stages of the framework whilst attending to one patient, each with their own starting point on the cyclical trajectory of care.

Figure 19. The conceptual framework. This figure summarises the findings illustrating four key concepts all linked by a core process, *making the link* and presents more detail than the simplified version in Figure 7 at the beginning of this chapter.



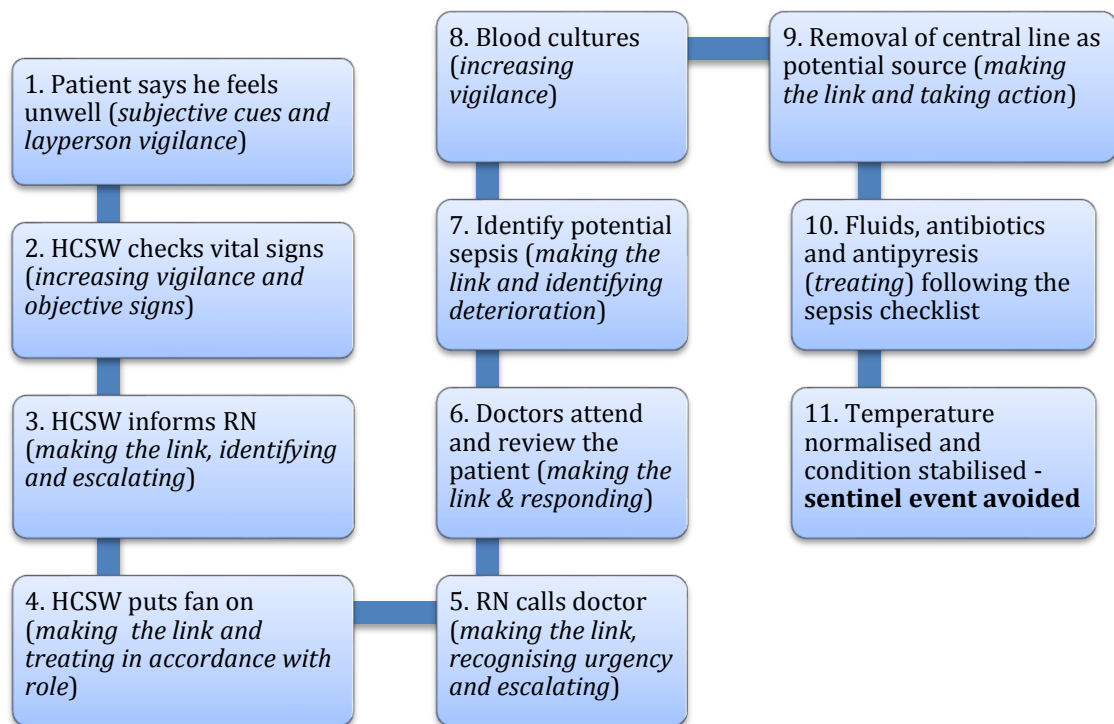
4.7.1 Case examples

Two case examples are presented below to demonstrate clearly how the framework can be applied in practice. Case study A, in Box 2 below, highlights the potential benefits in a system when the links were made without delay or omission, for a patient with sepsis. The multi-professional team used the sepsis checklist to good effect, and the patient survived and a sentinel event was avoided. Case study B in Box 3 demonstrates how not making the link and barriers in the system can delay the process, the outcome of which can be a sentinel event for the patient. The associated Figures 20 and 21 on the following two pages below illustrate how the conceptual framework fits and works in both examples, aligning with clinical practice.

Box 2. Case Study A (précis of participants words)

When alerted by a patient who said he felt unwell, the HCSW was prompted to check the vital signs. She subsequently informed RN Kerry of the changes. The pulse was raised and weak, the blood pressure was falling and the temperature was elevated. The HCSW put a fan on the patient and Kerry contacted the junior doctor who responded quickly and reviewed the patient along with the registrar. They decided to remove the patient's central venous catheter (thought to be a potential source of sepsis), took blood samples (cultures), gave intravenous antibiotics, fluids and oral antipyretic therapy (paracetamol). The patient's temperature returned to normal and the problem was resolved as the patient stabilised (IKK1:9-10).

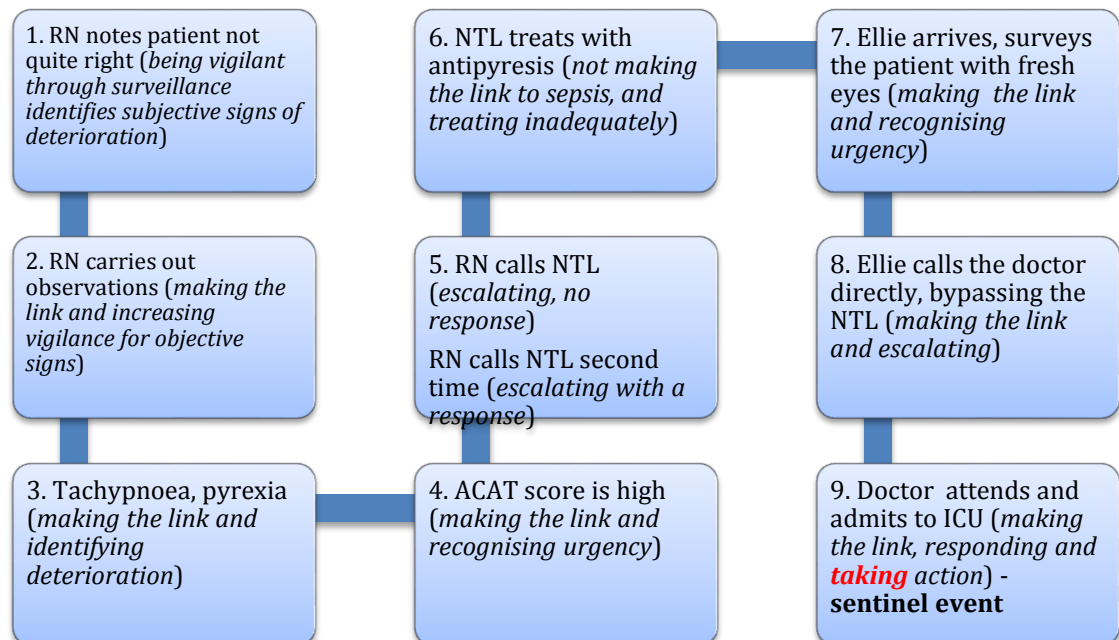
Figure 20. Applying the framework to case study A. This figure illustrates how the framework was applied to the case study in Box 2 above at each stage in the process of care.



Box 3. Case Study B (précis of participant's words)

When a patient did not look quite right to RN Ellie, these subjective signs prompted her to investigate further. The respiratory rate and temperature were elevated, there was no urine output, intravenous fluids had been stopped for five hours and the ACAT score was raised. The night-nurse had escalated to the Night Team Leader (NTL) twice, at 03:00 and 05:00 hours, but without reviewing the patient, NTL had recommended only oral paracetamol and a fan. Ellie felt she would have been more forceful with the NTL than the night nurse, giving them only 20 minutes to respond before escalating further. Ellie contacted the doctor directly at the start of her day shift. He responded within two minutes of her call and the patient was in the ITU within 24 minutes (1E1:2).

Figure 21. Applying the framework: Case study B. This figure illustrates how the framework was applied to the case study in Box 3 above at each stage in the process of care.



4.8 Summary

This chapter has presented the results from 25 interviews and 48 hours of observations with 33 members of the multi-professional team. The findings from this study have provided insight into the stages of a trajectory of rescue for the deteriorating patient consisting of four conceptual processes. A core process, *making the link*, has been identified which facilitates movement through the trajectory. Making the link at each stage could result in a positive patient outcome, but failure to make the link halts the trajectory with potential negative patient outcomes. Where the link was made, this involved applying knowledge and understanding to make decisions regarding subsequent actions. The use of subjective and objective intelligence, needing support, competing priorities and authority gradients were factors that could enhance or inhibit movement along the trajectory at any point.

The next chapter presents an in-depth discussion of the findings in conjunction with the extant literature.

Chapter Five: Discussion

5.1 Introduction

The aim of this study was to explore the communication that occurs and the social processes that are used within the multi-professional team when ward-based patients deteriorate clinically. The previous chapter presented the findings and a conceptual framework in which four processes emerged connected by a core process, *making the link*. The first part of this chapter will present a discussion of the findings in five subsections and will situate them within the broader context of the literature about the deteriorating patient:

- 5.2 Being vigilant through surveillance
- 5.3 Identifying deterioration and recognising urgency
- 5.4 Taking action: escalating and responding
- 5.5 Taking action: treating
- 5.6 Making the link.

5.2 Being vigilant through surveillance

This section will present a discussion of the findings related to *vigilance through surveillance* and associated literature.

5.2.1 Definition

Being vigilant through surveillance is the starting point on a clockwise trajectory through the conceptual framework. This process forms the foundation for identifying patient deterioration, recognising urgency and

the subsequent actions required (escalating, responding and treating). This concept includes an action component (surveillance), checking and observing patients for subjective cues and objective signs, and a behavioural component (being and remaining vigilant), being alert, attentive and watchful for any clinically significant changes (Meyer, Lavin and Perry 2007; Merriam Webster Online Dictionary)⁹. This discussion follows the findings that showed how *being vigilant through surveillance* was influenced by the way in which care was organized. It involved being vigilant for subjective and objective indicators, collected first-hand (primary vigilance) or by others (secondary vigilance), but visibility and ward geography, caseload and acuity, and the use of checklists further impacted on the healthcare professionals' ability to closely observe the patient for signs of deterioration.

5.2.2 Being vigilant

This study has revealed some of the difficult working conditions that healthcare workers experience in the acute ward environment and exposed a potentially hidden area of work where participants were routinely and carefully watching out for patient deterioration. Being vigilant was a hard and time-consuming aspect of the clinical work, exacerbated by single cubicles, acute caseloads and competing priorities. While the routine vital signs and other objective indicators were formally documented, the frequent, intermittent informal visual checking and subjective cues noted were not, and this potentially represents a large portion of unseen, unrecorded workload.

⁹ www.merriam-webster.com online dictionary

Nurse participants had large caseloads of eight to 12 patients, checking intermittently and frequently over long periods (12 to 13 hours), remaining vigilant for infrequent signs and signals that may or may not occur, that might or might not indicate deterioration. Others have identified the negative influence of long shifts (greater than 13 hours) on quality and safety in patient care including increased risk of errors and decreased vigilance (Scott, Rogers, Hwang et al., 2006, Stimpfel and Aiken, 2013; Stimpfel, Baho, Gorman and Aiken, 2013). Over 50 years ago, the Mackworth military experiments into vigilance in submariner sonar operators showed that accuracy of observations could decline by 10-15% after only 30 minutes and decrement was greater where the watch was long and positive signals were few (Mackworth, 1950). More recent human factors evidence highlights the importance of frequent short breaks and opportunities for sleep periods to minimize fatigue in shift workers (Porto, 2001). When this study was carried out, provision of routine breaks was difficult, particularly at night, so any increase in breaks would be unrealistic within the current limitations of staffing ratios and organisation of care.

5.2.3 Increasing vigilance

Identifying changes in subjective or objective indicators prompted increased vigilance and more frequent observations amongst the participants and these actions are supported by NICE (2007). International consensus suggests however that monitoring the acutely ill needs improvement (DeVita et al., 2010). Findings from the current study indicate that this could be achieved through increased staffing ratios and better patient visibility,

but greater use of technology (electronic monitoring) could potentially improve the observer's predicament from limited resources and poor visibility. The current standard at the research site provides continuous, automated monitoring for level 2 and level 3 patients, with manual, digital intermittent measurement in ward areas for the level 0 and level 1 patient. Using vigilance technology in ward areas has been shown to improve patient outcomes by decreasing length of stay (Jones et al. 2011; Bellomo et al., 2012), while Bonnici, Tarassenko, Clifton and Wilkinson (2013) suggest alternative near-continuous monitoring (including temperature, oxygen saturations and pulse) for use in acute wards to reduce the risk of infrequent or missed observations. This could improve being vigilant through surveillance locally by reducing the requirement for frequent checking and constant movement in and out of the cubicles.

5.2.4 Organising Care

The way in which vigilant care was organized differently on one study ward highlighted the potential benefits gleaned from grouping more seriously ill patients together in one bay. Patients could be clearly observed together and the need for frequent movement between geographically distant patients was reduced. Furthermore, patient acuity and dependency, rather than ward geography and raw numbers, determined caseload allocation. Nurses cared for greater numbers of patients where acuity was lower, but as few as four where acuity was high. This model of workload distribution could arguably reduce the *vigilance decrement* (Warm, Parasuaman and Matthews, 2008:434) and increase nursing surveillance capacity (Bellomo et

al., 2012; Jones et al., 2011) and is potentially transferable to other wards locally.

Patient visibility was an important issue highlighted by this study where 12 beds on each ward were housed in single cubicles. Inevitably problems presented where half the patients were concealed from view and other staff were also frequently out of sight. This is a timely finding, and a valuable addition to the current knowledge base, because the government committed to increase the number of single rooms in NHS hospitals by 45 000 (Mooney, 2008) and the Department of Health stipulated that all new developments must have at least 50% single occupancy (Hutton, 2004). Single rooms have been shown to improve family involvement in care and the patient experience, patient privacy, sleep and infection rates, reducing length of stay and medication errors (Mooney, 2008; Fairhall Bache, Dodd and Young, 2014). Findings from the current study indicate however that there is arguably a trade-off where the advantages of single occupancy are lost in part to limited surveillance capacity. These findings are supported by a recent nurse survey at the new 512-bedded Tunbridge Wells Hospital in Pembury, Kent, the first and only one in the UK with all single room occupancy, where concerns were expressed regarding reduced patient surveillance and increased failure to rescue events (Maben, Penfold, Rober and Griffiths, 2012). While single rooms may offer several advantages to patient care, some of the benefits may be lost due to poor visibility and this is an area requiring further investigation with opportunities for further research.

5.2.5 Secondary vigilance

The way in which care was organized on the wards meant that some healthcare professionals relied on secondary sources for patient information. This study adds to the existing knowledge that measuring patient vital signs, a valuable source of surveillance data, is frequently delegated to the HCSWs (Hogan, 2006; Beaumont and Luettel, 2008; James et al., 2010). This practice is supported by NICE (2007) where an RN supervises a competent HCSW, but for some, however, the RN might be the preferred choice to carry out the observations. A counter argument suggests that with appropriate training in both the procedure and the communication skills required to escalate the problem, HCSWs may be best placed to carry out this routine activity, freeing up the RN to respond to problems. This study showed that HCSWs were in closest proximity to the patient, through supporting them with their activities of daily living, with intimate, physical contact, but also through social time spent with them. This meant that they were more readily available to observe the patient for the earlier subjective cues, subtle changes that forewarned of potential deterioration that they could check out with objective vital sign measurement. There is arguably potential to capitalise on this valuable, but sometimes taken-for-granted subjective information that the HCSWs collect and this could be explored further in practice.

This study therefore exposed a hierarchy of tasks, influenced by proximity to the patient. Doctors for example, had less time to spend in direct patient contact and were reliant on others as a secondary source of information

about the patient. The nature of the professionals' interaction and duration of the social process involved in the task consequently affected the type of knowledge they gleaned about the patient. A smaller caseload and performance of intimate tasks in close proximity could result in knowing the patient in a more humanistic mode, and facilitate being vigilant for the earliest subjective warnings of deterioration. A larger caseload and greater distance from the patient interface could result in a more objective mode of knowing the patient. Thus different professional groups knew the patient in distinct but sometimes disparate ways.

By delegating the observations to the HCSW, the task has possibly been devalued by some. The importance of the task has arguably remained unchanged, regardless of who performs it, and the profile of vital signs therefore needs to be raised. The 'sterile cockpit' rule from human factors in aviation (Sumwalt, 1993) however may present one way forwards, where American Federal Aviation Association regulations require pilots to refrain from non-essential activities during critical phases of the flight. Similarly, those carrying out critical tasks in healthcare can be protected from interruption, as was observed with RN Betty (1B1;2), who wore a red tabard during drug administration to denote the importance and priority of the task. This could be extended to support being vigilant through surveillance, as any healthcare professional (fully trained with their competency assessed) needs to provide assurance that observations will be performed correctly on every occasion for all patients in a timely manner without interruption. Alternatively, recommendations would need to centre on

facilitating primary vigilance, looking at ways in which the RN can be freed up to be more directly involved in patient observation. Ways in which this can be used to improve the identification and escalation process are discussed later in this chapter.

5.2.6 Layperson vigilance

Findings revealed a new concept of *layperson vigilance* that referred to an extra layer of watchful activity for early warning signs carried out by the patient or their significant others visiting at the bedside. This process emphasizes the vigilance vantage point of being in close proximity to the patient and knowing them well, but also reinforces the value of involving patients and their relatives in care where they may pick up subtle clues that might otherwise go unnoticed by the healthcare team. Thus layperson vigilance may represent an untapped resource that could be used to greater advantage. But this needs careful thought before routine implementation where vulnerable people might be expected to take on the stressful responsibility of patient monitoring and feelings of guilt might be engendered when changes are not spotted. There is potential value in sensitively exploring more formal patient-public involvement strategies in being vigilant through surveillance predominantly because they are party to changes that may not be visible to any other than those who know the patient intimately. The discussion around layperson vigilance and escalation is further developed in section 5.4.1 below.

5.2.7 Caseload and acuity

All professional groups reported competing priorities and low staffing ratios and these factors restricted the process of being vigilant through surveillance. This study highlighted a concerning problem where, when a patient deteriorated, the team's resources were focused in one place, and with already low staffing ratios, such an event could seriously reduce surveillance capacity for all other patients. This is a timely finding that has since been reinforced by the Keogh review (Keogh, 2013) with immediate remedial action implemented at the research site and increased nurse staffing on the night shift.

These findings also reflect the wider national and international perspectives however. Over the last decade, a number of quantitative studies demonstrated links between nurse staffing ratios and patient mortality (Lankshear, Sheldon and Maynard, 2005; Rafferty, Clarke, Coles, et al., 2007; Kane, Shalmliyan, Mueller et al., 2007; Aiken, Cimiotti, Sloan et al., 2011). Building on these studies, NICE (2014b) recently published guidance on safe staffing for nursing adult patients in acute ward areas. They did not mandate minimum staffing levels for the UK, but recognised the increased risk of harm to patients when nurses cared for more than eight patients (NICE, 2014b), which is similar to what the nurses said in the current study. More recently, Voepel-Lewis, Pechlavandis, Burke and Talsma, (2013) supported findings that insufficient monitoring and nurse-staffing levels can contribute to patient deterioration, but they showed that where surveillance was increased, even where staffing remained low, patient rescue improved and

adverse events were reduced. The issue may therefore relate to how work activities are organised and prioritised and reinforces the need to concentrate on improving surveillance activity and capacity, even if it is at the expense of other tasks. New vigilance technology arguably may help.

The findings discussed thus far have raised issues that suggest different ways of working might provide a new solution to the situation where patients deteriorate unnoticed, out of sight. The evidence from this study suggests that observers needed to know what to look for and to understand the significance of any changes in order to make the link, but vigilance was influenced here by large caseloads, poor visibility, frequent interruption and the subsequent limited time available to be with the patient in close proximity.

AUKUH acuity and dependency audit data has been collected locally since 2006, providing a clear indication of where and when peaks of acuity exist across the organization (AUKUH, 2007; Shelford Group, 2013). Indeed, this data informed the selection of research wards for the study, identifying where the greatest number of Level 1a patients were, in order to increase the opportunity to observe deterioration. More recently named the Safer Nursing Care Tool (Shelford Group, 2013), acuity and dependency monitoring was not alluded to by any participant in the current study, but arguably has the potential to be used more proactively in daily practice. For example, participants highlighted the need for support (section 4.5.11) and

acuity and dependency scores could provide the objective evidence required to identify when and where this may be needed most.

In a recent review of 2010 fatal incidents extracted from the NHS database (2010-2012), Donaldson, Panasar and Darzi (2014) demonstrated that the largest proportion (35%) of deaths occurred as a result of mismanaged patient deterioration. They highlighted failure to observe in 113 cases, failure to act on or recognise deterioration in 462 and failure to give treatment in 130 cases. Deaths relating to falls (10%) and healthcare acquired infections (10%) represented a considerably smaller problem. Donaldson et al. (2014) concluded that mismanagement of patient deterioration is an area in need of attention, so the current study is very timely.

Locally, when patients are assessed at high risk of falling human resources are increased, sometimes with one-to-one care. Thus it can be seen that a similar model might be used where patients present a significant risk of deterioration. The provision of a centrally resourced supply of peripatetic remedial help, similar to the service available in falls prevention, triggered when total ward acuity increases above an agreed, pre-defined level using AUKUH methodology may provide a focused solution. The process of tracking and triggering used in obtaining support from CCOT could be applied in practice, but used in a different way. Using a nationally recognised acuity and dependency score could be used to anticipate problems in acute hotspots, pre-empting the requirement for CCOT. This

process is predicated on the premise that increased capacity for surveillance will improve opportunities to intervene early. This may be presumptive because it is dependent on the ability of those involved to make the link. By increasing being vigilant through surveillance with early provision of additional resources, within a whole-systems approach, the RNs on the ward could be freed up to focus on the sickest patients when required, comfortable in the knowledge that back-up human resources were checking on the rest of their caseload. Given time and opportunity to focus on a problem earlier in the course of a patient's decline (as with the sterile cockpit rule), without frequent interruption or concern for other unseen patients, may reduce the need for further specialist intervention if decline is halted sooner.

5.2.8 Checklists

The checklist, a memory aid and systematic list of cues to watch for, augmented *being vigilant through surveillance* for all groups of participants in this study, but not all were viewed positively. Where checklists had been designed and implemented by the users, as with the physiotherapists' on-call *pro forma*, they were seen in a positive light, but where they had been imposed upon them, as with multiple risk assessment tools for nurses, they were perceived as onerous. Checklists, or the 'paperwork', were described by nurse participants in negative vocal tones because of concern for a high volume task that took them away from the patient interface and *checklist fatigue* was noticeable with every nurse observed (Hales Terblanche, Fowler et al., 2008:22-30). Indeed Gawande (2010), one of the originators of the

checklist, questioned if there may be a point at which the requirement for extensive documentation outweighs their benefits. The findings from the current study indicate that locally, the point has probably been reached and any further developments should proceed with caution or be directed at reducing their number.

Checklists, imported into healthcare from high reliability organisations such as aviation, where highly complex procedures are carried out with very low failure rates, have been shown to improve patient safety by standardising routine procedures using evidence-based care. They can improve compliance with procedures and reduce adverse events and mortality (WHO, 2008; Thomassen, Storesund, Softeland et al., 2014) and are particularly useful when memory, vigilance and cognitive functions are affected by outside influences such as the high workloads experienced by participants in the current study (Gawande, 2010). Despite their potential benefits however, participants in the current study criticized checklists for their potential to inhibit cognitive processes and challenged the ‘tick box’ culture they engendered as reductionist, reducing professional activity to a list of tasks, where the human element was ignored and stopped participants thinking for themselves. Checklists can potentially oversimplify the work and may act as an impediment to swift decision-making (Bosk, Dixon-Woods, Goeschel et al., 2009), but a counter argument from a human factors perspective purports that they can reduce thinking time and reliance on memory, ensuring key actions are not forgotten (Gawande, 2010). The physiological track and trigger tool, ACAT, alluded to by most

participants in the current study as helpful, is a positive example of a checklist which served as a reminder to record the vital signs required to facilitate calculation of the score, but predominantly it served as an aid to identify deterioration and stratify risk.

5.2.9 Summary

Key findings have been discussed in this section and context has been provided to some of the hidden work of the multi-professional team, carried out amidst a resource-limited environment with poor patient visibility, competing priorities and frequent interruptions. The importance of observing the patient for early changes and indicators of deterioration, and ways in which this might be optimized, have been highlighted. This work adds to current understanding of the care of deteriorating patients, highlighting and raising the profile of sometimes unrecognised and taken-for-granted sources of vigilance, including the patient and their relatives, but also revealing the hidden work of the nurse, frequently checking the patient for subjective cues that are not formally recorded and not consistently shared across the team. An argument has been put forward for valuing observation highly with subsequent investment and resource allocation (human or technology) in the vigilance process that could improve patient safety. Essentially the solution may require thinking differently about how we organize care, grouping patients with the greatest potential to deteriorate together in one area and, or, increasing the support for closer observation earlier in the course of a patient's decline. This is an area that requires further testing in practice.

5.3. Identifying deterioration and recognising urgency

This section will discuss the findings related to the second key concept on the trajectory of care, *identifying deterioration and recognising urgency*.

5.3.1 Using subjective cues and objective signs

This study showed that all groups of participants used both subjective cues and objective signs to make the link and recognize deterioration when present. The findings add to the existing knowledge base by demonstrating how subjective and objective patient information was managed and communicated differently amongst the multi-professional team.

Objective signs included physiological variables that could be measured, formally documented and preserved graphically, where trends could be visualized and compared numerically. This information was shared across the multi-professional team using standard observation charts, accessible to everyone, found at the bottom of the patient's bed. Objective signs of deterioration were recognised when, through making the link with standard reference ranges for each parameter, declining trends in vital signs and early warning scores could be clearly seen. When communicating this verbally, participants were seen to refer to documented trends.

Subjective cues incorporated the more difficult-to-measure indicators and subtle changes in appearance, behaviours and attitudes that served as early forewarnings of deterioration that could prompt further investigation.

These were gathered by paying close attention to detail, detecting slight

deviations from the patients' norm, particularly by those in closest proximity to the patient, including their significant others. In order to identify changes, the patient's current state was compared with a known baseline, where previously observed. Unlike objective signs however, the subjective data was not systematically recorded so trends could not be identified clearly, and there was no structured way in which this seemingly valuable information was consistently shared across the team, openly acknowledged or preserved. The findings here would therefore suggest that consideration should be given to the ways in which key subjective changes could be recorded and preserved. Formally recognising and valuing this often hidden work by preserving it in documentary form might then lead to the incorporation of subjective cues into training and education programmes. This study showed that participants used subjective cues to indicate where something might be wrong with a patient, as reported elsewhere (Endacott, Kidd, Chaboyer et al., 2007; Cioffi et al., 2009), but the current study emphasizes that the process was similar across the multi-professional team, not just for nurses. Where a link was made and cues stood out as relevant, this prompted participants from all professional groups in the current study to search for more objective data, to confirm deterioration, to further segregate the urgent from the non-urgent situation. Others have also demonstrated this pattern, but again, only amongst nurses, checking early subjective intuitive concerns with measurable investigations (Cox et al., 2006; Minick and Harvey, 2003). The current study extends this finding to the multi-professional team.

5.3.2 Something *not right* and gut feelings

When subtle changes defied participants' vocabulary, *something not right* was a helpful phrase that captured their intuitive feelings. For example, some participants used *he doesn't look right* (indicating early deterioration) or *he went off* (indicating more urgent, rapid deterioration). Others too have found this to be the case, so the phrase 'not right' is not specific to the current research locale (Endacott et al., 2007; Cioffi et al., 2009; Henneman Gawlinski, Blank et al., 2010). *Ruttley* was another colloquialism, a term commonly used to describe adventitious lung sounds, probably meaning coarse crackles (a loud, low-pitched, discontinuous popping or bubbling sound). So it would seem that professionals in this study had developed their own language to describe common events associated with the deteriorating patient. In support, another study revealed how nurses used subjective words to describe objective measures, like *sleepy* or *lethargic* to describe the level of consciousness (Gazarian, Henneman and Chandler, 2010), but this is not quite the same. What the current study adds is that these colloquial, idiomatic terms were used freely in the vernacular amongst the participants and across professional boundaries and hierarchies where they knew each other well. Communicating these more subjective and subtle cues up the authority gradient and evoking a response was not easy for some and this is explored in more detail in the escalating and responding section. Again this study adds the multi-professional dimension to this finding where, in the current study, different groups of professionals identified similar intuitive experiences.

Not right was closely linked to what several participants from all professional groups called their *gut feeling* or a *sixth sense* that helped them intuitively to *make the link* between what they had observed and their interpretation of deterioration before more definitive objective signs were manifest. In communicating their intuitive findings, this had the potential to lead to an early intervention because they were 'not right' before the objective signs changed. This supports the seminal work of Benner (Benner and Wrubel, 1982; Benner, 1984; Benner and Tanner, 1987; Benner, Tanner and Chesla, 1992) and it would perhaps have been more surprising if participants had not alluded to their intuitive concerns about patients.

5.3.3 Knowing the patient

Getting to know the patient in a busy environment with multiple competing priorities was hard, but for participants in this study knowing the patient was important because it helped them identify when things were not quite right. Knowing what was normal meant they were able to recognize deterioration when deviations arose. This was a similar process to that used with objective signs, where knowing the normal reference range for a parameter meant that the current state could be compared against it, but with subjectivity, knowing the patient's own baseline was key. This process therefore emphasized how *not* knowing the patient could be problematic, particularly for those at greater distance from the patient. For those further removed, the assessment process was slower as they needed to rely on secondary vigilance, information from those in closest proximity.

Knowing the patient and its usefulness in intuitively identifying usual patterns and patient problems confirms earlier work by Tanner (2006), which focused on nursing and extends it to a multidisciplinary sample in the current study. The findings here raised an interesting point where different groups of participants seemed to know the patient in different ways, possibly influenced by the time available for interaction. For example, the pharmacist's brief visit contributed a fresh eye on one part of the broader multi-professional perspective, juxtaposed to the HCSWs who, with prolonged engagement in intimate-type care, noted signs that were more personal and idiosyncratic. The importance of familiarity and intimacy within the context of caring has been recognized and others have reported that it is crucial in early recognition of subtle changes (Radwin, 1995; Minick and Harvey, 2003; Mantzorou and Mastiogiannis, 2011; Gazarian et al., 2011).

The RNs spent relatively short periods with each patient, but made frequent repeated visits to the sickest patients to monitor changes in their condition. The importance of repeated interactions by nurses in the process of knowing the patient has been recognized previously where information from an initial patient encounter is updated with each subsequent visit (Takemura and Kanda, 2003). Participants in the current study did similar things. Their initial baseline patient image was compared with how they 'looked' each time they visited to determine changes and any potential deterioration. But unlike the vital signs, without formal documentation, this more informal type of observation and key nursing work was rendered

invisible, but also difficult to share possibly because of limited opportunities for interaction. While HCSWs communicated subjective cues with ease to their RN colleagues, and similar occurred between RNs and junior doctors or physiotherapists, it was harder for others, junior doctors for example, to communicate them to their seniors.

The importance of time is a prominent theme running through each of the factors that influenced *knowing the patient* in this study (caseload, competing priorities, continuity, proximity and being with the patient). Others have indicated that spending quality time is an important factor in knowing the patient (Radwin, 1995; Luker, Austin, Caress and Hallett, 2000). A more recent literature review reinforced this, but while they demonstrated that nurse availability and sustained contact were important, they also suggested that the practice environment does not provide the conditions to support this (Zolnierrek, 2014). The current study provides evidence in support of this (interruptions, competing priorities and needing support).

The findings from the current study draw attention to the importance of involving a wide range of perspectives and different ways of *knowing the patient*. Different groups of participants picked up disparate aspects of the deteriorating patient, which together would have created a more holistic view. If individuals' knowledge about the patient could be shared as a team, this might help to improve patient rescue and recovery. The way in which

information was shared was sometimes complex, variable, unsystematic, disparate and hierarchical.

Knowing the patient has been identified as central to skilled judgment (Tanner, Benner, Chesla et al., 1993), a concept that supports expertise (Jenny and Logan, 1992; Radwin, 1995; Morrison and Symes, 2012) and it may be a function that decreases the complexity of decision-making (Currey and Worrall-Carter, 2001). Other studies have demonstrated its worth in other fields for example, Henneman et al. (2010): to prevent errors in critical care practice; Richards and Hubert (2007): in pain management; Crocker and Scholes (2010): in weaning the patient from the mechanical ventilation.

Thus it would seem that there is a substantial body of extant literature that supports the concept of *knowing the patient* as identified in the current study, however this work does not specifically relate to the deteriorating patient. Cioffi (2000a) found that *knowing the patient* enabled nurses to more readily recognise a decline and this assisted in their decision to call for help. As in the current study, participants used subjective data and described situations where something was wrong, rather than a precise list of objective signs. Just like participants in the current study, they could not quite put their finger on what was happening, they had a gut feeling or a sixth-sense that all was not well, or not quite right.

In previous studies, the concept of *knowing the patient* has been distinguished as different from (and more than) the formal, clinical, objective knowledge *about* the patient. It is about *knowing the patient* as a person (Tanner et al., 1993; Whittemore, 2000; MacNeela, Scott, Treacy and Hyde, 2010; Kelley, Docherty and Brandon, 2013) and an understanding of the patient's experience, behaviours, feelings and perceptions of interventions (Radwin, 1995). It occurs in the context of a relationship (Luker, Austin, Caress and Hallett, 2000; Zolnierrek, 2014) and is underpinned by healthcare worker engagement, involvement and spending time with the patient (MacNeela et al., 2010; Morrison and Symes, 2011). Jenny and Logan (1992) described it as a cognitive and rational process to determine the salient aspects of a patient's situation, to compare the patient's current status with their baseline range of responses. Thus knowing the patient enhanced being vigilant through surveillance for the participants in the current study.

5.3.4 Collectively knowing the patient

While for participants *knowing the patient* was shown to facilitate identifying deterioration, this multi-professional study has also raised the profile of a different type of knowledge, collective knowledge. The term *collective* is used here because it was not necessarily shared or jointly owned knowledge, in part because the opportunities to impart it were few. Different groups of participants knew the patient, albeit in disparate ways, but it was difficult to see how or if this collective knowledge came together, or how the whole could ever be made visible to anyone other than the

constant observer-researcher, in the privileged position of seeing more than the individual participants. This is a key finding and a potentially original contribution to knowledge, and it revealed the importance of the participants' valuing (or not valuing) each other's knowledge to this end. This reflective memo (Box 4 below), demonstrates how collectively knowing the patient contributed to the overall picture.

Box 4. Memo (1KK1- 14/01/12 – Knowing the patient): An illustration of *collective knowing*. This reflective memo demonstrates how each member of the team knew the patient slightly differently, from a different perspective, and contributed different types of knowledge to the overall picture.

Knowing the patient in relation to her activities of daily living (eating, drinking, sleeping, mobility, for example) helped the HCSW to note changes that included a decline in appetite, a reluctance to get out of bed for a wash and a low mood all of which she linked to a decline in condition. The RN knew that the patient's chest sounded more rattly today than on her shift yesterday, and noted her breathing was more shallow, and although she was still alert, there were idiosyncratic changes in mental status that might indicate deterioration. The physiotherapist had a more focused knowledge and understanding of the patient's respiratory status and her mobility. The pharmacist highlighted the patient's limited response to an antimicrobial drug and advised alternative dosing to achieve rapid therapeutic effect and avoid further deterioration. The consultant physician might not have picked up any of the intimate patient details without support, but he valued that knowledge from the HCSW in closer proximity to the patient. He wanted to be approachable to his colleagues so that they would share information with him, and openly invited them to do so, asking them to use his first name. Furthest away from the patient, with the briefest of contact time, he was reliant on others' knowing the patient, but held overall accountability; he had the potential to be the conduit for all patient data. In practice however, observations revealed that it was the usually invisible work of the ward-based nurse, seen while observed at close quarters in the research process, to perform the role of intelligence gatherer.

This discussion so far has highlighted the ways in which different participants came to know the patient. The previous section showed that

intelligence could be obtained first hand (primary vigilance) or through others (secondary and layperson vigilance). Those higher up the authority gradient, furthest away from the patient interface, were reliant on others for information. It was the nurse who was central to the information gathering, with different professional groups able to provide different pieces of a metaphorical jigsaw, each with a slightly different perspective, each with something different to offer that might go unnoticed by other members of the team. What has become clear through ongoing analysis of the data is that a key individual is required to assemble the puzzle and *make the link* between all the disparate pieces, and see the whole with a kind of collective knowing. Electronic patient records may help but valuing others perspectives is perhaps more important.

5.3.5 Making the link

In this process, identifying deterioration and recognizing urgency, the participants needed to make the link between subjective cues, deranged vital signs and patient deterioration and then grade them into urgent and non-urgent cases. They were supported in this by the use of a track and trigger score, a form of checklist that was helpful for the junior staff, but also used by the seniors to simply confirm their suspicions and add objectivity credibility to their assessment. In essence participants needed to know what they were looking for, think about what they had found, sort the relevant from the irrelevant and make a connection to its meaning in respect of clinical deterioration. Some were unable to make the link due to limited knowledge and understanding, but the score provided the help needed for

those with little knowledge and limited sense of salience (Benner and Tanner, 1987). An interesting omission in the process of *making the link* was the participants' lack of use of the Safer Nursing Care Tool (Shelford Group, 2013). This tool provides a measure of patient acuity and dependency across the ward environment and all senior nurse participants in this study would have been familiar with it, but use of the tool was not in evidence either during the observation sessions and the participants did not allude to it in the interviews. As discussed, the researcher used the tool to identify wards with higher proportions of Level 1a patients to increase the opportunity for observing deterioration.

5.3.6 Summary

The discussion thus far has emphasized the importance of remaining vigilant, particularly for the earliest subtle subjective changes in a patient's condition, and this has been shown to be hidden, taken-for-granted work. Evidence here suggests that this is across the multi-professional team, not as others have found, just within the nursing domain. This study has shown how each professional group contributes to the bigger picture of patient deterioration, including the patient and their family, but it has also highlighted the need for a central repository for all the data, a way in which all the disparate pieces of the metaphorical jigsaw can be connected, so the benefits of collectively knowing the patient can be optimised. The nurse is centrally placed geographically, a *privileged* position (MacNeela et al., 2010:1298) that could be used more effectively to this end.

5.4 Taking action: escalating and responding

This section will present a discussion of the findings related to the reciprocal process of escalating and responding from the perspective of both the caller-escalator and the responder.

Multiple factors influenced the escalation-response process and the findings showed that a persistent, credible, assertive caller who provided sufficient, appropriate, clear, objective information about an urgent case to an accessible, knowledgeable responder with whom a rapport had been developed, established good conditions to evoke a positive response. Alternatively, a tentative, deferential junior caller, presenting subjective information across hierarchical boundaries to an unapproachable senior responder might enjoy less success.

5.4.1 The authority gradient

The presence of an authority gradient and its negative influence on the escalation-response process was a key finding from this study. A steeper gradient occurred across professional boundaries and was exacerbated when the caller-escalator was fearful of contacting or disturbing the responder, fearful of making a mistake or appearing unable to cope. The differential was reduced where caller and responder knew each other, where a rapport and a trusting relationship had developed, and the caller had credibility. Hence, nurse-to-nurse escalation was straightforward and response was rapid, for example when a HCSW escalated concerns to the RN, or the RN called the CCOT, participants said they always responded to

their requests for assistance. Where the gradient was steeper, (nurse to doctor or junior to senior doctor, for example), a response was not always forthcoming. Others have reported similar findings (Endacott et al., 2007; Mackintosh, Rainey and Sandall, 2012).

a) Supporting challenge

Challenging directly up the hierarchy was potentially difficult for some participants in the current study, and there was no evidence in the observational data of overt confrontation. The seminal paper *To Err is Human* (Kohn, Corrigan and Donaldson and the Institute of Medicine, 2000) suggests pursuing a healthcare environment in which information flows freely against the power gradient. In the airline industry the crew are encouraged and expected to challenge up the hierarchy and this principle from human factors engineering has been adopted into some healthcare practice. For example, the Matching Michigan-Keystone project (Pronovost, Needham, Berenholtz et al., 2006) used in the ICU at the research site ensures the use of the most up-to-date evidence in infection, prevention and control aiming to reduce the risk of sepsis in critically ill patients during central venous catheterisation. A checklist empowers a suitably trained observer (locally this is a HCSW) to challenge errors and omissions made by the operator (usually a senior doctor), regardless of the power differential. Checklists, despite the reservations of some participants in this study with regards to the volume of work they generate, could therefore be used as a powerful tool to democratize knowledge, where the same information is

available in a format that doctors, nurses, HCSWs and patients can all understand (Winters, Gurses, Lehman, et al., 2009).

In the current study, data revealed that some participants lower down the authority gradient were in possession of critical information, but were unable to persuade those with higher status to respond to their request for help. This mode of communication is somewhat reminiscent of the doctor-nurse game, first described by Leonard Stein in 1967. For example, nurse-escalators Carole (1C1:6) and Darcy (3DD1:22) were deferent rather than direct with doctor-responders. Doctor, Jim reinforced this, bemoaning the reticence of some callers (2JJ1:9). Ellie demonstrated an alternative approach however, abandoning the doctor-nurse game (Stein, 1990), stating the problem politely, using critical language and persisting until a response was achieved,

Right, I'm not happy. They are Acatting at 6. I've given the appropriate treatment. If you're not here in 20 minutes I am going to ring the consultant and that's what I would have done (1E1:3).

She demonstrated how tools might support challenging up the hierarchy and provides an example of how the CUS mnemonic might be used to good effect (I'm concerned, I'm uncomfortable, I'm scared), also imported from human factors engineering, thus the tendency to speak indirectly and deferentially was avoided (Agency for Healthcare Research and Quality, 2014). The use of the checklist (ACAT) and objective information strengthened her case. Using a structured communication tool (SBAR) had

the potential to improve the escalation-response process further for her and for other participants with less confidence.

b) Communication styles

Different approaches to communicating deterioration were revealed by this study; tentative versus assertive, and unstructured versus structured. Some have argued that this might be explained by the differences in nursing and medical training. While doctors are trained to deliver brief, systematic headlines, nurses provide a more narrative description of clinical status (Leonard, Graham and Bonacum, 2004; Groff and Augello, 2003; Mackintosh and Sandall, 2010). Essentially, in the current study, the onus rested on the caller-escalator to convince the responder to act. A different way of working might be to give license for callers to simply to generate a response by alerting the responder to their being worried. Others have shown that communication issues can influence the care of a deteriorating patient (Cioffi 2000b; Kenward and Hodgetts, 2002; Andrews and Waterman, 2005; NCEPOD, 2005; NPSA 2007a; 2007b). Structured communication tools have been recommended to overcome such problems including the SBAR tool, an acronym for Situation, Background, Assessment and Recommendations (NHS Institute for Innovation and Improvement, 2010), or RSVP, an acronym for Reason-Story-Vital signs-Plan (Featherstone, Chalmers and Smith, 2008). There was no evidence in the current study that a structured communication tool was used to handover information about a deteriorating patient. Ellie was the only participant to mention such a tool (E1:14), but in a somewhat disparaging tone, she dismissed its benefits for a

senior nurse. Arguably, the potential advantages may be more apparent to a junior healthcare professional when trying to circumnavigate hierarchical structures.

Kaiser Permanente, a non-profit making American healthcare group, developed the use of SBAR, which originated in the US Navy (Monroe, 2006; Mackintosh and Sandall, 2010). It provides a standardized approach to communicating patient issues. The way in which nurses package information when handing over to doctors can influence the response (Andrews and Waterman, 2005) and coupled with the aforementioned differences in communication styles of nurses and doctors, SBAR provides a standardized approach to communication advocated to speed up the handover process and level the hierarchy, endorsed by several national bodies (NHS Institute for Innovation and Improvement, 2010; NPSA, 2007a; 2007b; Patient Safety First Campaign, 2008). Mackintosh and Sandall (2010) raise concerns that the tool may devalue the merit of subjective data and intuitive sense making within the assessment process, but an alternative argument suggests that there are no restrictions regarding the type of intelligence presented in the assessment section of the SBAR tool. Further research into use of the tool is required.

c) Reducing the authority gradient

Two high-profile cases of Josie King and Lewis Blackman have prompted action in the USA resulting in a reduction of the authority gradient between

the patients' significant others and the doctor. Josie and Lewis ¹⁰ died despite the protestations of their mothers, vigilant at the bedside, persistently trying to raise the alarm and summon a senior doctor when they knew something was wrong with their child. Nurses ignored their concerns and failed to identify deterioration, recognize urgency or escalate to the experts. The mothers' post mortem petitions resulted in some hospitals establishing systems, which now empower patients and their significant others to alert the rapid response team directly, leapfrogging the ward-based nurses. This has met with some favourable response (Greenhouse et al., 2006; Gerdick, Valish, Miles et al., 2010). This has clear links to the earlier discussion regarding *layperson vigilance* (in section 5.2.6) and the importance of early identification, but in order for the benefits of this concept to be captured for the benefit of the patient, there is a need to reduce any potential power differential.

There are examples in the literature of ways in which those lower down the gradient have empowered to overcome this gradient. For example, Condition H(elp) has been added to the repertoire of emergency calls at the University of Pittsburg Medical Centre, Shadyside Hospital, in the USA. Condition H empowers the patient or their significant others to call for assistance of a dedicated team including a nurse, physician and a patient relations co-ordinator (Greenhouse, Kuzminsky, Martin and Terryman, 2006). In a nine-month trial the team received 21 calls, five of which reported unresolved pain and one identified chest pain. Odell, Gerber and

¹⁰ www.josieking.org and www.lewisblackman.net

Gage (2010) reported a similar programme initiated in the UK, *Call 4 Concern* (C4C), where patients leaving the ICU, transferring back to the ward were provided with written and verbal information regarding how to contact the CCOT. Twelve families out of potential 147 patients transferred placed a call for concern during a six-month pilot period. Two related to patients who had become critically ill and required readmission to the ICU, but the team considered that they had added value to patient care and the relatives' concerns in all cases.

The concept of *layperson vigilance*, identified in the current study, has clear links to knowing the patient, and emerges from the rapport that significant others have with the patient and being in close proximity. Layperson vigilance has the potential to improve early escalation at ward level. The benefits of being mentally connected or attuned to patients has been recognised in renal care (Harwood, Ridley, Lawrence-Murphy et al., 2007), in weaning patients from mechanical ventilation (Hangdahl and Storli, 2012), therapeutic engagement with the patient (Hobbs, 2009:57) and openly inviting patients to contribute to their care (Epstein and Street, 2011); all have been linked to successful patient outcomes. The doctors in the current study acknowledged and valued this knowledge in nurses and this may explain why some were amenable to response based on minimal information or subjective cues alone.

d) Approachability of the responder

Nurse participants demonstrated their approachability, evidenced by layperson escalation to them when early signs of deterioration were spotted. Consultants revealed how they tried to increase their approachability, reducing the hierarchy with the use of first names and inviting callers. This is reflective of *leader inclusiveness* behaviour, advocated in the human factors literature (Nembhard and Edmonson, 2006; Lekkar, 2011) where leaders use words and actions that invite and encourage collaboration and contribution from others and provide the right atmosphere where others can speak out.

e) Deference to expertise

Deference to expertise is a key characteristic of high reliability organizations (those with almost error-free performance, despite hazardous conditions where any error could be catastrophic) such as the airline and nuclear industries. They operate a hierarchical approach in the normal working environment, with a clear reporting structure and chain of command. When an emergency occurs, senior staff defer to the person with greatest knowledge and skill to resolve the problem, regardless of their status in the hierarchy (Lekkar, 2011). This model is reflected in rapid response systems, where the parent consultant tops the authority gradient in routine patient care, but when a patient becomes critically ill, they may defer to the CCOT nurse, lower in the hierarchy but a knowledgeable, credible expert with access to higher level resources, evident in the current study where

consultant Jim said of CCOT, *however bad its going to get, they have been there before and they know what to do* (2J)1:18)

f) Credibility of the caller

The current study highlighted that credibility of the caller was a key factor in reducing the gradient across professional groups and hierarchical boundaries. Some nurse participants used the credibility of others to circumnavigate the hierarchical organizational structures to evoke a response. For example, both the doctor and the physiotherapist participants perceived CCOT as a credible source of information about the deteriorating patient, therefore CCOT were able to evoke a response from them when the ward-based nurse might not. Similarly, peer support was sometimes needed to provide the reinforcement and ratification required to overcome the fear of reprimand from a potential responder. These findings reinforce those of Cioffi (2000a), who found that nurses questioned themselves when calling for help and were worried about doing the right thing in making the call.

g) Empowering others

Empowering those lower down the hierarchy, to influence those higher up was another key finding. Nurse participants were empowered to circumnavigate hierarchical boundaries with the use of objective signs, specifically the track and trigger score. Supported by hospital policy and NICE (2007), the track and trigger score theoretically enabled nurses to override the authority gradient, call for help and to achieve a response within 30 minutes for a patient triggering on ACAT with a score over 5. But

the reality for some participants in this study was different to expectations because there were other variables that influenced the responder's availability to attend, predominantly, competing priorities.

5.4.2 Competing priorities

Competing priorities from high workloads and patient ratios, as discussed earlier, were inhibiting factors in the rapid response process and may explain why there was only partial adherence to the use of track and trigger scores. Since this study was completed others have found similar (Prytherch, Schmidt and Featherstone, 2013; Niegsch, Fabritus and Anhoj, 2013; Guinane, Buknall, Curry and Jones, 2013; Yiu, Khan, Subbe et al., 2014). Yiu et al. (2014) highlighted the process of *alarm fatigue* where professionals' clinical judgment led them to deviate from escalation protocols. If an over-sensitive tool triggers frequently and generates numerous false alarms, like the *crying wolf* alluded to by the participants in the current study, failure to escalate may be the result. It is important to remember that the ACAT used by participants in this study was not a sensitive score, rather it was similar to those assessed by Smith et al. (2008a; 2008b), none of which was deemed sufficiently sensitive for clinical practice. Doctor Fabio reinforced this saying; *it only seems to pick up end points that are urgent markers, like oliguria or hypotension* (1FF1:2).

It would be easy to conclude that a nurse did not escalate because they were busy with too many competing priorities, similarly the same could be said of the overwhelmed junior doctor who, to paraphrase one participant (Fabio),

was only able to do about 40% of the jobs on his list and therefore unable to respond in every case of deterioration. Clearly there are a number of extenuating variables that influence the decision to escalate or respond in any situation. In the current study, participants being busy was a key factor in their approach to workload and prioritising action. Purling and King (2012) found lack of available resources was a major barrier to response.

5.4.3 Needing support

The whole ethos of the escalation response process is built on the principle that the participants needed support. This is echoed by findings of Cox et al. (2006) who identified that this was not just physical support of numbers of staff but also from those with knowledge and skills. Some participants did not realize what they did not know and were then unable to make the link, thus support was also required from an educational perspective. CCOT were widely acknowledged by the participants in this study as a source of support, both from a physical presence and for their knowledge and skills. This study identified that different groups of professionals found support in different ways and revealed a myriad of informal support networks with examples of CCOT, pharmacists and physiotherapists providing support to the nurses and doctors, and specialist nurses and physiotherapists reciprocating support between each other.

5.4.4 Summary

This section has highlighted that the factors influencing the escalation-response process are multiple and complex. Table 18 below provides a

matrix that summarises the enhancing and inhibiting factors for both the caller and the responder.

Table 18. Caller-responder matrix

	CALLER communication factors	<i>Influencing factors</i>	RESPONDER communication factors
Enhancing	Assertive Persistent Credible Sufficient information Objective Critical language Structured	<i>Knowing each other</i> <i>Rapport</i> <i>Trust</i>	Accessible Knowledgeable Approachable
Inhibiting	Junior Tentative Deferential Subjective information	<i>Gradient</i> <i>Fear</i> <i>Competing priorities</i>	Unapproachable Hierarchical

An authority gradient has been revealed, but this could be overcome in part by the use of a structured communication tool and improved communication styles. A key finding was the way in which the gradient could be reduced, namely approachability of the responder, escalator-responder relationship, deference to expertise, supporting challenge up the hierarchy, credibility of the caller, empowering those lower down the hierarchy and deference to expertise.

5.5 Taking action: treating

This section will discuss the findings regarding taking action and treating the deteriorating patient alongside the associated relevant literature.

5.5.1 Treating urgently

Oxygen and intravenous (IV) fluid therapy are essential interventions for the deteriorating patient in the treatment of hypoxia and hypovolemia respectively. The study findings provided examples of speedy administration of both in urgent situations, but this was not the case in every scenario, where some delays or omissions in these vital treatments were also observed or reported. Competing priorities on a busy ward, exacerbated by poor visibility, limited human resources, knowledge and understanding were in part responsible, but a novel finding from this study explains how *fearing harm* also contributed to inaction.

5.5.2 Fearing over-administration

The findings from this study showed some limited knowledge and understanding around the administration of oxygen and IV fluids, but a more novel finding related to healthcare professionals' fear of over-administration of treatment in the deteriorating patient. Other papers have identified that the potential fear of hypercapnia can result in failure to treat hypoxaemia (Bateman and Leach, 1998; Lavery, 1999) and Abdo and Heunks (2012) suggested, like a participant in the current study (1FF1:6), that medical training might be responsible. But these are published opinions rather than the results of a systematic study. In the current study, the identified process, fearing harm (from over-administration), applied not just to oxygen therapy, but to other interventions as well.

Hypoxemia is a medical emergency that requires the urgent administration of high flow oxygen to prevent anaerobic respiration, tissue hypoxia and ultimately cell death. It can develop rapidly (within approximately three minutes) and therefore needs rapid intervention. Evidence supports the use of oxygen in hypoxemia (O'Driscoll, Howard and Davison, 2011a). The current study showed that, in the face of hypoxia, some healthcare professionals were fearful of administration of oxygen therapy because of the potential for apnoea. Failing to make the link between hypoxia and the urgent need for oxygen meant that in some cases it was delayed or even omitted, for fear of doing harm.

The process of *fearing harm* in this way is an important and potentially new finding from this study which adds to the understanding of why healthcare professionals sometimes fail to administer appropriate therapy in a timely manner, which might be inappropriately interpreted as simply lack of knowledge and a need for more training. *Fearing harm* was also a process that could have further implications beyond just oxygen and IV fluid therapy and has greatest significance perhaps for education and training where complex decision-making in an anxiety-provoking environment can result in failure to make the link. Several cases in this study illustrated concerns for the principle of over-administration; fear of fluid overload and pulmonary oedema was associated with a tentative approach to fluid therapy, fear of hypercapnia and apnoea was associated with a cautious approach to oxygen therapy, but other therapeutic interventions were approached similarly (e.g. antibiotics, hormone replacement therapy and nicotine patches). Treatment

strategies that limit risk and associated training may help to overcome *fearing harm*.

5.5.3 Knowledge and understanding – making the link

This study has highlighted some issues where there was clearly lack of knowledge and understanding in relation to the deteriorating patient around oxygen and IV fluid therapy. For example, a physiotherapist participant raised concerns about a nurse who did not fully understand that atmospheric air contained 21% oxygen (V1:17) putting the patient at potential risk of hypoxia, a doctor revealed that he was unsure over what time frame to give fluid resuscitation (1FF1:14) risking ongoing hypovolemia, a nurse incorrectly understood normal urine output to be 25ml per hour (1C1:3) missing an opportunity to recognize oliguria, and on another occasion, failed to demonstrate the correct aseptic non-touch technique when manipulating a central venous catheter (1C1:7), putting the patient at potential risk of sepsis. This same lack of understanding about oxygen therapy has been found in other studies (Smith and Poplett, 2002; DH, 2009; NCEPOD, 2005; O'Driscoll, Howard, Bucknall et al., 2011b). Others have also reported similar ongoing problems with respect to IV fluid therapy (NCEPOD, 1999; 2005; 2009; NICE, 2013). The Keogh (2013) review identified a need for better training towards improving fluid management.

Thus limited knowledge, skills and understanding around aspects of care of the acutely ill adult generally have been raised as a concern in the literature

(McQuillan et al., 1998; NCEPOD, 2005; NPSA 2007a; 2007b; NCEPOD, 2009; NCEPOD, 2012). Some have found gaps in doctors' and nurses' training and newly qualified professionals' inadequate preparation for management of the deteriorating patient has been demonstrated (Buist, Jarmolowski, Burton et al., 2001; Smith and Poplett, 2002; Smith, Perkins, Bullock and Bion, 2007; Cooper, Kinsman, Buykx et al., 2010; Matheson and Matheson, 2009; Bogossian, Cooper Beauchamp et al., 2014). One study explored nurses' experiences of caring for deteriorating patients and failed to highlight any knowledge deficit from the participants' perspective (Cox et al., 2006), but this may be explained by a lack of awareness about what they did not know (Cutler, 2002). More recently, Cooper McConnell-Henry, Cant et al., (2011) used the Situational Awareness Global Assessment Technique (SAGAT) to measure RNs' performance in managing the deteriorating patient in simulated scenarios. They found that nurses lacked the skills to identify deterioration trends and to act appropriately, failing to measure key vital signs, with poor recall of parameters and only moderate comprehension of what was happening in the scenarios.

Solutions to the problem have focused on educational interventions, but simulation training has potential benefits where staff members are able to rehearse the use of knowledge and skills, and other factors such as situational awareness and teamwork. Personal experience as a university lecturer in pre-registration nurse education, teaching acute and critical care skills and as a member of the Acute Illness Management (AIM) course faculty at the research site, has provided experiential evidence of the

potential benefits of learning through simulation, similar to those identified in respect of the Acute Life-threatening Events Recognition and Treatment (ALERT) course by Smith and Poplett (2004).

Competencies associated with the NICE (2007) guidance on care of the acutely ill adult have been published (DH, 2009), but there is no evidence that these have been evaluated in practice, and personal experience indicates that these have not been widely adopted in a formal way. It would seem logical to suggest something around training at this juncture and the simulation approach would seem to be the way forward. The Australian Commission on Safety and Quality in Healthcare (2014) has recently consulted on the training and competencies for recognizing and responding to clinical deterioration. A similar consultation process may be required in the UK before any definitive decisions are made on the way forward regarding developments in education and training in care of the deteriorating patient. A national group led by Peter Nightingale is currently reviewing the DH (2000) comprehensive critical care strategy and the output from this has the potential to guide future work in this direction. Furthermore, the response to this problem may not lie solely in the domain of education. Some of the work in the sphere of human factors may prove helpful, and situational awareness may be one aspect of this.

5.5.4 Situational awareness

Situation awareness (SA) is a concept recognized within the findings of the current study, predominantly in relation to taking action and treating the

deteriorating patient, but also throughout the conceptual framework. The findings illustrated two examples where situational awareness was lost, one in which two doctors were so focused on obtaining a blood sample that they failed to notice what was happening around them when the patient was severely hypoxic (3AA1:7). In another, a doctor inappropriately removed oxygen therapy from a patient prior to arterial blood gas sampling and seemingly failed to consider the potential risk for hypoxia (Y1:21).

SA potentially has broader implications across the whole conceptual framework devised from this study, and provides a deeper understanding of the core process, making the link, as will be discussed in the next section. Essentially SA relates to the healthcare professional knowing what is going on around them, but is more formally defined as,

the perceptions of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future (Endsley, 1995:36)

While SA has been recognised as an essential non-technical skill in high reliability organisations such as the airline and nuclear industries (Fioratou, Flin, Galvin et al., 2010), it has only recently been recognised in healthcare (Fore and Sculli, 2013), but high levels of SA have been linked to better outcomes (Singh, Petersen and Thomas, 2006). A recent literature review found only five papers of a suitable standard that examined SA in nursing (Stubbings, Chaboyer and McMurray, 2010).

Applicable in rapidly changing, dynamic situations (Wickens, 2008), situational awareness forms the basis of decision-making and Endsley's (1995) model presents three levels to this effect, perception, comprehension and projection. Level 1 (perception) requires the acquisition of data about the situation and the environment. The professional then generates a mental model about the patient status from the observations, and as the information changes, the mental model changes accordingly (Fioratou et al., 2010). Thus level 2 (comprehension) relates to how the professional interprets the data through their knowledge and understanding and the mental model that they formulate from it. If they get it wrong, SA is lost (Endozien, 2015). Level 3 requires a decision to be made on the action required, based on projection of the mental model into the near future. Thus when viewed alongside Endsley's (1995) model, the significance of the core process *making the link* in the conceptual framework from the current study is emphasized. Other key concepts are similarly enhanced, as articulated in the examples below.

Level 1 Perception: In order to distinguish the deteriorating patient from the stable one, the observer had to make sense of multiple elements in the environment. In the process of *being vigilant through surveillance* the participants had to gather subjective cues and objective signs from the patient and the environment and then make sense of them. This process required vigilant behaviour on the part of the observer, but the risk of complacency and a lack of awareness of the potential danger have been highlighted by Sculli and Sine (2011:213).

Level 2 Understanding: Next, participants had to comprehend what was happening from the observations made, that is, they had to *make the link*, using their knowledge and understanding to formulate a mental model of the situation, to first identify deterioration and subsequently recognise and stratify urgency. Further links were then required to achieve Level 3 situational awareness, at which point they had to decide what to do next.

Level 3 Projection: Participants had to formulate a projection of what might happen in the immediate future and base their decisions about subsequent actions on the links they made. In the case of a nurse, this could relate to the decision to call for help, *escalating* to a doctor. The doctor would then have to decide whether *responding* was appropriate or not based on the information provided. A successful response was dependent on a shared mental model from the information provided. On arrival at the scene, the responder would need to achieve level 1 situational awareness, and the whole process would start again with the gathering of information from the scene.

Thus the conceptual framework from the current study is supported by Endsley's model of situation awareness, and by the same token, the conceptual framework provides a practice based way of understanding the process of situational awareness and raises its importance in the healthcare arena.

The case example of the septic patient (1KK1:9-10) highlights the different levels of situation awareness required at each stage of the conceptual framework, *making the link*. At level 1 (perception), being vigilant through surveillance provided the observational evidence that showed the patient to be tachycardic, hypotensive and oliguric. At Level 2 (comprehension) the participants used the information gathered to make the link through their comprehension to identify the potential for sepsis. This was supported by a checklist, should their level of understanding be limited. They identified the central line as a potential cause of the sepsis and, with Level 3 situation awareness (projection), determined that if the line were not removed further deterioration would ensue. Furthermore, the checklist served as a reminder of the specific IV antibiotics required to reduce the risk of further deterioration. This is an example in which checklists were able to reduce the cognitive load and increase situation awareness (Endozien, 2015).

According to Sculli and Sine (2011) the complexities of the healthcare arena render it more difficult to retain SA than in the airline environment. Poor visibility and ward geography in the current study were two factors that potentially restricted SA. Furthermore fatigue, high workloads, frequent interruptions and distractions, poor communication and automaticity have been shown to negatively affect SA (Endozien, 2015) and these were evident in the current study findings. Stubbings et al. (2012) indicated that SA could be improved, once workers were cognisant of the principles and suggested that it could be used to underpin training to improve decision-making.

A lot subsequently depends upon the formulation of an accurate mental model to achieve individual situation awareness at all three levels, but Endsley (1995) also refers to the concept of team awareness, where each member possesses the SA required, depending on their role and responsibilities. As Wickens (2008) suggests, the whole is greater than the sum of its parts in such cases, but if one member has poor SA, this can have serious consequences. So for example, in the current study, where the nurse provided faulty and incomplete data to the responder, they could not in turn achieve level 2 awareness and any subsequent comprehension and projection would also be faulty in the absence of a shared mental model.

The current study showed that the multi-disciplinary team all contributed to knowing the patient, but in a different way (as Endsley's 1995 model suggests), however it was difficult to see where the contribution came together. This might be enhanced by more frequent team updates, handovers and patient reviews (Endozien, 2015) and opportunities for professionals to train together to develop opportunities for shared SA (Stubbings et al., 2012).

5.5.5 Summary

This section of the discussion has highlighted two key areas of knowledge development. It has revealed the significance that the fear of harming patients with a rescue intervention can play in influencing whether or not the patient receives treatment. Furthermore, it has demonstrated close practice-based links between the conceptual framework and the important

part that situational awareness plays in effecting appropriate action, intervention and treatment for the deteriorating patient. This reinforces the need for the earlier pre-requisite concepts of being vigilant, identifying, recognising, escalating and responding and the significance of making the link. Several ways in which situational awareness could enhance the clinical environment have been raised; learning together, frequent patient reviews, use of structured communication tools and checklists.

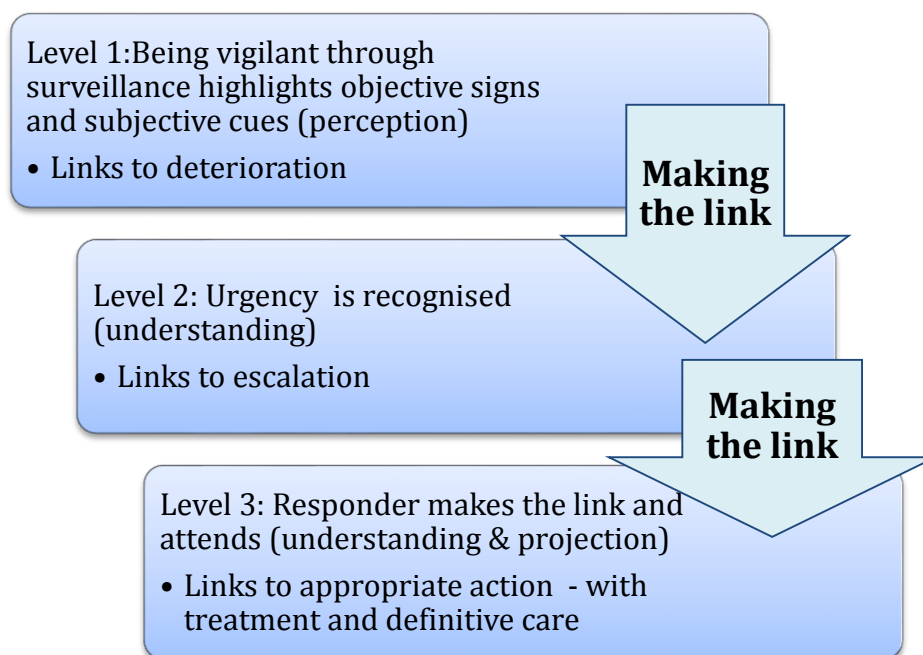
5.6 The core process: Making the link

This section will present a discussion of the core process, making the link, alongside the relevant literature. Recommendations for practice will be made as appropriate.

This study adds to the current literature regarding care of the deteriorating patient, emphasizing the importance of being able to use knowledge and understanding to actively engage with the topic and think about what needs to be done in order to rescue the patient. The key concepts being vigilant through surveillance, identifying deterioration and recognising urgency, and taking action (escalating, responding and treating) provide a structure to the care of a deteriorating patient but engaging, thinking and applying knowledge and understanding was important in connecting them together. The crucial message here is that without the early link made from the use of subtle, pre-emptive subjective cues to early deterioration, the trajectory of care has potential to breakdown. Thus perception (first level situational awareness) was required to initiate the process, but making the link

(understanding and projection at higher levels of awareness) was essential for progression through a safe trajectory of care for the deteriorating patient (Endsley, 1995). Data from this study provided the basis for a multi-professional, multi-factorial trajectory of safe care for the deteriorating patient is illustrated in Figure 22 below alongside stages of Endsley's (1995) model of situational awareness.

Figure 22. The ideal trajectory of care for the deteriorating patient
This figure aims to articulate how the three levels of situational awareness are relevant at different stages of the conceptual framework.



If a vigilant, perceptive observer gathered evidence of early patient changes and made the cognitive link between those derangements using appropriate knowledge and understanding to identify deterioration, if urgency of the situation was recognised and escalated appropriately, if a timely response ensued from skilled professionals and treatment was given accordingly, the

patient would stand the best chance of improvement. If the trajectory of care was interrupted at any stage, if the healthcare professional was unable to make the link required, if situational awareness was lost at any juncture, then this could result in a negative outcome for the patient and ultimately failure to rescue (FTR). A wide range of professionals were interviewed or observed in this study. Failing to make the link was not the prerogative of any one professional group, indeed the data provides examples where HCSWs, RNs, doctors, physiotherapists and pharmacists did not make the link.

Others have previously defined linear trajectories of safe care for the deteriorating patient, all using slightly different alliterative terminology. NICE (2007) use *recognizing* and *responding*; Odell et al. (2009:2000) referred to *recognition, recording and reviewing, reporting, responding* and *rescuing*; the DH (2009:9) use *recorder, recogniser* and *responder*. These phases, or stages, are all part of a one-dimensional, uni-directional process in which the patient is observed, deterioration is recognised, escalation is mounted and the responder attends and treats the patient; an ideal pathway. These tools are useful in practice, but arguably they represent an oversimplification of the process. The experience from practice as suggested by the participants in the current study was that the process is more nuanced.

The key concepts earned their place in the final conceptual framework from the current study because they formed the basic structure of a process of

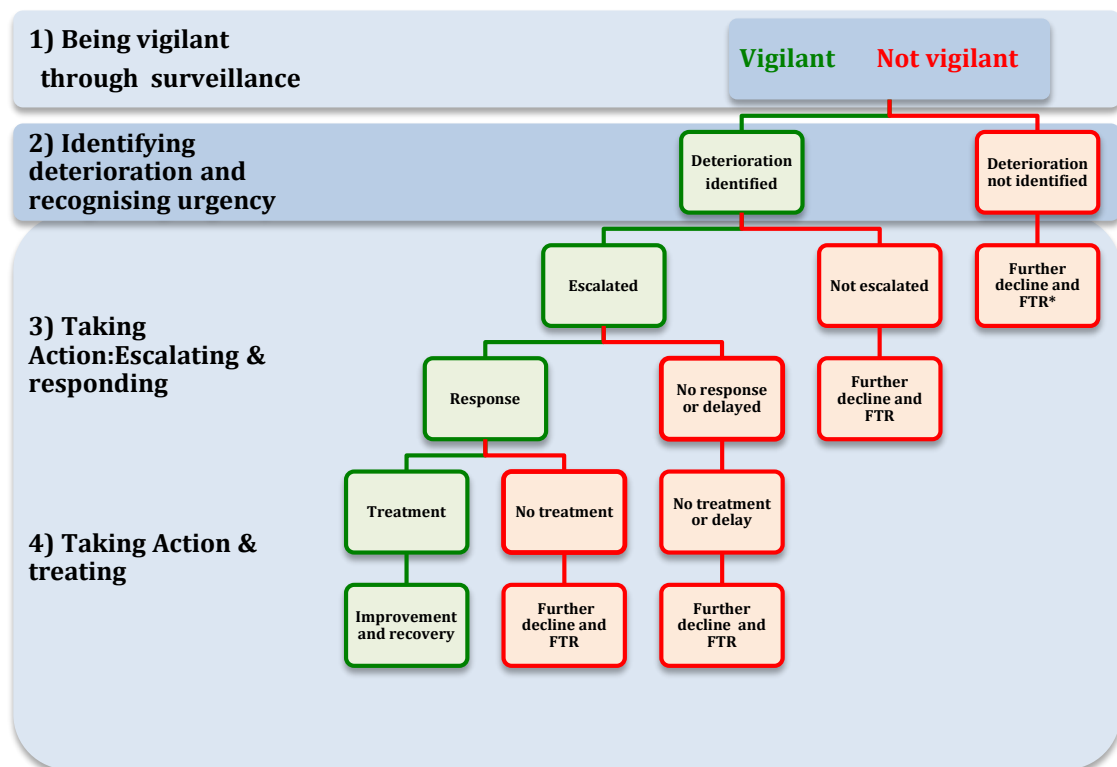
care for the deteriorating patient ascertained through interacting with the participants. What the current study adds is intelligence about the processes that surround the different phases of the trajectory, the nuances that can influence the success or failure of the process.

The four concepts form an essential part of the framework, but alone were not sufficient to explain what was happening in practice. A trajectory may suggest a linear process, but this was not always the case as influencing factors were multiple and complex. There is clear inter-dependency between the concepts, that is, recognition is dependent upon surveillance, escalation is dependent upon recognition, response is dependent on escalation (although a doctor may appear serendipitously) and treating is dependent on recognizing urgency and need for intervention. The findings in this study have shown the process to be convoluted and multi-faceted, central to which was the requirement for thought, understanding and knowledge application at each juncture, the core process *making the link*. A cognitive link had to be made in order to progress through the framework and this is arguably where other more linear trajectories do not fully articulate what happens or is required in practice. The links between the four concepts in the framework are the essential prerequisites to progression through the process and a successful outcome.

Figure 18 below (reproduced from above in Chapter Four), depicts the ideal and not so ideal pathway for the deteriorating patients overlaid with the four key concepts from the framework. This aimed to articulate and simplify

the process, to enhance understanding and ultimately support training and education. In such simplification there is the risk that the process might inadvertently be interpreted as linear, and this would be wrong because the experiences of the participants in this study were anything but smooth. For them, it was not simply the case of a stepped or staged approach.

Figure 18. (repeat from Chapter Four) Key concepts are superimposed onto the flow chart here – this summarises Figure 17 with core concepts superimposed for clarity
**FTR = failure to rescue*



A linear aspect to the trajectory, depicted in Figure 18 is necessary, but not sufficient to fully articulate what was happening for the multi-professional team. Rather, this representation is analogous to a road map where there is

an ideal, safe and speedy route, which gets the traveller from start to finish without problems, something linear that has been imposed, but continuing the analogy further in practice there is the potential for diversions, reversals, detours, accidents or breakdowns along the way.

The track and trigger score provides an example of a tool that helped participants to *make the link* between the observations and deterioration, and supported their understanding, where a high score confirmed urgency and a need to call for help. The score supported level 2 situation awareness and facilitated a shared mental model where both escalator and responder were speaking a common language. Arguably, the score does not fully compensate for reduced vigilance or surveillance where, in this study, nurses cared for many acutely ill patients with high patient-to-nurse ratios, in a geographical environment that limited their visibility, with constant interruptions in clinical practice. The track and trigger tool could reduce the cognitive load and help them to quickly *make the link* between altered physiology and urgent deterioration, where the presence of a high score could empower the caller and strengthen the case for escalation.

Nevertheless, a response is difficult from busy, overwhelmed healthcare professionals when several patients trigger the need for help simultaneously and there are subsequent multiple competing priorities. The presence of a rapid response team can support the wards, but may still not guarantee timely treatment if the responder loses situational awareness on arrival. The trigger is merely an alert, while it directs escalation, it does not prompt treatment and cannot mitigate for any fear of over-treating the hypoxic,

hypovolemic patient with oxygen or IV fluids. Thus, within a multi-faceted system and a chain of events, there is the potential for the process to deviate from the desired pathway at many points along the way, irrespective of a score or a response team that might influence patient outcome.

There were multiple factors that influenced every part of the trajectory, but communication processes, inter- and intra-professional, were very important. These findings indicate that factors that augment observing and recognising deterioration alone will not necessarily result in better patient outcomes. This is an important message for decision-makers in organisations where patient rescue rates are, quite rightly, paramount. Improving compliance with vital signs and increasing positive triggers with more sensitive tools, recognizing earlier and achieving near-perfect escalation rates are essential parts of patient care that can be supported by technology. But technology does not provide the complete solution and cannot help in isolation because it will not pick up the early nuanced signs of early deterioration that a healthcare professional with adequate time to be with, and know, the patient can identify.

Inter-professional communication was a key area where there was potential for breakdown. Having decided that intervention was needed, the caller was dependent on the responder to attend and had, in some cases, to persuade them to do so. Success or failure of the call was dependent on the numerous factors revealed by this study, but competing priorities were predominantly the key. Furthermore, the responder could, in turn, become the caller-

escalator adding a further stage to the process, dependent again upon another who they too had to present the case for a response. Again there is the potential for technological support to highlight where and when support is required for a deteriorating patient, but without the human infrastructure to support an adequate response strategy, automated alerts can have only limited effect.

5.6.1 Summary of making the link

While the literature review demonstrated how researchers have focused on the role that rapid response systems play, the findings from this study emphasize the importance of adequate, knowledgeable human resources, a baseline ward team of healthcare workers at the direct patient interface on the ward, with the ability to *make the link* and, empowered to take action and prevent further patient decline.

This study adds to the existing body of knowledge by providing an explanation of where the vulnerabilities lie within the internationally recognised system of rapid response, because of the complex, multi-faceted social and cognitive human processes required to successfully progress through that trajectory. The vulnerable points in the pathway were found predominantly where participants were required to *make the link*, that is where they needed to think and apply knowledge, skills and experience to the new, ongoing, complex or unusual situation facing them in order to move safely forwards. These links, susceptible to breakdown, represent potential areas for further process and practice development.

5.7 Summary

This chapter has presented a discussion of the findings. The next chapter will present research reflections, recommendations and will conclude the thesis.

Chapter Six: Reflections, Conclusions and Recommendations

6.0 Introduction

This chapter will present researcher reflections on the study's methodology; the strengths and limitations of the study design and its execution will be examined in relation to trustworthiness and rigour. The aims and objectives of the study will be revisited, the original contributions to knowledge will be highlighted, recommendations will be summarized and the report will be concluded. This chapter will be presented in five subsections:

6.1 Original contribution to knowledge

6.2 Reflections on methodology and rigour

6.3 Strengths and limitations

6.4 Conclusions

6.5 Recommendations

6.1 Original contribution to knowledge

A summary of the original contribution to knowledge from this thesis is presented below.

a) Being vigilant through surveillance

In an environment hampered by poor visibility, high workloads and low staff-to-patient ratios, this study revealed how new ways of working could overcome these obstacles and increase being vigilant through surveillance with sometimes hidden or taken for granted methods. These included,

- The importance of *primary vigilance*, with frequent checking on the patient
- *Secondary vigilance* from the HCSWs provided a wealth of subjective intelligence that could forewarn of potential deterioration.
- *Layperson vigilance* was an important and novel finding. The original contribution of this thesis to knowledge relates to the previously unrecognized concept of layperson vigilance. *Knowing the patient* more than any other, and sometimes in closest proximity to them, the patient's significant other and the subjective cues they identified could provide early warning of impending deterioration. Significant others therefore offer insight into the patient's condition that could be harnessed to greater effect in identifying the deteriorating patient earlier in the course of their decline.
- Putting the sickest patients into one area was reported to improve visibility, reduce the requirement for constant checking and to facilitate closer observation.

b) Identifying deterioration and recognizing urgency

- The importance of *knowing the patient* was revealed as a key factor in identifying deterioration, but while others have previously focused on the nurse, the current study emphasized the multi-professional nature of this process that has not been previously shown. *Collective knowing* therefore raises the profile of the multi-disciplinary element to the process where all members of the team know the patient in a slightly different way. The nurse plays a crucial role in synthesising the sometimes fractured and disparate intelligence, making the link

between the component parts and completing a metaphorical jigsaw to provide a clear picture of deterioration. This has the potential to help the team move the patient along the trajectory towards rescue.

c) Escalating and responding

- The study revealed the key attributes of both the caller and the responder that support the escalation-response process, but key to its success was the way in which participants reported that the authority gradient could be reduced
 - A rapport between caller and responder, knowing each other
 - Giving permission and empowering the caller to ask for help

d) Taking action: Treating

- This study revealed a new understanding that explains why some patients might not receive treatment for their deterioration. The fear of harming patients from over-administration (oxygen and IV fluid in particular) was a serious concern where treatment was delayed, omitted or in some cases, removed. This principle is potentially transferable to other interventions, where the fear of doing wrong prevents us from doing what is right and may have implications for the way in which healthcare professionals are educated.

e) Making the link

- The importance of being able to make the link between what was found and what needed to be done at each stage in the trajectory was a key factor in moving forward in the rescue process. Obstacles that inhibit the process have been shown to be multiple and complex, but recommendations will be made to suggest ways in which these can

be overcome. This finding has clear links with a model for situational awareness in clinical decision-making.

6.2 Reflections on methodology and rigour

This section will present the researcher's critical reflections and evaluation of the research methodology, focusing specifically on the quality of the study. The rigour, strengths and limitations of the methodology at all stages of the research process, including the research design and ethical issues, will be reviewed to determine the trustworthiness of the study. Four specific criteria for evaluating constructivist grounded theory are used, namely *credibility, resonance, usefulness* and *originality* (Charmaz, 2006:180-182; 2014:337-338). Originality has been addressed already in section 5.7 above.

6.2.1 Research design

Bryant's (2002) challenge to ensure a consistent design throughout the study, with congruence between the underpinning paradigm, methodology and methods was paramount for this study. The phenomenon of interest, multi-professional care of the deteriorating patient in the ward environment, required an approach that enabled the researcher to get close to the action, so a methodology underpinned by the naturalistic paradigm provided the opportunity to study people in their natural surroundings.

Grounded theory fitted well with the phenomenon of interest because its aim is to explore social processes (Glaser and Strauss, 1967; Charmaz, 2006; 2014). If one subscribes to the constructivist perspective where reality is

seen as pluralistic, multiple and complex, and reality is different for individuals in different contexts (Appleton and King, 2002), then the grounded theory approach purported by Charmaz (2006; 2014) was an appropriate choice. As a novice in grounded theory methodology, the researcher was anxious to avoid criticism of methodological *slurring*, where the distinction between grounded theory and other qualitative approaches is blurred or where terms are misused and not specific (Baker, Wuest and Stern, 1992:1335). It was important therefore to include all of the key tenets that arguably constitute grounded theory methodology, namely theoretical sampling, the constant comparative technique, theoretical sensitivity, memo writing and theoretical saturation. Close adherence to the guidance of Charmaz (2006) supported this consistency to strengthen the rigour of the study.

a) Data gathering methods

A constructivist grounded theory approach required methods of data gathering that would enable the researcher to capture the multiplicity of the participants' experiences. Observation and interviewing facilitated this where, listening to what the participants said, watching what they did and interacting closely with them generated a rich, broad dataset, interpreted in context by the researcher. It is important to stress here that data gathering methods were not triangulated so that one would validate the findings of another, because that would be incongruent with constructivist thinking, rather data from both sources were valued equally and used to provide a broader range of insights into the subject area.

Interviewing and observation sessions complemented each other providing different types of data, together they gave a clearer picture of what was happening in the field, the strengths and weaknesses of each were therefore counterbalanced. For example, cases from interviews generally involved participant's talking about their own successes and negative aspects in the performance of others. During observations however, missed opportunities by the participants were noted. These might not have been raised in an interview situation, not because participants were being intentionally deceptive, but because in some cases limitations in their own knowledge meant they were unaware of the omission or its impact.

Observations over seven or eight hours might reveal one or two cases of deterioration. Conversely, interviews could be more productive where one hour could elicit up to six different cases of patient decline. But the observations provided unexpected insight into cases where only minor deterioration was observed. This expanded understanding on the use of subjective cues and the role of the patient's significant others in surveillance action and vigilant behaviour. This data might not have been accessible through interviews alone. Thus the observations revealed some of the taken-for-granted elements of care, for example, where HCSWs in close patient proximity, picked up some of the earliest subjective signs of patient deterioration, and this was seemingly part of their routine daily activity.

b) The researcher

Credibility of the researcher and familiarity with the subject area were important contributory factors to the study's rigour. Chapter Three depicts the researcher as an experienced specialist in the field of acute and critical care with over twenty years' experience in clinical, educational, operational, managerial and strategic level roles, underpinned by relevant academic qualifications. Coupled with knowledge of the setting, the researcher was therefore well placed to carry out the study into the phenomenon of multi-professional care of the deteriorating patient (Lincoln and Guba, 1985). A contrary perspective might suggest that as an insider, the researcher might not see things that an outsider would. To counteract this immersion in the world of the participants through observations and interviews was key. Checking out interpretations with participants through ongoing analysis and reflection on the process helped to make the researcher's position clear. From a constructivist perspective the researcher is part of the process, and as Charmaz (2014: 27) indicates, researchers are not *passive receptacles into which data are poured*.

c) Researcher reflexivity

Underpinned by a constructivist perspective, it was recognised from the outset that the findings of this study would be contextual in time, place and person. This means that another researcher with a different background, with other strengths and limitations, even with similar participants, could have produced different findings. So what I brought to the research was quite important in the whole process. Through use of reflexivity however,

any such influence could be made open and transparent and the outcomes of the research could be judged in accordance.

Reflexivity is defined as a process whereby the researcher *gains insight into their work that guides future actions and interpretations* (Birks and Mills, 2011:175), but Charmaz (2006) explains that it provides the opportunity for the reader to determine how much the researcher's background has influenced the inquiry. Essentially, for the current study it meant being aware of the potential effect of my experiences, beliefs, interests and assumptions could have on the study, as well as other influences from the values in the setting and the participants and interactions therein.

Personal concerns related specifically to my role as a senior member of the nursing team with a strategic role at the research site and how that might influence what participants said in the interviews and how they behaved in practice during observation. It is impossible to be sure, but this did not seem to be the case and participants talked freely to me as a researcher in the interviews and acted in practice how they had previously appeared to me in my usual role. This may be reflective of my approachability from many years' experience as a practice educator in ICU and as a clinical skills tutor at the university. Similarly, although not directly transferable to the research arena, my interviewing skills have been honed with patients in clinics where my prime focus is to encourage them to talk in a safe and comfortable environment. I know from both professional and patient feedback that I am

an attentive and active listener, and on a personal level, I am genuinely interested in and enjoy listening to what people have to say.

While the data gathering was less concerning than anticipated, the data analysis presented different issues. Pre-emptive personal reflection suggested that my focus might be on patient harm, based on my critical care experience of regularly admitting patients to ICU in extremis from acute wards where care prior to arrival had not been optimised. This was perhaps the case initially, where I may have judged harshly at first, encouraged in some cases by the participants' criticism of others. While reflective memos provided the opportunity for lone reflection, regular supervisory sessions with the support of two experienced researchers provided a 'sounding board', peer-debriefing for open discussion and an opportunity to identify any personal preconceptions. Their probing questions aimed at facilitating deeper levels of thinking to develop my theorizing skills. An unexpected benefit of the research process, therefore, has been my personal development in respect of an understanding of the wider perspectives involved in incident analysis, the complexities of any untoward event and the multiple factors that influence overall outcome in any situation. This has manifested in my professional development as an investigator of serious untoward incidents, recognised by the local coroner.

Peer scrutiny from colleagues in the preparation phase of a poster presentation and latterly its delivery at an international conference

provided additional opportunities for reflection prompted by 'outsider' support and scrutiny.

d) Sample and recruitment strategies

The sample used influences rigour of the study and credibility of the findings, but it was the range and depth of data that different participants from different settings and professional groups provided, rather than size that arguably supported trustworthiness in this case (Charmaz, 2006). The sample in this study was similar in size to that recommended by Stern and Porr (2011:52) who indicate that *30 to 40 interviews and hours of observation* usually provide sufficient data to reach saturation. The study had 33 participants. The quality of the data gathered from different participants was an important factor here that undoubtedly impacted on the sample size and achievement of data and theoretical saturation. A combination of participants volunteered. Some participants were very articulate in informative interviews and some busy clinical shifts provided rich sources of observational data, but some participants were more hesitant or the shift was unusually quiet. More of the latter would have inevitably required a larger sample size for data sufficiency.

Charmaz's (2006) measures of rigour place some weight on the range and depth of data, the use of a variety of settings and sufficiency of evidence in achieving credibility for any findings. In this study, participants were recruited from one site only, but from three different wards, medical and surgical, and from a range of professional groups, at different levels, grades

and experience, and over 26 months (two eight-month periods with an unavoidable ten-month break in between). Revisiting the site after a period of enforced absence may have inadvertently benefitted and captured different perceptions, perspectives or attitudes. From an interpretivist perspective, one is also cognisant not simply of the existence of multiple realities, but also the dynamic nature of reality and how the findings of this study are contextually based in time and place. Most importantly however, data sufficiency was determined by the achievement of data and theoretical saturation, through immersion in the field, after 26 interviews and 48 hours of observations, which elicited 85 cases for evaluation from 33 participants. At this point no new ideas were sparked by the data and all categories were saturated. Thus triangulation of participants, professional groups and areas of work and prolonged engagement in the field enhanced plausibility of the findings.

The initial recruitment strategy for participants, involving poster and verbal presentations to groups, elicited no spontaneous response. On reflection this approach was perhaps too impersonal, but predicated on a novice's concern to avoid any accusations of coercion. Visiting the wards and speaking directly to members of the multi-professional team about the project, however, was successful and this fits with Appleton and King's (2002) suggestion that interaction and discussion with potential participants is more likely to gain access and recognizes the interpersonal skills of the researcher. But it might also be because potential participants in this case were too busy to contact the researcher, whereas given a face-to-

face opportunity they were keen to volunteer as the process was simplified. Any concerns about coercion were dispelled when, during the interviews, the participants were keen to talk and in many cases little prompting was required. Early participants opted for observation and again this was thought to be reflective of extreme work pressures, whereby it was easier to be shadowed by a researcher (who would help them with some practical tasks) than take an hour out of a busy schedule for an interview. This was helpful to the recruitment strategy because the early observation sessions facilitated enhanced accessibility and visibility of the researcher to other potential participants, providing opportunities to build a rapport with the teams and recruit further volunteers.

One limitation of the sample in this study was the one-off nature of some researcher-participant interactions and this may have provided limited opportunities for comparison. All participants were consented for up to three data collection sessions, but only one RN (Chris), one HCSW (Alan) and one physiotherapist (Dawn) were interviewed or observed twice. Nevertheless, the two observations with Chris and Alan facilitated comparison between night and day shifts and their different roles, and were key in identifying the categories *competing priorities* and *needing support*. Two interviews with Dawn, several months apart allowed comparison over time, but the second interview only reinforced rather than contradicted what was said in the first and no new categories were generated. For most participants the one-off interview appeared to be sufficient, evidenced by participants having lots to say initially but towards the end of the interview

they started to run out of examples and this brought the interview to a natural end. A second interview may not have elicited many more cases, but in retrospect it may have provided further opportunity for deeper exploration of initial cases cited. No doctor was observed in practice and this may have provided deeper insights from the perspective of a responder and would have further enhanced credibility of the findings. Several doctors were interviewed and it is unknown whether observations of doctors would have elicited any further cases of deterioration.

e) Data analysis

Charmaz's (2006) text and grounded theory methodology (GTM) provided the novice researcher with a systematic approach to data analysis and a set of tools with which to complete the task: theoretical sampling, coding, constant comparison, memo-writing and theoretical saturation. The reality, however, was a non-linear, complex and, at times, chaotic process because the tools could not be simply applied in a prescriptive way, rather they had to be used intelligently and adapted in response to the findings of the study.

While initially the prospect of data from a wide range of sources, different professional groups and different ward areas seemed appealing, data analysis from multiple perspectives felt overwhelming at times. Coding for meaning was hard cognitive work. It was not a linear process; rather there was a need to move back and forth between and within transcripts. Initial stages with the first transcripts were straightforward, but as the volume of data built, the process became more chaotic and it was difficult to visualize

the dataset as a whole. At this point, manual handling was dispensed in favour of the computerised data organising software tool, NVivo®, but not before the use of manual highlighter-pen techniques, the use of post-it notes on wall-mounted posters and electronic computer-generated mind maps were exhausted. None of these techniques were satisfactory on their own, but going through the process was required in order to immerse oneself fully in the data and to learn the craft. Coding through NVivo® facilitated data sorting into concepts while at the same time maintaining a visual representation of the data as a whole.

NVivo® also facilitated the constant comparative technique. While manual comparison was not abandoned entirely, electronic data was easier to sort and compare. Where data was compared with data, codes could be compared with codes to elicit subtle differences within quotations within transcripts, within groups and across groups of participants. Furthermore the electronic record serves as an audit trail for repetition, peer review and local compliance monitoring. While there may be no best or preferred method, a combination of techniques supported the task in this study.

Member checking can enhance credibility of the analysis (Lincoln and Guba, 1985) where participants are asked to scrutinize the findings and feedback if they resonate with their experience or not. Participants in this study were asked to review their transcripts for accuracy only and were invited to remove any data that they may have retrospectively felt uncomfortable about having revealed (none chose to exclude any data). If one accepts that

the interpretivist approach is one in which knowledge is created in a particular time and place, and the existence of multiple realities is acknowledged, returning the overall findings to the participants for validation would not be consistent with the espoused methodology and was therefore not undertaken. When participants looked at their own data in retrospect, at a different point in time, from a different perspective, and without any knowledge of the larger dataset, they may have thought differently about the data. In this study, the interviews and observation sessions were used for member checking (Charmaz, 2006). The researcher checked out her understanding directly with the participant prospectively during the session, or ideas from previous sessions and emerging concepts from the analysis were tested out for their resonance on subsequent participants and different professional groups. Thus theoretical sampling provided an inbuilt process of member checking (Charmaz, 2006).

Transparency and leaving a clear audit trail is another hallmark of the study's credibility. The level of detail provided in Chapter Three regarding the research methodology aimed to provide other potential researchers with sufficient information to allow repetition of the study in the same way, using the same methodology, data collection and analysis (Pope and Mays, 1995). While this study is technically reproducible, any findings are arguably situated in a specific time, place and sample. The results of this study were therefore particular to this specific group of participants at a particular point in time constructed with and interpreted by a particular researcher. If one believes, as is purported from an ontological perspective

in this study, that truth is multiple, complex and dynamic over time, then another researcher with another group of participants might generate similar, but not exactly the same findings. The findings of this study are not generalisable, but they may resonate and transfer to similar or other settings. The setting for the research was described in detail so the consumer of this research will be able to identify differences in the contextual nuances, but it is anticipated that the core concept, making the link, will be globally relevant to healthcare professionals.

Memos were used to capture thoughts, ideas, and insights into the data analysis (Charmaz, 2006) and as such, were instrumental in delivering the required methodological audit trail (Birks and Mills, 2011). These were duly written and subsequently sorted in relation to the codes, categories and concepts identified and remain filed, available for scrutiny. They were not included in the final thesis as they were very preliminary ideas. However, what they may show to an interested observer is the nascent ideas of the concepts articulated in this thesis. On a personal level, developing memo-writing skills proved most difficult of all analytical devices and presented a significant opportunity for learning. Charmaz (2006) advises to write freely, without deep thought or attention to syntax, and this was duly followed with the promise from Charmaz that these would form early drafts for sections of the thesis. In writing the thesis, what ultimately transpired was that all iterations were in effect, an exercise in further theoretical memo writing, and a continuation of the analysis process, but it is only with a retrospective view that this became apparent.

How decisions were made regarding the development of categories from codes, and concepts from categories is illustrated in Tables 12 to 14, Figures 2 to 4 and 7 to 18 and Boxes 1 to 4 found throughout the findings and discussion chapters. Facilitated by NVivo®, the aim was to clearly delineate how the key concepts and the core process, which interlinked them all, were derived. Sorting with NVivo® enhanced the extensive use of quotations to illustrate categories. This potentially enables any consumer of the research to make their own informed decision regarding dependability of the data and resonance of the findings from the minutiae of detail provided.

Checking out the findings with others through peer review enhanced credibility and resonance of the findings, as did the triangulation strategies that provided multiple opportunities for data comparison (within transcripts, across different groups of professionals and from participants working in different areas of the hospital, looking after different types of patients, with medical and surgical conditions).

As well as being a novice in grounded theory methodology, the researcher had limited experience in theorizing. These issues were countered by the guidance of two expert naturalistic researchers, supervising the process and providing an opportunity to learn in a safe, supportive environment, and this may go some way to counter the limitations of the lone researcher.

There may have been some benefits from a sole researcher with a consistent presence and a clear view of the data from all participants: a collective, holistic knowledge that might be lost with multiple researchers. Debriefing

with supervisors was an essential part of the learning and quality control process, as was reflexivity.

6.2.2 Ethical issues

Ethical issues and rigour are closely aligned. There were no significant ethical issues during the execution of this study and arguably this is the result of careful planning where the study design was built on firm ethical foundations. Researcher confidence and assurance can therefore be provided where the study was completed in an ethically sound and problem-free way, as evidenced by the absence of untoward incidents in respect of autonomy (privacy and confidentiality), consent, beneficence, non-maleficence and justice. No participant became visibly upset during an interview or observation session, no participant indicated that they may have suffered any harm as a result of the data gathering, no participant chose to withdraw from the study during or after data collection and there were no significant events to report formally during the research process. If the researcher had observed or been made aware of any examples of poor practice or if the researcher needed to provide emergency support in the clinical environment should a patient become critically ill, plans were in place to respond appropriately, however neither of these situations occurred during the observation or interview sessions. The local ethics committee granted permission to proceed with the study and all materials remain in storage (as described in Chapter Three) in preparation for any local audit of compliance with the agreed research process.

While the researcher was considered to be an integral part of the study, where participants and researcher would interact to construct the data, the execution of the study during the data gathering presented some subtle personal ethical concerns. Stepping out of the role of nurse consultant-teacher and assuming the role of researcher was initially an unanticipated difficulty, specifically where missed opportunities presented in practice. As an interested observer, with nursing skills and some expert knowledge, this generated difficulty in remaining non-committal and non-interventional, particularly in the first observation session, but this improved with practice and supervision. This was tested further when working with a nurse participant whose knowledge was clearly limited, exacerbated by a huge nighttime caseload of 12 patients that included two acutely ill deteriorating patients and a delayed response to calls for assistance from others with equally resource-limited roles. Taking a naïve approach, I encouraged the participant to explain some clinical issues as she addressed them in practice, already knowing the answer. The participant willingly and kindly attempted to teach me about the hemodynamics of blood pressure and central venous pressure monitoring, but fraught with mistakes and misleading information. I countered her limited understanding by providing some reading materials after the event. The discomfort of not being able to address the problem head-on with overt support and advice in my normal operating mode was an unanticipated drain on personal emotional resources as the differences between researcher mode and clinician mode were highlighted.

6.3 Strengths and limitations of the study

A lone, novice researcher carrying out a study in a single-centre, as a part-time student while maintaining full-time employment in the NHS presents a number of potential limitations to the research process. The long duration of the study programme and the dynamic nature of practice resulted in some of the findings and recommendations having already been resolved before the study concluded. These limiting factors also add strength to the work however. Time spent in the field with a variety of participants from different groups of professionals at different times of the day and night added quality and completeness to the data that a brief sojourn would not have delivered. The researcher was a novice, but this was counteracted with the supervisory support of two experienced researchers.

Lacking in confidence from limited experience the novice researcher followed the rules carefully and concerns regarding methodological inconsistency motivated adherence to the directions of Charmaz (2006) with precision. Thus one of the strengths of the study is found within the methodological precision and subsequent inclusion of all the key tenets of constructivist grounded theory.

Given the chance to repeat the study, there is one key issue I would like to address. The findings would have been enhanced through the observation of participants from other professional groups. Registered and unregistered nurses were observed, but the opportunity to observe doctors,

physiotherapists or pharmacists did not present. All professional groups were interviewed however.

6.4 Conclusion

This study aimed to discover what happened when patients deteriorated clinically on hospital wards, how the multi-professional team identified deterioration, how they defined it, how they responded to it, communicated it and acted, what issues and concerns they had, what factors enhanced or inhibited the process and how they made sense of it all.

Box 5. Aims and objectives of the research (from section 1.3)

Aim: What happens in practice on the ward amongst the multi-professional team when acutely ill adult patients deteriorate clinically?

Objectives: To explore, understand, describe and explain

- What happens on the ward when patients start to deteriorate?
- How do healthcare professionals know that a patient is deteriorating, how do they define it and communicate it to each other?
- What issues and concerns are relevant to practitioners in the clinical environment? What are the enhancing and inhibiting factors?
- What do they do in practice and how do they make sense of what they say and do?

It has been argued that this type of knowledge generation necessitated an approach that would allow the researcher to get close to the action. By using a grounded theory approach, the researcher was able to access prospective data through observing the multi-professional team in action on the wards,

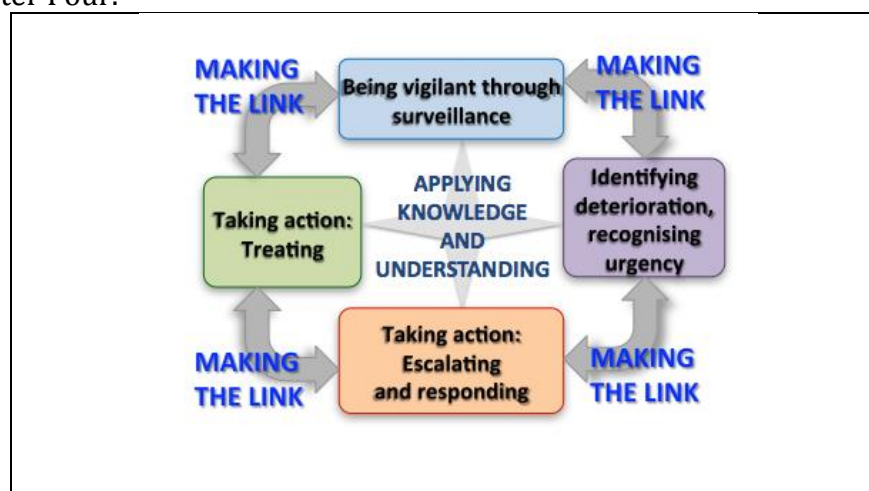
caring for acutely ill patients and, or, interviewing them to obtain retrospective information about their past experiences of patient deterioration. Box 5 above summarises the aims and objectives of the study.

Four key concepts were developed, which describe, explain and extend understanding of what happens amongst the multi-professional team on the wards when patients deteriorate

- Being vigilant through surveillance
- Identifying deterioration and recognizing urgency
- Taking action: escalating and responding
- Taking action: treating.

Figure 7 below is a repeat of that presented at the outset of Chapter Four and illustrates the focal point of the framework only, which shows how a core process, making the link, connects these four concepts.

Figure 7 (repeat). The four key concepts connected by the core process *making the link*. This figure focuses on the central components taken from the full conceptual framework presented in Figure 7 above in Chapter Four.



In order to identify deterioration, members of the multi-professional team observed the patient, conscientiously watching, getting to know them through continuity of care, in close proximity and working with their significant others. Participants needed to be perceptive (first level situational awareness), frequently checking their interpretation of subtle cues from the patients and their environment with objective measures. Thus the patient was surveyed closely and staff remained vigilant for the early warning signs that could pre-empt deterioration, namely *being vigilant through surveillance*.

This study revealed new ways of working that have the potential to further improve surveillance capacity on the wards. HCSWs were highlighted as a significant source of secondary vigilance and all valued their early identification of subtle cues. One ward reported cohorting patients, segregating those who were at greatest risk of deterioration into one bay where one nurse with a smaller-than-normal caseload could closely observe them. A new concept, *layperson vigilance*, where the patient's significant other sometimes recognizes the early subtle changes that forewarn deterioration has the potential to be used proactively, so staff can intervene before problems develop.

For information obtained through vigilant surveillance to be meaningful, an understanding of surveillance data was required (second level situational awareness) in order to make the link, recognizing urgency where appropriate. Potentially distracted by frequent interruptions, competing

priorities from large patient caseloads, they were assisted in this process by a checklist (a track and trigger scoring tool) to stratify patient decline and urgency.

Once identified and recognized participants had to project or anticipate what might happen in the future (level 3 situational awareness), they had to make the link and decide if support was needed; taking action by escalating to a doctor, specialist nurse or physiotherapist. Based on the message from the caller-escalator, the responder, too, had to make the link and decide whether to attend, or not, but taking action by responding was also influenced by similar resource issues to those of the caller. This study has revealed how the potential authority gradient between caller and responder could be reduced. A credible, persistent, knowledgeable caller, empowered to convey urgency with sufficient, structured objective information and a good rapport, could positively influence a responder's attendance.

On arrival, the responder had to decide on appropriate action by treating the patient, making the link with the intelligence gathered. For some, the fear of harming the patient could present barriers to treating deterioration and the need for team situational awareness was therefore crucial. The nurse, as a consistent presence, was ideally placed to support *collective knowing* and team situational awareness, putting all the pieces of a metaphorical jigsaw together, making the link to facilitate a shared mental model of patient deterioration.

These four concepts support previous research and the linear pathways they have highlighted (Odell et al., 2009; DH, 2009), now entrenched in NHS practice by NICE (2007). However, this four concept-based process is not sufficient to capture what sometimes happens in practice. The current study demonstrated that the process could be non-linear and uncovered the multiple associated factors that enhanced or inhibited a safe direction of movement. The framework presented in this study adds the crucial core process, making the link, not considered previously but important because it supports progression through the trajectory.

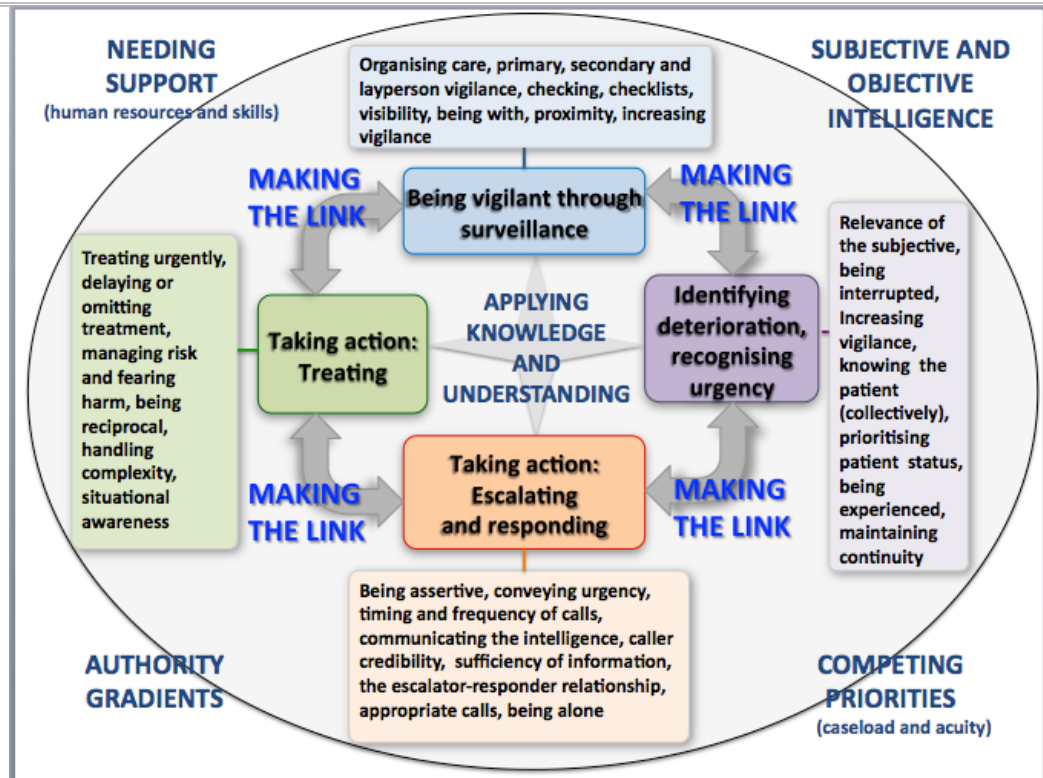
These findings therefore go some way to explaining why previous researchers have struggled to clearly demonstrate the beneficial effects of implementing a rapid response system. Essentially, there are so many factors that influence the progress of care for any individual, that is, multiple opportunities where things can go wrong (as illustrated by the red route in Figures 11, 15 and 17 above), therefore it is very difficult to isolate the specific effects of a score or a team.

More importantly, where this study adds to the current understanding is the emphasis on *making the link*. This core process required the application of knowledge and skills and different levels of situational awareness in order to move through what might, on the surface, have appeared to be a linear trajectory. This process too could be influenced by factors sometimes beyond the control of the participants, associated with each of the four concepts and illustrated in the framework. Knowing what to do, what action

to take was crucial, but there were limited checklists in place that guided the participants, with the exception of the sepsis protocol and the physiological track and trigger tool for the acutely ill deteriorating patient. Thus this study revealed how there was considerable caution around the administration of vital interventions like oxygen therapy for the hypoxic patient and intravenous fluids for the hypovolemic, cardiovascularly compromised patient, where *fear of harming* the patient sometimes restricted intervention to treat deterioration.

The conceptual framework below summarises this concluding section.

Figure 19. The conceptual framework: Making the Link. This is a reproduction of the figure illustrated at the end of Chapter 4, provided for the reader's convenience.



6.5 Recommendations

This section provides a list of recommendations for practice and policy, research and education.

6.5.1 Practice and policy

This study has highlighted the importance of *being vigilant through surveillance* and a potential gap exists where surveillance capacity can sometimes be low. Recommendations are aimed at increasing this.

- HCSWs were identified as a key source of surveillance. This resource should be valued and developed further in conjunction with the importance attributed to patient observation. Use of the *sterile cockpit rule*, that is where vital patient care activities are valued, prioritised and protected from disturbance, which has the potential to ensure both accuracy and timeliness of surveillance activities.
- The patient's significant others have been recognized here as a valuable source of some of the earliest indicators of deterioration manifest in the new concept *layperson vigilance*. Ways in which lay involvement can be developed, but not depended upon, should be explored in practice. Empowering the patient's significant other to contact the ward-based staff for assistance when they recognise signs of deterioration in their loved one, that might not be immediately apparent to others, could be further explored.
- Cohorting patients where the sickest patients are housed in a bay together and can be visualized together cared for by a nurse with additional skills and a smaller caseload of acutely ill patients may be

the way forward as the number of deteriorating patients continues to rise. This way of organizing care needs further investigation in practice and the Safer Nursing Care Tool (Shelford Group, 2013) may present a way forward to guide this work. As well as serving nurse managers with an evidence-based staffing calculation, the tool could provide an objective method of identifying groups of patients who would benefit from cohorting. It could also serve as an alert, in addition to the track and trigger score, to highlight areas of high-level acuity in need of additional support and attention.

- The importance of knowing the patient from complex and multiple perspectives was a key finding, but ways in which this shared knowledge can be captured is crucial. The nurse potentially has an important and central role to play in this process. It is recommended that the nurse may be ideally placed to lead ward rounds and update the team on the multi-professional perspectives throughout the day and night.
- An authority gradient was a key inhibitor in communicating patient deterioration amongst the members of the multi-professional team. This needs further exploration of how this might be overcome but it is recommended that the following might be a way forward,
 - The use of a structured communication tool such as SBAR
 - Empowering nurses to use subjective cues to summon help by adding them more specifically to the track and trigger tool
 - Opportunities for multi-professional training

6.5.2 Research

- Visibility has been identified as a key inhibiting factor in vigilance and surveillance and more research is required regarding the effects of single cubicles in NHS hospitals. The current research site is ideally placed for this with 50% of the beds housed in single rooms.

6.5.3 Education

- Addressing the fear of harming a patient associated with treating deterioration needs to be addressed through training curricula, but also by providing support in clinical areas to guide the novice in the decision making process and to help them make the link. Developing clear treatment protocols that include the use of oxygen and intravenous fluid therapy should be explored. Rapid response protocols identify when to call and who to call for support, but there is little guidance regarding what to do in some urgent situations. This may be the way forward, standardizing actions in response to key problems encountered by the response teams, and helping all professionals to make the link.
- This research has emphasized the multi-professional aspect to the rescue process for the care of the deteriorating patient. It is recommended therefore that all available opportunities be explored for shared learning.

I leave the final words in this thesis from two study participants, who said,

“If you think there is any reason they might go off then you just have to keep going in and checking... check a bit more, just double-check (2N1:22)”

“The problem is while you get a patient ‘go off’ for want of a better word, I do think that other people have to wait in the background, and if a second goes off, we’re in trouble (F1:20).

7.0 References

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Appendices

Appendix 1. The National Early Warning Score - NEWS (RCP, 2012)

PHYSIOLOGICAL PARAMETERS	3	2	1	0	1	2	3
Respiration Rate	≤8		9 - 11	12 - 20		21 - 24	≥25
Oxygen Saturations	≤91	92 - 93	94 - 95	≥96			
Any Supplemental Oxygen		Yes		No			
Temperature	≤35.0		35.1 - 36.0	36.1 - 38.0	38.1 - 39.0	≥39.1	
Systolic BP	≤90	91 - 100	101 - 110	111 - 219			≥220
Heart Rate	≤40		41 - 50	51 - 90	91 - 110	111 - 130	≥131
Level of Consciousness				A			V, P, or U

*The NEWS initiative flowed from the Royal College of Physicians' NEWSDIG, and was jointly developed and funded in collaboration with the Royal College of Physicians, Royal College of Nursing, National Outreach Forum and NHS Training for Innovation.



NEW scores	Clinical risk
0	Low
Aggregate 1-4	
RED score* (Individual parameter scoring 3)	Medium
Aggregate 5-6	
Aggregate 7 or more	High

Reference

Royal College of Physicians (2012) *National Early Warning Score (NEWS): Standardising the assessment of acute-illness severity in the NHS*. Report of a working party. London: RCP, 2012. Found at <http://www.rcplondon.ac.uk/sites/default/files/documents/national-early-warning-score-standardising-assessment-acute-illness-severity-nhs.pdf>
Last accessed 14/02/15

Appendix 1 (continued) NEWS (RCP, 2012) The observation chart

NEWS KEY 0 1 2 3		NAME:	D.O.B.	ADMISSION DATE:		
DATE				DATE		
TIME				TIME		
RESP. RATE	≥25		3		≥25	
	21-24		2		21-24	
	12-20				12-20	
	9-11		1		9-11	
	≤8		3		≤8	
SpO ₂	≥96		1		≥96	
	94-95		2		94-95	
	92-93		3		92-93	
	≤91				≤91	
	Inspired O ₂ %	%	2		%	
TEMP	≥39°		2		≥39°	
	38°		1		38°	
	37°				37°	
	36°		1		36°	
	≤35°		3		≤35°	
NEW SCORE uses Systolic BP BLOOD PRESSURE	230		3		230	
	220				220	
	210				210	
	200				200	
	190				190	
	180				180	
	170				170	
	160				160	
	150				150	
	140				140	
	130				130	
	120				120	
	110		1		110	
	100		2		100	
	90				90	
80		3		80		
70				70		
60				60		
50				50		
HEART RATE	≥140		3		≥140	
	130		2		130	
	120				120	
	110		1		110	
	100				100	
	90				90	
	80				80	
	70				70	
	60				60	
	50		1		50	
	40				40	
	30		3		30	
	Level of Consciousness	Alert				Alert
		V / P / U		3		V / P / U
	BLOOD SUGAR					Blood Sugar
TOTAL NEW SCORE					TOTAL SCORE	
Additional Parameters	Pain Score				Pain Score	
Urine Output					Urine Output	
Monitoring Frequency					Monitor Freq	
Escalation Plan Y/N n/a					Escal Plan	
Initials					Initials	

Reference

Royal College of Physicians (2012) *National Early Warning Score (NEWS): Standardising the assessment of acute-illness severity in the NHS*. Report of a working party. London: RCP, 2012. Found at <http://www.rcplondon.ac.uk/sites/default/files/documents/national-early-warning-score-standardising-assessment-acute-illness-severity-nhs.pdf>
Last accessed 27/7/13.

Appendix 2: Results of the literature search (November 2014)

Search 1: Key author search - Elicited 84 results

	Cinahl hits	Medline Hits (titles filtered)	Embase Hits (titles filtered)	Exclusions and duplicates filter	Abstract filter
DeVita M	14	67	77	24	11
Hillman K	65	111	156	21	15
Smith GB	50	243	279	19	17
Subbe C	8	30	38	14	12
Cioffi J	34	40	41	40	6
Buist M	7	40	50	40	3
Odell M	58	100	122	8	4
Endacott R	90	100	98	17	16
Total					84

Search 2: Acutely ill /deterioration/ ward-based

Removing any of the previous hits identified by the key author search and applying the exclusion criteria elicited 38 results

		Cinahl Hits	Medline Hits	Embase Hits	
1	Deteriora*	9211	82622	123581	38
2	At risk	426850	108960	147251	
3	Ward or ward-based	286	26182	11480	
4	1&2&3	3	32	59	
	Title and abstract filters applied	0	15	23	

Search 3: Track and trigger scores (and synonyms) - Removing any of the previous hits identified by the results of searches 2 and 3 and applying the exclusion criteria via the title and abstract elicited 48 results

	Cinahl Hits	Medline Hits (title filter)	Embase Hits (title filter)	Filtered by exclusions and duplicates	Abstract screen
National early warning score	16	11	45	31	48
Track and trigger	3	2	8	2	
Patient at risk		1	2	2	
Physiological track and trigger	3	2	3	2	
Early warning score	56	88	169	27	

Search 4: Rapid response teams

Excluding any duplicate results from searches 1, 2 and 3 and applying the exclusion criteria to the title and abstract elicited 217 results

	Cinahl	Medline Title filter	Embase title filter	Exclusions and duplicates filter	Abstract filter	Total
Critical care outreach team	14	53	91	53	8	217
Medical emergency team	66	251	464	131	44	
Rapid response system	84	85	135	85	26	
Patient at risk team	3	3	5	3	1	
Rapid response team	222	447	390	183	140	

Search 5: Miscellaneous terms

		Cinahl	Medline	Embase	Exclusions and duplicates filter (titles)	Abstract filter	Total
1	Failure to rescue	141	281	352	95	79	85
2	Nurse concern	4	8	10	2	2	
3	Antecedents	1742	5187	6712	7	4	
4	Vital signs	3711	7262	12858			
5	3+4	0	3	8			

Total studies reviewed 472

Appendix 3. Summary of participants and data collection

Code	Role (<i>Sn = senior</i>)	Method	Duration (hrs)	Date	
1A1	Alan	HCSW	observation	5	Oct 2010
1B1	Betty	RN	observation	10	Oct 2010
1C1	Chris	RN	observation	3 (night)	Oct 2010
1C2	Chris	RN	observation	7	Oct 2010
D1	Dawn	Physiotherapist (sn)	interview	1	Nov 2010
D2	Dawn	Physiotherapist (sn)	interview	1	July 2012
1E1	Elly	RN	interview	1	Dec 2010
1F1	Farah	RN	interview	1	Jan 2011
2G1	Gail	RN	observation	4	April 2011
2H1	Helen	RN (sn)	observation	4	April 2011
2J1	John	RN	observation	3.5	April 2011
K1	Kate	Physiotherapist	interview	1	April 2011
2M1	Mary	RN	observation	4.5	April 2011
2N1	Nora	RN	interview	1	May 2011
2P1	Polly	RN	interview	1	May 2012
1R1	Rita	RN	interview	1	May 2012
1S1	Sue	RN	interview	1	May 2012
2T1	Trish	pharmacist	interview	1	May 2012
U1	Una	physiotherapist	interview	1	July 2012
V1	Val	physiotherapist	interview	1	July 2012
2W1	Wanda	HCSW	interview	1	Aug 2012
X1	Xavier	physiotherapist	interview	1	Aug 2012
Y1	Yvonne	physiotherapist	interview	1	Aug 2012
Z1	Zoe	physiotherapist	interview	1	Aug 2012
3AA1	Alice	RN (senior)	interview	1	Aug 2012
1BB1	Bob	pharmacist	interview	1	Aug 2012
1CC1	Carole	RN (senior)	interview	1	Sept 2012
3DD1	Darcy	RN	interview	1	Sept 2012
3EE1	Elaine	RN (senior)	interview	1	Sept 2012
1FF1	Fabio	Dr (junior)	interview	1	Oct 2012
1GG1	Gill	Dr (junior)	interview	1	Oct 2012
1HH1	Harry	Dr (surgeon)	interview	1	Nov 2012
2JJ1	Jim	Dr (physician)	interview	1	Nov 2012
1KK1	Kerry	RN	observation	7	Dec 2012
3LL1	Linda	HCSW	interview	1	Dec 2012
TOTAL TIME			74 hrs		
INTERVIEWS			26 hrs		
OBSERVATIONS			48 hrs		
PARTICIPANTS			33		
HCSWs			3		
RNs			16		
Doctors			4		
Physiotherapists			8		
Pharmacists			2		

Appendix 4: Staff Talk Poster *(Contact details and Trust logo removed)*

«Staff Talk»

Confidential & Free counselling service for staff

Are you feeling...

- Stressed
- Anxious
- Harassed
- Depressed

Or having difficulties with...

- Relationships
- Confidence
- Finances
- Working conditions



«Staff Talk» can offer you 6 sessions in a range of locations at a time that suits you, to help you overcome these difficulties.

We offer:

- A completely confidential self-referral service (any exceptions to this will be clearly outlined in your first session)
- About six sessions of counselling
- Help to find other resources if counselling is not for you
- Help with work-related and non work-related issues

**Appendix 5: Letter of invitation for potential participants (V1
31/12/09)**

TRUST LOGO HERE

**LETTER OF INVITATION (V1, 31/12/09)
Multi-professional care of acutely ill adults: a grounded theory
approach.
Researcher: Michele Platt**

Date
Address

Dear

I would like to invite you to take part in a local research project being undertaken by me in my role as a PhD student with the University of Warwick, exploring the care of deteriorating acutely ill adults on the wards.

You have been invited to take part because you work on an acute ward in the Trust where you are likely to have been exposed to clinical situations in which acutely ill patients deteriorate. I would like to talk to you about your experience and / or observe you in clinical practice to find out more about the processes you and your colleagues go through when patients become ill.

If you would like to take part or find out more, please contact me on the intensive care unit.

If you have any questions about the research or would like to talk further about your potential participation please contact me via my office telephone ***** ext ****, or on the intensive care unit on ext ****, or call ***** and ask for me by name. I carry a Blackberry and can also be contacted by email on (email supplied)

Yours truly

Michele Platt

Enc. 1

Appendix 6: Information sheet for potential participants (V1,

31/12/09)

TRUST LOGO HERE

**INFORMATION SHEET FOR POTENTIAL PARTICIPANTS (V1,
31/12/09)**

**Multi-professional care of acutely ill adults: a grounded theory
approach.**

Researcher: Michele Platt

I would like to invite you to take part in a research study exploring the care of deteriorating acutely ill adults on the wards. Before you decide if you would like to participate, you need to understand why the research is being carried out and what it would involve for you. This information sheet has been designed to help you decide. Please take time to read and consider the information carefully. Talk to others about the study if you wish, but please ask me if there is anything that is not clear or if you would like more information to help you make your decision.

What is the purpose of the study?

Acutely ill patients can present the healthcare team with a number of challenges when they deteriorate on the wards. By combining qualitative interviews and observations of practice, this study aims to explore what happens when a patient becomes ill, what communications and actions take place and how professionals make sense of what they say and do. By developing a greater understanding of the processes involved in identifying and caring for the deteriorating patient, findings from this study will be useful for developing practice in this area.

Why have I been invited to take part?

I am interested in interviewing or observing doctors, registered nurses, healthcare support workers, physiotherapists, pharmacists and occupational therapists who have experience of caring for acutely ill patients.

Do I have to take part?

It is up to you to decide whether or not to take part. If you decide not to take part in the study your wishes would be respected and no further contact will be made.

What would happen if I decide to take part?

If you decide to take part you may choose to agree i) to undertake from one to three interviews or ii) to observations of your practice or iii) to both interviews and observation.

If you agree to take part in an interview, it will be in the hospital at the end of, or just before your shift, or at a time most suitable for you. It will take

place in the seminar room on ***** or an alternative venue of your own choice within the hospital, should you prefer. The interview may last up to 60 minutes. I would like you to tell me about situations in which you have been involved in caring for a deteriorating patient on your ward and your thoughts and feelings about these experiences. I would like to digitally record the interview so that I can concentrate on what you are saying without having to write extensive notes. I will transcribe the interview from the recording into a password protected computerised file, using earphones so that it cannot be overheard.

If you agree to take part in an observation session I would like to shadow you (similar to having a student) whilst you are working to get a feel for what happens when patients become acutely ill. I would be able to help with simple every day tasks but will not be working as a registered nurse. I would arrange a suitable time for you when I am able to shadow you on your ward. The observation session would usually be for a full shift. I will make brief hand-written field notes at convenient points during the session, but will make more extensive notes at the end. You can ask me to withdraw at any time during the observation without giving an explanation.

Will my taking part in the study be kept confidential?

All information collected from you during the course of the research will be kept strictly confidential. Your anonymity will be maintained throughout the study through the use of a pseudonym, allocated to you on commencement of the data collection. Your full name will appear only on the consent form and a file, for my reference only, listing all participants and contact details. I will be responsible for ensuring that when collecting or using data, legal or regulatory requirements in any part of the UK are upheld.

Unlike the interviews, which will be conducted in private, observations will take place on the ward so there is a possibility that your colleagues on duty might realise that you are involved in research. I will inform them of my presence and my role as a researcher. Direct quotations made by you and others may be used in the final report. You will be asked to give signed consent for this to happen. You may be able to recognise your own voice in the report, but your name will not be linked to any quotation.

If during data collection, it becomes clear there is a persistent problem in clinical practice, I will suggest that you discuss the issue with a senior colleague on the team. I will undertake my responsibilities of disclosure within the principles outlined by the Nursing and Midwifery Council (NMC, 2008). If I encounter care that requires immediate action I will take appropriate steps to ensure patient safety.

I will analyse the data and my academic supervisors at the University of Warwick will review portions of the raw data. Data will be anonymised before they see it, so it will not be possible to trace it back to you.

Will I receive any expenses or payment for taking part?

There is no payment available for taking part in this study. The researcher will make every effort to ensure that data collection takes place at a time and place convenient to you.

What are the possible benefits of taking part?

Taking part in the study would give you the opportunity to review and talk about your practice caring for acutely ill patients on your ward and it is hoped that this would be a useful experience for you. This cannot be guaranteed however. The information from this study may be used to guide future developments in this area of practice and it is hoped it will increase our understanding of care of acutely ill patients.

What happens to me after taking part?

Once the interviews and/or observation sessions are completed your direct involvement in the study will be over. If you have any questions that occur at a later date, I will answer these as best as possible if you contact me directly. You will receive a letter of acknowledgement and thanks for your involvement and you will be given a summary of the findings to keep.

What are the possible disadvantages and risks of taking part?

The associated risks of taking part in this study are minimal. Data collection might highlight potentially sensitive issues that may prompt you to question your own actions and those of others. There will be an opportunity after the session to debrief with the researcher, but if you need further support in response to some of the issues raised during the study, you can contact the confidential, self-referral counselling service available free to all Trust employees at *Staff Talk*, contact number 01623 784910 (information leaflet attached, V1, 31/12/09).

What if there is a problem?

If at any point during your participation you feel that you do not wish to continue your involvement with the study, you can withdraw without giving any reason. The researcher will stop the observation or interview and recording.

If you chose to withdraw from the study during or after your participation, you can decide whether or not any data collected from you before your withdrawal is included. Unlike other types of research however where all data is collected before the analysis starts, in the approach used here (grounded theory) data collection and analysis take place simultaneously. This means that findings from my early analysis of the first data collection will direct my subsequent data collection and it would not be possible to completely remove your data from the study once the analysis has begun.

In the unlikely event that something does go wrong and you are harmed during the research and this is due to someone's negligence, then you may have grounds for a legal action for compensation against the

sponsor of the research, which is the University of Warwick, but you may have to pay your legal costs. If you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the course of this study, the normal NHS complaints mechanisms will be available to you.

What if new information becomes available?

Sometimes in the course of a research project, new information becomes available about the issue that is being studied. If this happens, I will tell you about it, discuss it with you and whether you want to continue in the study.

Who is organising and funding the research?

The University of Warwick is sponsoring the research and providing indemnity. As the research is being undertaken as part of an academic qualification, external funding has not been sought. The researcher will not receive payment for carrying out the study. My employers (*****) have funded my PhD studies and have provided me with time in which to undertake this work.

Who has reviewed the study?

The proposal for this research was reviewed by my academic supervisors at the University of Warwick, and by two independent researchers, also from the University of Warwick, but not previously known to the researcher. The NHS Research Ethics Committee, an independent group of people who aim to protect the safety, rights, wellbeing and dignity of research participants has reviewed this study and permission has been granted to proceed. The Directors of Nursing and Medical Director have given their permission for me to commence the study.

What should I do next?

It is hoped that this information sheet has provided you with sufficient information in order for you to make a decision as to whether or not you would like to take part in the study. If you would like to discuss your invitation with an independent person who has no personal involvement in the research you can contact ***** *name and phone number supplied*

Thank you for reading this information leaflet and considering your participation in this study. If you need any further information at any time please contact

Michele Platt, RN (Researcher).
Contact details supplied here

Appendix 7: Information leaflet for staff (V2 05/05/10) *Trust logo and contact details removed.*

**Multi-professional care of acutely ill adults:
A grounded theory approach**

Key research suggests that the care of acutely ill patients can sometimes be suboptimal and once complications set in we may be unable to rescue the patient's life. This is a key area of interest in the Patient Safety Campaign

www.patientsafetyfirst.nhs.uk

The Augmented Care Assessment Tool (ACAT) helps us to identify deteriorating patients and the Critical Care Outreach Team is on hand to assist when required, but it would be helpful to know what happens before Outreach arrive.

- **What helps or hinders you in practice?**
- **How do you recognise a deteriorating patient?**
- **How do you share this information with your team?**
- **What have been your experiences of caring for very sick patients? How have they changed over time?**

If you are a doctor, registered nurse, healthcare support worker, physiotherapist or occupational therapist, I would like to talk to you about these issues and perhaps observe you in practice on the ward. Your participation would be entirely voluntary and all data collected would be treated in the strictest confidence.

Appendix 8: Information Poster for Staff (V1, 31/12/09) *Trust logo and contact details removed.*

Multi-professional care of acutely ill adults: A grounded theory approach

What happens on your ward when an acutely ill patient deteriorates?



Are you a nurse, doctor, healthcare support worker, physiotherapist or occupational therapist interested in taking part in a research study about the care of acutely ill patients?

I am a PhD student, working in the Trust, and would like to observe you in practice and/or talk to you about your experiences with acutely ill patients on the wards. If you would like to take part please contact me for further information on one of the numbers below.



Appendix 9: Information poster for staff, patients and visitors - Trust

logo and contact details removed.

**Multi-professional care of acutely ill
deteriorating adults**



A PhD student (a registered nurse) is currently carrying out a research project on this ward. She is observing nurses, doctors, healthcare support workers, physiotherapists and occupational therapists, looking at what they say and do while they are caring for acutely ill patients.

The focus of the study is specific staff on the ward who have given their consent to be observed. Sometimes the researcher will be observing a member of staff around a patient's bed.

She will not be recording anything about what the patients say or do, but if you feel that you do not wish to be involved in the observations in any way, please make your feelings known to a member of staff or the researcher.



It is important to note that the poster above indicates that nothing would be recorded about what the patient said or did. Nothing the researcher overheard the patients say was recorded. Signs of clinical deterioration were recorded by the researcher, but only in respect of what the participants said and the subsequent actions taken by them in response to those changes.

Appendix 10: Consent form for interviews (V2, 05/05/10)

TRUST LOGO REMOVED

CONSENT FORM A (INTERVIEW) (V2, 05/05/10)
Multi-professional care of acutely ill adults: a grounded theory approach.
Researcher: Michele Platt

1. I confirm that I have read and understood the *Information Sheet For Participants* (V1. 31/12/09) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason. ☐
3. I understand that relevant sections of my personal details and data collected during the study may be looked at by individuals from regulatory authorities including those bodies assigned to ***** I give permission for these individuals to access this information. ☐
4. I understand that the interview will be digitally recorded and the contents of that recording will be transcribed by the researcher. At this stage I understand that pseudonyms will be given to protect mine and others' identity. ☐
5. *Verbatim* quotations may be used within the report. I give permission for this to happen. ☐
6. I agree to take part in the above study. ☐

.....
Name of participant	Date	Signature
.....
Name of person taking consent	Date	Signature

Appendix 11: Consent form for observation (V2, 05/05/10)

TRUST LOGO REMOVED

CONSENT FORM B (OBSERVATION) (V2, 05/05/10)
Multi-professional care of acutely ill adults: a grounded theory approach.
Researcher: Michele Platt

1. I confirm that I have read and understood the *Information Sheet for Participants* (V1. 31/12/09) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving reason. ☐
3. I understand that relevant sections of my personal details and data collected during the study may be looked at by individuals from regulatory authorities including those bodies assigned to *****. I give permission for these individuals to access this information. ☐
4. I understand that I will be observed in clinical practice by the researcher Michele Platt who will write field notes about what she observes. ☐
5. I agree that the researcher may ask me brief questions about clinical practice during the observation sessions. ☐
6. I understand that the field notes will be transcribed by the researcher. I understand that pseudonyms will be given to protect mine and others' identity. ☐
7. *Verbatim* quotations may be used within the report. I give permission for this to happen. ☐
8. I agree to take part in the above study. ☐

..... Name of participant Date Signature
..... Name of person taking consent Date Signature