Clinical Decision Making in Uncertainty; An Ethnography of a Complex Intervention in the Ambulatory Emergency Care setting

Dr Sara McKelvie

Trinity College
University of Oxford

Doctor of Medicine
Hilary Term 2021

Abstract

Clinical Decision Making in Uncertainty; An Ethnography of a Complex Intervention in the Ambulatory Emergency Care setting

Objectives

AEC (Ambulatory Emergency Care) provides acute assessment and treatment in the community for acutely unwell complex older patients, with patients staying in their own homes overnight. The investigation aimed to understand the Clinical Decision-Making of the senior clinicians in the AEC environment as an example of working in Clinical Uncertainty.

Methods

Three AEC sites were purposively sampled to recruit twelve clinicians with backgrounds in Geriatrics, General Practice, Emergency and Acute Medicine. This qualitative investigation used focused ethnography within a case study approach to understand the decision-making processes in the context of the AEC environment. Observation during an AEC shift was complemented by informant interviews. A framework approach to thematic analysis used "*a priori*" and data derived codes to develop explanatory themes. Ethnographic principles of constant comparison and Cognitive Task Analysis were used to evaluate the clinicians' decision-making processes for index patient cases.

Findings

The work of AEC is complex negotiated distributed team-based decision-making to deliver an individually tailored care plan for patients with urgent healthcare needs suitable for out-of-hospital management. Key decision-making stages included triage, diagnostic, management and prognostic decisions. Variation in the delivery of these components was achieved through negotiation and individual tailoring. The participating AEC clinicians had a diverse background training and were boundary spanning individuals with cognitive flexibility and contextual adroitness. Clinicians mitigated the cognitive load of working in urgent care settings by altering

their tasks, referral thresholds and clinical behaviours. Effective team working was enhanced by team reflexivity. Team based decision-making was required to manage the complexity and uncertainty of working in the AEC environment.

Conclusions

This critical example of AEC decision-making demonstrates how complexity, negotiation and teamwork affect clinicians working in urgent care environments with high clinical uncertainty and cognitive load. These findings could inform the development of medical training curricula, interdisciplinary working and health service design.

Acknowledgements

Funding Statement

This research was funded by the National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care Oxford at Oxford Health NHS Foundation Trust. The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care.

Thesis Supervision

DM supervision was provided by:

Dr Margaret Glogowska, University of Oxford, Senior Mixed Methods Researcher

Professor Daniel Lasserson, University of Warwick, Professor of Acute Ambulatory Care

Professor Joanne Reeve, Hull and York Medical School, Professor of Primary Care Research

Thank you for your encouragement over the past 5 years

Dedication

Thank you to my grandparents who showed me how to share understanding in diversity

Thank you to my parents who encouraged me to ask why

Preface: Decision Difficult

"Life is short, and Art long;

the crisis fleeting;

experience perilous,

and decision difficult"

(Hippocrates, 400 BCE)

"…we must acknowledge that clinicians doing complex everyday work get things right far more than they get them wrong. We focus on the 10% of adverse events while mostly overlooking the 90% of care that has no harm. Understanding errors is critical, as is seeking to stop outmoded, wasteful, or excessive care. But, if we also better appreciate how clinicians handle dynamic situations throughout the day, constantly adapting, and getting so much right, we can begin to identify the factors and conditions that underpin that success."

Jeffrey Braithwaite, Changing how we think about healthcare improvement, BMJ 2018

(Braithwaite, 2018)[1]

"*Everyday clinicians make difficult decisions in healthcare; understanding what influences these decisions for the most vulnerable patients must remain a priority for healthcare research*."

McKelvie 2021

[1] Page 3

Table of Contents

Abstract 2

Objectives 2

Methods 2

Findings 2

Conclusions 3

Acknowledgements 4

Funding Statement 4

Thesis Supervision 4

Dedication 4

Preface: Decision Difficult 5

Table of Tables 11

Table of Figures 12

Abbreviations 12

Chapter 1: Understanding the Ambulatory Emergency Care Complex Intervention 13

1.1 The "*wicked problem*" – Recruiting, Training and Retaining AEC staff 13

1.2 What is ambulatory emergency care? 15

1.3 AEC CDM as a complex intervention 16

1.3.1 Researching AEC Complex Interventions 18

1.3.2 The Participants in AEC decision-making 20

1.3.3 The Components of AEC Decision-Making 21

1.3.4 The Target Population for the AEC Complex Intervention 22

1.3.5 The Expected Outcomes of an AEC Complex Intervention 23

1.3.6 What are the possible Mechanisms of Impact in the AEC Complex Intervention? 23

1.3.7 How does the Urgent Care Context affect the AEC Complex Intervention 25

1.4 An ethnographic case study of clinical decision making in AEC settings 26

1.5 Personal Rationale for this thesis 27

1.6 Organisation of this thesis 27

Chapter 2: Cognitive Load in Clinical Decision-Making in Urgent Care Environments; Systematic Review and Narrative Synthesis 28

2.1 Knowledge work and Cognitive Load in Urgent Environments 28

2.2 Systematic Review and Narrative Synthesis 31

2.3 The findings of the Systematic Review and Narrative Synthesis on Cognitive Load in UC39

2.4 Factors affecting cognitive load in UC 41

2.4.1 The effect of time on cognitive load in UC 41

2.4.2 The effect of space on cognitive load in urgent care 43

2.4.3 The effect of resources on cognitive load in urgent care 43

2.4.4 The effect of demand on cognitive load in urgent care 46
2.4.5 The effect of patient factors on cognitive load in urgent care 47
2.4.6 The effect of the team on cognitive load in urgent care 48
2.4.6 The effect of cognitive load on the clinician in urgent care 49
2.4.7 The clinical outcome of cognitive load in emergency healthcare 51
2.5 Discussion 53
2.5.1 Comparison with existing literature 54
2.5.2 Strengths, limitations and future research directions 55
2.5.3 Conclusion and recommendations 55
2.6 Updated thematic framework and conceptual map 55
Chapter 3: Methodology 57
3.1 Introduction to the Methodology chapter 57
3.2 Methodological Framework 57
3.2.1 Qualitative approaches to healthcare research 57
3.2.2 Ontological and Epistemological approach 58
3.2.3 Ethnographic approaches to healthcare research 60
3.2.4 Case Study approaches to healthcare research 63
3.2.5 Methodological Approach 64
3.3 Outline of Study Conduct 65
3.3.1 Participant Sampling Strategy 68
3.3.2 Access, Recruitment and Consent 69
3.3.3 Participant Demographics & Research Sites 69
3.4 Data Collection Methods 70
3.4.1 Modifications to Fieldwork Conduct 71
3.5 Data Analysis and Synthesis 72
3.5.1 Framework analysis & conceptual map 72
3.5.2 Within-Case and Across-Case Analysis of ethnographic data 73
3.5.3 Process Tracing to test causal relationships between environment and decision-making 74
3.5.4 Analytic induction to define CDM in AEC 75
3.5.5 CTA & the Critical Decision Method for Index Case Analysis 75
3.6 Trustworthiness 76
3.6.1 Trustworthiness & Epistemological Approach 76
3.6.2 Trustworthiness in Study Conduct & Data Analysis 78
3.7 Ethical Considerations 80
3.7.1 Procedural concerns 81
3.7.2 Contextual issues 81

3.7.3 Consent 82
3.7.4 Privacy 83
3.7.5 Harm 83
3.7.6 Exploitation and reciprocity 84
3.7.7 Foreshadowed ethical problems 84
3.8 Chapter Summary 85
Chapter 4.1: The effect of cognitive load on clinicians working in AEC 87
4.1.1 The AEC clinician in context 87
4.1.1a Characteristics of the AEC Clinicians 87
4.1.1b The experience and training of the AEC clinicians 89
4.1.1c The work roles of AEC clinicians 91
4.1.1d AEC clinicians and flexibility 93
4.1.1e Summary of the AEC clinical practice 97
4.1.2 The Environmental Factors in AEC that affect clinical uncertainty & cognitive load 98
4.1.2a The Effect of High Demand in the AEC environment on Cognitive Load 99
4.1.2b The Effect of Time in the AEC environment on Cognitive Load 101
4.1.2c The Effect of Space in the AEC environment on Cognitive Load 103
4.1.2d The Effect of Disruptions in the AEC environment on Cognitive Load 106
4.1.2e Personal and emotional responses to cognitive burden from the AEC environment 108
4.1.2f Summary of the environmental factors that affect cognitive load 109
4.1.3 The effect of cognitive load from the AEC environment on clinical decision-making 110
4.1.3a Altered work time under cognitive load in AEC 110
4.1.3b Altered work tasks under cognitive load in AEC 111
4.1.3c Altered clinical behaviours under cognitive load in AEC 111
4.1.3d Altered team roles under cognitive pressure in AEC 113
4.1.3e Summary of the effect of cognitive load from the AEC environment on clinical decision-making 114
4.1.4 The Effects of AEC Environmental pressures on clinicians and cognitive load 114
Chapter 4.2 Complex Negotiated Clinical Decision-Making in AEC 116
4.2.1 Constant and Variable components in AEC decision-making 116
4.2.2 Constant components in AEC decision-making 117
4.2.2a Triage decisions in the AEC Complex Intervention 117
4.2.2b Diagnostic decisions in the AEC Complex Intervention 121
4.2.2c Management decisions in the AEC Complex Intervention 123
4.2.2d Prognostic decisions in the AEC Complex Intervention 125
4.2.2e Summary of the Constant components of AEC Decision-Making 128

4.2.3 Variable components in AEC decision-making 128
4.2.3a Negotiation in AEC decision-making 129
4.2.3b Individual Tailoring in AEC decision-making 131
4.2.4 Complex Negotiated Clinical Decision Making in Ambulatory Emergency Care 136
Chapter 5: AEC Decision-Making work: Problem-solving in context 137
5.1.1a The Participants: The work of the Senior AEC Clinical Decision-Makers 138
5.1.1b The Components of AEC decision making: Constant and Variable 140
5.1.1c The Target Population for AEC: Assessing suitability for AEC 140
5.1.1d The Outcome of an AEC CI: Individually tailored care plans 142
5.1.1e The Effect of the Urgent Care Context on AEC decision-making 144
5.2 The complex social interaction of AEC clinical decision-making 146
5.2.1 Negotiated Distributed AEC decision-making 147
5.2.2 Team decision-making in AEC 152
5.2.3 Complexity in AEC decision-making 153
Chapter 6: Critical Appraisal & Reflection 156
6.1 Methodological contributions 156
6.2 Strengths and Limitations 158
6.2.1 Strengths of this ethnography 158
6.2.2 Trustworthiness of this ethnography 158
6.2.3 Limitations of this ethnography 165
6.3 Researcher reflexivity & positionality 168
6.3.1 Researcher Positionality 168
6.3.2 Background & Identity 169
6.3.3 Interests & Motivation 170
6.3.4 Expectations & Assumptions 170
6.3.5 The Impact of the researcher on the research: Managing potential inquirer bias . 172
6.4 Impact of the research on the participants and researcher 173
6.4.1 Reactivity and the impact on the participants 174
6.4.2 Impact of the research on the researcher 177
6.5 The impact of the COVID-19 pandemic 182
Chapter 7: Translation to Practice: Implications for clinical education, practice, policy and research 185
7.1 Complex negotiated distributed team-based decision-making in AEC 185
7.2 Implications for Clinical Education, Practice, Policy and Research 185
7.2.1 Implications for Clinical Education 185
7.2.2 Implications for Clinical Practice 187
7.2.3 Implications for Healthcare Policy 189

7.2.4 Implications for Health Services Research 193
Appendix 196
A1 Cognitive Load in Urgent Care: Weight of Evidence Assessment 196
A2 Cognitive Load in Urgent Care: Summary of Studies 197
A3 Participant Data Summary Table 202
A4 Participant demographics 204
A5 Information Sheet and Consent Form for Participants 205
A6 Study Protocol 209
A7 Topic Guide 209
A8 Data Collection Tool 211
A9 Fieldwork Protocol 212
A10 Thematic Coding Manual for NVivo 212
A11 Standard Operating Procedure: Concerns Protocol 214
A12 AEC Roles 217
A13 Patient Index Cases 218
Appendix Chapter 8: Understanding and Managing Clinical Uncertainty in Decision-Making in the AEC Complex Intervention 219
8.1 Clinical uncertainty in decision making; A critical review of the literature 219
8.1.1 Clinical uncertainty in decision tasks 221
8.1.2 Types of clinical uncertainty 222
8.1.3 The impact of clinical uncertainty on decision-making 227
8.1.4 Summary of the literature on clinical decision-making in uncertainty 232
8.2 A methodological framework for analysis for understanding clinical uncertainty 233
8.3 What are the sources of Clinical Uncertainty in AEC decision making? 235
8.3.1 Clinical Uncertainty in AEC Triage Decisions 237
8.3.2 Clinical Uncertainty in AEC Diagnostic Decisions 238
8.3.3 Clinical Uncertainty in AEC Patient Management Decisions 240
8.3.4 Clinical Uncertainty in AEC Prognostic Decision-Making 249
8.3.5 Clinical Uncertainty and Decision Modification in AEC 253
8.3.6 Awareness of uncertainty in the AEC Complex Intervention 257
8.3.7 Summary of Clinical Uncertainty types in AEC Decision-Making 257
8.4 Managing Clinical Uncertainty in AEC Decision-Making 258
8.4.1 Reducing Uncertainty in AEC 259
8.4.2 Sharing clinical uncertainty with patients in AEC 265
8.4.3 Decision Support and Guidelines to manage Clinical Uncertainty 270
8.4.4 Team decisions to manage Clinical Uncertainty in AEC 271
8.4.5 Continuity of care to manage Clinical Uncertainty 273

8.5 AEC as a Critical Example of Decision-Making in Clinical Uncertainty 275
References 278

Table of Tables

Table 1 Key principles of ambulatory care (Corrado, 2001) 15
Table 2 Alternatives to inpatient hospitalisation; 4 models of care (Conley et al., 2016) 16
Table 3 Measuring Cognitive Load, adapted from Byrne (2011) 30
Table 4 Search results 34
Table 5 Inclusion and Exclusion criteria 34
Table 6 Framework analysis: Thematic chart of cognitive load in urgent care 38
Table 7 How does cognitive load affect decision-making in urgent care; a thematic framework of results 54
Table 8 Definitions in Case Study Research 63
Table 9 Types of Case Study adapted from Thomas 2016 64
Table 10 Objective 1 To understand how clinicians working in ambulatory care settings make clinical decisions 67
Table 11 Research Question 2 To understand how the ambulatory care setting affects how clinicians make clinical decisions 68
Table 12 Aggregated Analytic Coding Manual for AEC Decision-Making 73
Table 13 Trustworthiness in Constructionist Inquiries 76
Table 14 Ten Core Elements of a Social Construction Inquiry Framework (Patton, 2002) 78
Table 15 Trustworthiness of Study Conduct, adapted from (Lincoln and Guba, 1985) 79
Table 16 Trustworthiness of data analysis (Miles and Huberman, 1994) 80
Table 17 Characteristics of the participating AEC clinicians 88
Table 18 Participant Roles 92
Table 19 Factors causing Cognitive load in the AEC environment 99
Table 20 Clinical responses to Cognitive Load for AEC clinicians 110
Table 21 Constant Components of the AEC Complex Intervention 117
Table 22 Variable Components of the AEC Complex Intervention 129
Table 23 Suitability for Ambulatory Emergency Care (AECN criteria) 141
Table 24 The Tacit Criteria used to assess suitability for AEC 141
Table 25 Trustworthiness of Study Conduct, adapted from (Lincoln and Guba, 1985) 159
Table 26 Audit to demonstrate development of the findings 164
Table 27 Linking Research Question 1 to the Findings 167
Table 28 Linking Research Question 2 to the Findings 168
Table 29 Implications for Future Doctor Programme 189
Table 30 Decision Making Tasks in Clinical Uncertainty 222
Table 31 Types of Clinical Uncertainty in Decision-Making 226
Table 32 Clinician responses to uncertainty in decision-making 230
Table 33 Managing Clinical Uncertainty in Consultation 232
Table 34 Framework Analysis of Uncertainty in AEC Decision-Making 234
Table 35 Magnitude of uncertainty in AEC Clinical Decision-Making 234
Table 36 Sources of Clinical Uncertainty in the AEC Decision-Making 236
Table 37 Types of Clinical Reasoning adapted from (Cooper et al., 2017) 241
Table 38 Managing Uncertainty in AEC Decision Making 258

Table of Figures

Figure 1 Dimensions of Complex interventions (Craig, 2008) 17
Figure 2 Process evaluation of complex intervention (Moore et al., 2015) 19
Figure 3 Understanding the AEC complex intervention 20
Figure 4 Search terms 32
Figure 5 PRISMA chart for Cognitive Load Systematic review 36
Figure 6 Weight of Evidence Framework (Gough 2007) 37
Figure 7 Stages in a Narrative Synthesis (Popay 2006) 39
Figure 8 Environmental sources of cognitive load in AEC 56
Figure 9 An ethnographic case study of AEC clinicians 66
Figure 10 Environmental sources of cognitive load in AEC 98
Figure 11 The Cause and Effect of Cognitive Load from the AEC context on the clinician 115
Figure 12 Constant and Variable Components of AEC Decision-Making 116
Figure 13 Decision-Making in the AEC Complex Intervention 137
Figure 14 AEC Decision-Making at work in uncertainty; Problem solving in context 147
Figure 15 Negotiated Distributed Social Interactions in AEC; A network diagram of Ruby's Index Case 148
Figure 16 Dimensions of Complexity in AEC Decision-Making (Craig, 2008) 154
Figure 17 Initial Conceptual Map March 2016 171
Figure 18 Parallel journeys for the researcher 178
Figure 19 Changes in the AEC Complex Intervention during the COVID 19 pandemic 184
Figure 20 Types of Clinical Uncertainty in Decision Making 227
Figure 21 REACT Model of Managing Uncertainty in AEC 277

Abbreviations

Abbreviation	Definition
A&E	Accident and Emergency
AEC	Ambulatory Emergency Care
ANP	Advanced Nurse Practitioner
CCT	Certificate of Completion of Training
CDM	Clinical Decision-Making
CGA	Comprehensive Geriatric Assessment
CI	Complex intervention
CTA	Cognitive Task Analysis
ED	Emergency Department
FE	Focused ethnography
GP	General Practitioner or General Practice
HCP	Health Care Professional
HITH	Hospital in the Home
QDU	Quick Diagnostic Units
NHS	The UK National Health Service
MDT	Multidisciplinary Team
OOH GP	Out of Hours General Practice
OSPAN	Operation Span Task
RCP	The Royal College of Physicians
WOE	Weight of Evidence

Chapter 1: Understanding the Ambulatory Emergency Care Complex Intervention

Emergency and urgent healthcare services are overwhelmed and overcrowded. Ambulatory emergency care (AEC) is one health system response which delivers acute care outside of the hospital setting (RCP, 2013). The Royal College of Physicians (RCP) define this type of care as "*clinical care which may include diagnosis, observation, treatment and rehabilitation, not provided within the traditional hospital bed base or outpatient services and can be provided across the primary/secondary interface*" (RCP, 2007). Clinicians working at this interface between primary and secondary care require the skills to confidently manage acute medical problems in the community setting (Lasserson, 2017). These complex AEC decision-making processes have not previously been investigated in the ambulatory setting and are the 'cases'[2] under examination in my thesis.

This exploratory ethnographic case study aimed to understand the clinical decision-making (CDM) of clinicians delivering the ambulatory emergency care. The study was designed to understand the effect of their clinical reasoning processes and environmental context on the delivery of the AEC intervention. In summary, the purpose of this research was to understand the clinical decision-making work of ambulatory clinicians and the factors, context and mechanisms that affect the implementation of AEC.

1.1 The "*wicked problem*" – Recruiting, Training and Retaining AEC staff

UK health systems have felt the simultaneous challenge of increasing demand for acute medical care and reducing numbers of hospital beds (Ewbank, 2017). Compounding the problem is the larger number of older people with complex needs, for example multi-morbidity, requiring emergency hospital admissions (Purdy, 2010). The resulting overcrowding and delays in acute

[2] The 'cases' are the clinicians making clinical decisions in ambulatory emergency care, Chapter 3

and emergency services are associated with adverse outcomes and increased mortality (Lowthian et al., 2015).

AEC has been identified nationally as a potential solution to tackle the growing numbers of emergency hospital admissions. Reducing emergency hospital admissions and increasing integrated community-based services is a clinical priority for NHS England (NHS, 2014). The King's Fund estimated 1 in 6 emergency medical admissions was due to an ambulatory care-sensitive condition (ACSCs), which if recognised and treated could reduce the need for emergency hospital admissions (Tian et al., 2012). Estimates suggest reducing these hospital admissions for ACSCs could save between £96-238 million each year (Tian et al., 2012).

Whilst AEC has emerged as a new model of care, little is known about the clinicians required to deliver this type of healthcare (Lasserson et al., 2018). There is little current evidence of the skills and attributes required of the senior decision-maker who is responsible for deciding which unwell patients can be safely treated outside of the hospital (Lasserson, 2017). Some authors have felt that clinicians with expert generalist skills are ideally suited to staff these centres (Lasserson, 2017, Reeve et al., 2013). However it is the disciplines that traditionally have these expert generalist skill sets which are facing declines in recruitment; general internal medicine, emergency medicine and general practice (RCP, 2012).

This can be described as a "*wicked problem*" for healthcare as it encompasses clinical, social, behavioural change involving multiple agents and stakeholders (Ferlie et al., 2013). Firstly, there are no clear solutions for the increasing demand for hospital beds (Ewbank, 2017). Secondly, the NHS workforce is already overstretched and increasing numbers would require considerable investment (Edwards, 2016). Thirdly, moving clinicians away from "*admit to hospital*" as a default decision would also require considerable cultural change in clinical practice (Lasserson, 2017). The driving problem behind this research project is how to develop AEC clinicians able to provide acute healthcare for patients outside the traditional hospital admission structure.

This project aimed to develop a conceptual model of AEC decision-making to inform the further development of this specialty (White and Glazier, 2011). The objective of this academic investigation was to understand the following critical workforce dilemma; how do we recruit, train and retain a viable workforce able to practice safely and effectively within the ambulatory care setting.

1.2 What is ambulatory emergency care?

Ambulatory emergency care (AEC) aims to provide acute assessment and treatment in the community for patients with acute illnesses (Lasserson et al., 2018). This model of care has been described as "*an attempt to deliver on the ideal of hospital substitution, by using hospital technologies and skills to manage acute inpatients at home* (Montalto, 2010)". Key principles of ambulatory care are described in Table 1, the emphasis is on providing hospital equivalent care in alternative settings.

Table 1 Key principles of ambulatory care (Corrado, 2001)

Key principles of ambulatory care (Corrado, 2001)
• The outcomes are equivalent to inpatient care • The cost is not more expensive than inpatient care • The intervention is acceptable to patients and carers and incurs no further emotional, physical or financial burdens

These ambulatory services have been organised in different ways. A recent review of alternatives to inpatient hospitalisation established that there were 4 main models for this type of care; hospital in the home (HITH), observation units, quick decision units and outpatient management (Table 2) (Conley et al., 2016). They concluded that for low risk patients with acute medical problems, alternative management strategies to inpatient care achieved equivalent outcomes and patient satisfaction at lower costs (Conley et al., 2016). The AEC settings studied

in this project, function as outpatient management units and could refer for HITH functions and arrange brief overnight stays for observation if required.

Table 2 Alternatives to inpatient hospitalisation; 4 models of care (Conley et al., 2016)

Alternatives to inpatient hospitalisation; 4 models of care (Conley et al., 2016)
1. Outpatient management: emergency department or clinic workup and treatment with close outpatient follow-up 2. Quick Diagnostic Units (QDUs): organised clinics that obtain rapid diagnoses for serious illnesses (eg, malignant neoplasm) 3. Hospital in the Home (HITH): evaluation in the ED or clinic followed by delivery of inpatient-level care within the patient's home 4. Observation Units: protocol-driven management for up to 24 to 48 hours within a dedicated space with subsequent discharge for outpatient follow-up

Much of the evidence for ambulatory care has come from Australia where "*Hospital in the Home*" (HITH) programmes have been running for over 30 years (Caplan et al., 1999). Their experience of using the ambulatory model of care has increased the capacity of their hospital system with reduced resources as compared to opening traditional hospital beds (Montalto, 2010). HITH programmes are associated with reductions in mortality, readmissions and patient and carer satisfaction (Caplan et al., 2012, Conley et al., 2016, Shepperd and Iliffe, 2005). Despite Montalto's (2010) experience in ambulatory care, he also recognised the educational challenges for future ambulatory clinicians; lack of awareness of ambulatory care in the community, limited educational opportunities for doctors in training and lack of senior support for ambulatory care (Montalto, 2010). This thesis seeks to understand how ambulatory doctors gain experience and consider what training might be required for AEC clinicians.

1.3 AEC CDM as a complex intervention

Complex interventions (CI) are healthcare activities that are delivered through multiple interacting components. These activities are usually delivered by healthcare professionals (participants) through a series of behaviours to a target population (patients) (Richards and Hallberg, 2015). The components are characterised by variability in the interactions, behaviours,

individuals, and possible outcomes (Richards and Hallberg, 2015). Complex interventions are recognised to have constant and variable components that interact (MacPherson and Schroer, 2007). Constant components are fixed reproducible essential functions of the intervention, whereas variable components are the aspects of the intervention that vary with context (Hawe et al., 2004). In this research study, I propose to consider the clinical decision-making work of the senior clinician in ambulatory care as a complex intervention due to the number of interacting components present (Craig, 2008) (Figure 1).

Figure 1 Dimensions of Complex interventions (Craig, 2008)

Dimensions of complex interventions - MRC Complex Interventions (Craig 2008)

- Number of and interactions between components within the experimental and control interventions
- Number and difficulty of behaviours required by those delivering or receiving the intervention
- Number of groups or organisational levels targeted by the intervention
- Number and variability of outcomes
- Degree of flexibility or tailoring of the intervention permitted

Previous work by the British Association of Ambulatory Emergency Care defined some of the essential components of AEC as early access to senior decision-makers, opening hours matching demand, access to diagnostics, close collaboration with other clinical services, a mixed workforce and patient selection processes (Hamad and Connolly, 2018). However, gaps remain in the understanding of how the clinical decision-making work of ambulatory care is performed and by whom (Lasserson et al., 2018).

In the AEC model studied in this ethnography, patients often had acute and chronic medical problems, physical, functional and social needs (McKelvie et al., 2016). It is not known how senior clinicians assess these multiple domains in order to plan out-of-hospital ambulatory treatment. The constant and variable components of clinical decision-making in AEC have not been described or understood, providing challenges for workforce training and development.

1.3.1 Researching AEC Complex Interventions

Previous research has concentrated on investigating the effectiveness of ambulatory interventions. These studies investigated how well the intervention worked, but few examined which components of the CI were associated with improved outcomes (Edwards et al., 2017). The most commonly measured outcomes in hospital avoidance complex interventions were mortality, hospital use, length of stay, cost effectiveness and patient satisfaction (Conley et al., 2016, Caplan et al., 2012, Shepperd et al., 2008). These suggest that equivalent healthcare is provided with higher patient satisfaction (Glogowska et al., 2019) and for often equivalent cost (Conley et al., 2016, Caplan et al., 2012, Shepperd et al., 2008). This evidence suggests that AEC is a safe, feasible and acceptable alternative to hospital-based care. However, what is not understood is whether the outcomes are affected by the context or participants implementing the CI activities. This study investigated the context and factors affecting participant's decision-making to help understand how these CI in AEC are best implemented.

The challenge for in researching complex interventions is understanding how they exert their effects. As discussed earlier, the unifying principle of complex interventions is the provision of healthcare through multiple interacting components (Craig, 2008), but understanding which components are essential remains difficult. Cited practical and methodological challenges for evaluating complex interventions include lack of standardisation, adaptation to local contexts, multiple interacting mechanisms of action and inability to evaluate experimentally (Craig, 2008). However, these assumptions regarding the challenges are based on methodologies best suited to evaluate simple problems, which are epistemologically incongruent to appraise a complex system. Instead research designs compatible with complexity theory are needed to understand the multidimensional phenomena in context (Hawe et al., 2004).

Authors in organisational healthcare research argue that an understanding of the context is essential when explaining the outcomes of complex interventions (Dopson and Fitzgerald,

2005)[3]. One of the criticisms of the original MRC definition was the lack of reporting on the impact of the context and how this affected the intervention (Richards and Hallberg, 2015). Later authors emphasised the need to know how the setting modified the intervention (Anderson et al., 2013). For example, local healthcare practices could influence the delivery of a complex intervention, but also affected how the intervention was interpreted in situ (Richards and Hallberg, 2015)[4]. To address the epistemological concerns, in this investigation, an ethnographic approach was chosen in order that the complexity of AEC clinical decision-making could be studied in context.

Process evaluation has been used to assess complex interventions in context. The interconnected relationships between context, the intervention, implementation, mechanisms and outcomes in complex interventions were previously identified (Figure 2) (Moore et al., 2015). In this study I use process mapping and cognitive task analysis (3.5) to explore the constant and variable components of the AEC clinical decision-making as a complex intervention (Figure 3). The thesis discusses the effect of the participants (4.1), context (4.1) the implementation of the intervention (4.2) and the potential mechanisms of impact (5.2 and 8.4). The rest of the chapter introduces these decision-modifying factors that affect the AEC complex intervention by discussing what is known about the target population, participants, components of AEC decision making, expected intervention outcomes, mechanisms and context (Figure 3).

Figure 2 Process evaluation of complex intervention (Moore et al., 2015)

[3] Page 21 Chapter 2 Studying Complex Organizations in Health Care, E Ferlie & S Dopson
[4] Page 224 Chapter 23 Process Evaluation of Complex Interventions, Moore et al

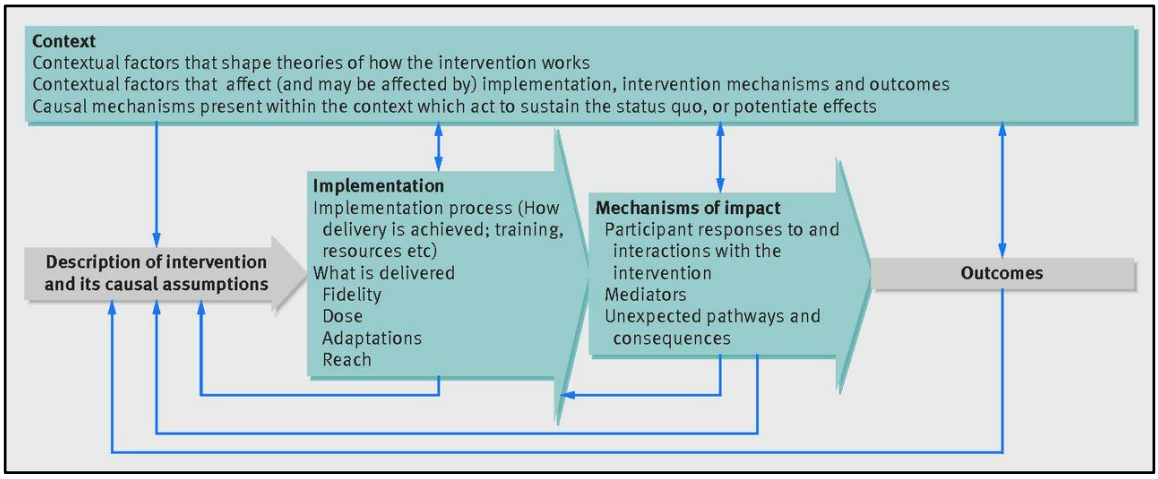
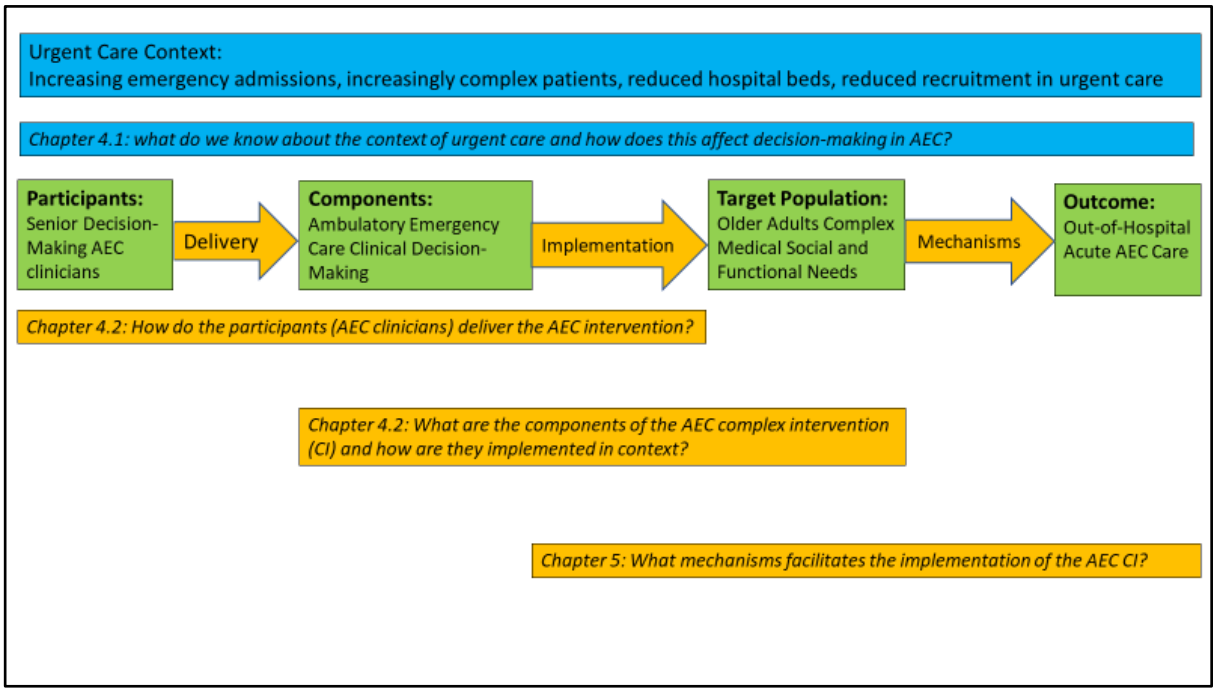


Figure 3 Understanding the AEC complex intervention



1.3.2 The Participants in AEC decision-making

In the AEC sites studied, the participants delivering the CI were senior decision makers in AEC, who lead the wider ambulatory multidisciplinary team (MDT) (McKelvie et al., 2016). This study aimed to address a gap in the literature, as few studies have examined the effect of the participant on delivery of complex healthcare interventions (Moore et al., 2015). However, case study research in organisational management did reveal the importance of senior clinicians with

professional credibility and knowledge in delivering complex interventions in evidence based healthcare (Dopson and Fitzgerald, 2005)[5].

It is currently unknown which clinicians can optimally lead the AEC team and there is considerable variation between models of ambulatory care (Lasserson et al., 2018). Previous work has suggested that these senior decision-makers are essential team members as they are able to evaluate clinical and diagnostic information (Hamad and Connolly, 2018). However, no accredited specialist training for ambulatory care currently exists. This study focused on examining the decision-making of the senior clinician who coordinated the MDT and directed the AEC intervention.

1.3.3 The Components of AEC Decision-Making

In this thesis, I considered how the senior AEC clinician directed the components of the AEC intervention through their clinical decision-making. The AEC intervention activities were described in previous work (McKelvie, 2016), where it was noted that the senior decision maker worked with the MDT to conduct a medical, functional and social assessment for acutely unwell older adults. The British Association for Ambulatory Emergency Care also described the need for an experienced clinician who could select suitable patients for AEC and direct their care (Hamad and Connolly, 2018). Despite this known need for a senior decision-maker, little was known about this clinical decision-making in AEC and how these decisions were made (AECN, 2018). Prior work suggested that decision-making needed to include assessments of illness severity, suitability of the patient for AEC care and the ability of the AEC service to provide appropriate care (Hamad and Connolly, 2018, AECN, 2018). However, how these decision-making processes were performed by clinicians during the AEC intervention was unknown.

The senior clinician in these AEC sites was required to direct the MDT to deliver the AEC intervention, through the development of a clinical plan (McKelvie et al., 2016). Previous studies

[5] Page 104 Chapter 6 Professional Boundaries and the Diffusion of Innovation, L Fitzgerald and S Dopson

found that when teams were able to directly assess and implement their plans, patients had improved outcomes (Ellis, 2011). However, the decision-making processes in teams which delivered Comprehensive Geriatric Assessment (CGA) based interventions have not been studied previously. Nor have the decision-making components of ambulatory care been described or understood in context. This study examined the constant and variable components of clinical decision-making in AEC to investigate who and how AEC clinical plans were developed and delivered in order to implement the ambulatory complex intervention (Figure 3).

1.3.4 The Target Population for the AEC Complex Intervention

The nomenclature around the people involved in the complex intervention is often confusing with participants being used for the practitioners and patients (Craig, 2008, Anderson et al., 2013). In this thesis, participants refers to the healthcare practitioners implementing the complex intervention and the target population is used for the patients receiving the intervention. In this section we discuss the target population for AEC in this case study.

The AEC units examined in this research often stated that their aim was to provide out of hospital care for older patients with complex and social care needs that required an MDT approach[6]. It is known that older patients are at risk of iatrogenic harm during hospital admissions (Gillick et al., 1982). The AEC approach aimed to reduce the overnight hospital stays to limit the potential iatrogenic harm of hospital admission particularly, functional decline. Risk factors for functional decline in this group were long term medical conditions, sensory losses, psychological problems, social disengagement, nutritional deficits and environmental concerns (Ayis et al., 2006, Stuck et al., 1999). These risk factors in combination with reduced mobility during a hospital stay increased the potential for hospital associated harms including thrombosis, muscle deconditioning and hospital acquired infections (Gillick et al., 1982, Kortebein, 2009). Therefore

[6] Citation for service descriptions not included to aid anonymity of the setting and participants (Chapter 3)

avoiding unnecessary hospital admissions for this group has been a target for recent NHS health policy (NHS, 2014).

Further research has suggested that having a community based complex interventions such as a CGA, were associated with increasing the likelihood of patients being alive and in their own homes by reducing patient falls, hospital and nursing home admissions (Beswick, 2010). A CGA assessment recommends assessing the patient holistically using a number of domains; medical conditions, mental health, function needs, social circumstances and environment (Welsh, 2013).

The goal of the AEC intervention in the sites examined in this study were to provide a holistic assessment using CGA principles and deliver equivalent hospital care in a community settings (McKelvie et al., 2016). This thesis concentrated on the decision-making processes that allowed delivery of the AEC intervention to the target population, for whom hospital admission could increase the risk of iatrogenic harm.

1.3.5 The Expected Outcomes of an AEC Complex Intervention

The AEC complex intervention aims to provide an individualized treatment plan for the patient based on the MDT assessment using the principles of ambulatory care to provide hospital equivalent treatments in a community setting (McKelvie et al., 2016). Previous work suggests that the development of a care plan is a key outcome for complex interventions for older people (Ellis, 2011). But there is limited research on how these care plans are created, implemented or individually tailored and the underlying clinical decision-making processes are not understood. This study aimed to explore these processes in real life situations to increase our understanding of this area.

1.3.6 What are the possible Mechanisms of Impact in the AEC Complex Intervention?

As discussed earlier, understanding the effective mechanisms and components in a complex intervention is challenging (Richards and Hallberg, 2015). Frequently studies show limited information on intervention fidelity, implementation and context (Edwards et al., 2017, Shepperd et al., 2009, Conley et al., 2016). Possible mechanisms of action for CI include how the

intervention is organized, the intervention components, how the participant implements the CI or interaction with the target population (Anderson et al., 2013, Datta and Petticrew, 2013, Moore et al., 2015).

Organizationally, there is evidence that the setting, team or model of care often affect intervention implementation but it is not known how this might work (Conley et al., 2016, Ellis, 2011). Conley et al (2016) suggested that all four AEC models showed equivalent outcomes to hospital care implying that the setting or model may not be the defining mechanism for the intervention. Instead the key attribute may be that the MDT can directly implement the intervention (Ellis, 2011).

Other authors proposed that the healthcare activities in complex interventions for frail older people worked by improving access to help, recognising unmet need and better anticipatory care (Beswick, 2010). Ellis (2011) thought the provision of a care plan coordinated healthcare professionals to provide an integrated approach. However, the nature of effective components of the AEC intervention remains an important unanswered question in ambulatory care.

In terms of the participant effects on the CI, both continuity of care and tolerance to clinical uncertainty have been proposed as mechanisms of action. Continuity of care was associated with reduced hospital admissions for ambulatory care sensitive conditions (Barker et al., 2017). The physicians' management and tolerance for clinical uncertainty may also alter clinical behaviours (Beresford, 1991, Seaburn et al., 2005).

Effective interactions between the clinical team and patient may also facilitate goal setting in complex interventions (Ellis, 2011). Communication of the benefits and risks of an out-of-hospital care plan can empower patients and carers to share responsibility for their health (McKelvie, 2016). However it is also known that communication failures have resulted in clinical harm (Brell, 2014).

Overall, it seems likely that when implementing a complex intervention that there are likely to be several mechanisms at work during the AEC intervention (Caplan et al., 2012). The ethnographic approach in this study allows examination of the clinical decision-making cases in situ which may provide evidence of the mechanisms that affect the intervention delivery.

1.3.7 How does the Urgent Care Context affect the AEC Complex Intervention

The importance of the context on the AEC intervention is also an unknown area. Few studies of complex interventions report on the context in which their complex intervention occurs (Moore et al., 2015, Richards and Hallberg, 2015). What is known is that urgent and emergency healthcare settings are critical examples of clinical uncertainty due to the environmental, time, and health system pressures inherent to these surroundings (Kuhn, 2002, Croskerry and Sinclair, 2001).

Previous ethnographic studies have identified contextual factors that affected whether patients were admitted to hospital from the ED; these were the time of day, staff shortages, busyness, clinical complexity, lack of community options and the 4-hour breech time (Pinkney et al., 2016). They highlight that clinical uncertainty occurring at the breech time prompted clinicians to admit the patient to hospital to obtain time to reduce this uncertainty (Pinkney et al., 2016). This suggests that contextual factors and clinical uncertainty affect the clinician's decision-making in ED. This ethnography investigated whether similar contextual factors and clinical uncertainty were seen.

In addition, as AEC is a relatively new type of healthcare, uncertainty exists in the level of risk tolerated for acute treatment outside of the hospital. Two scoring systems have been validated to aid prediction of suitability for ambulatory care but differ in their derivation and performance (Lasserson et al., 2018). Both scores concentrate on the risk levels for same day hospital discharges but do not predict successful out of hospital care or patients who are more likely to deteriorate with this type of care (Thompson and Wennike, 2015, Lasserson et al., 2018). Therefore, as clinical scoring systems are of limited use, clinicians need to make decisions which

are outside of their normal practice, a form of beyond protocol working (McKelvie, 2020). Understanding clinical decisions in the AEC context provides a key example of how clinicians work with clinical uncertainty at the limits of their scope of practice.

1.4 An ethnographic case study of clinical decision making in AEC settings

This chapter has discussed why AEC clinicians are needed to help manage increasing demand from patients with complex health and social care needs in the context of fewer hospital bed numbers. AEC workforce development may increasing the capacity for ambulatory care outside of the hospital. The study was specifically designed to understand the clinical decision-making process used by clinicians working within ambulatory emergency care (AEC) settings in order to inform decisions about workforce planning, recruitment and retention.

In summary, I propose that ambulatory care decision-making should be considered a complex intervention due to the components involved. This introductory chapter explored what is known about the AEC CI, the components and how these might affect the implementation. These components of AEC decision-making were considered in terms of their effect on target population, participants, implementation activities, outcomes and mechanisms (Moore et al., 2015). It is likely that some components are constant in AEC decision-making and others may vary (MacPherson and Schroer, 2007).

The participants (senior decision makers) in this study of AEC, directed the AEC intervention through their clinical decision-making work. Little is known about the components of decision-making that allow clinicians to treat acutely unwell patients outside of the hospital. This ethnographic case study focused on AEC decision-making in context and sought to explore the AEC intervention from the view of the participants. This included:

- How the AEC complex intervention was delivered in context
- How AEC decision-making was performed by clinicians including constant and variable components

- Which mechanisms and factors affected AEC decision-making

The next chapter discusses what is known about ambulatory decision-making. As this is the first study to study these reasoning processes, I reviewed allied literature on decision-making in urgent care and the management of clinical uncertainty in the context of urgent care. Chapter 2 will discuss how the context of urgent care and the clinical uncertainty present in urgent care might affect the AEC clinician.

1.5 Personal Rationale for this thesis

This chapter has discussed the background and impetus for the study from a health services research viewpoint. Here I also introduce the personal motivations for undertaking this thesis. I am a GP with a special interest in healthcare for older people. As a final year GP trainee, I had a 6-month fellowship in AEC. This apprenticeship lead to my interest in workforce development as I questioned how clinicians could safely and effectively gain an understanding of working in AEC as a new emerging specialty. This is further discussed in Chapter 3.6 and 6.3.

1.6 Organisation of this thesis

The dissertation is organised into seven chapters. Chapter 1 provided a brief overview of ambulatory emergency care and introduced the components of the complex intervention. Chapter 2 will consider the literature on clinical decision-making in urgent care. Chapter 3 will outline the methodological framework required to understand the work of AEC, describing the development of the ethnographic multiple case study with cognitive task analysis. Chapter 4 examines the clinical decision-making work in the AEC complex intervention. Chapter 4.1 concentrates on how the complex intervention is delivered in the AEC context by clinicians and Chapter 4.2 investigates the constant and variable components of AEC decision making. Chapter 5 discusses AEC decision-making as problem-solving in context. Chapter 6 critically appraises the thesis and charts the research journey through this AEC investigation. Chapter 7 considers the implications of this ethnography on clinical education, practice, policy and research.

Chapter 2: Cognitive Load in Clinical Decision-Making in Urgent Care Environments; Systematic Review and Narrative Synthesis

This chapter discusses what is known about knowledge work, cognitive load and examines the effect of the context of UC on clinical decision-making. To understand the cognitive workload of UC and the effect on clinical decision-making, this chapter systematically reviews and critically appraises the literature.

2.1 Knowledge work and Cognitive Load in Urgent Environments

Knowledge workers were defined by Peter Drucker as professional workers whose work included thinking, problem solving, actions and interactions (Drucker, 1967). Professional workers such as clinicians have often been described as knowledge workers as they use an abstract knowledge base to complete tasks and vary their response to the context (Okkonen et al., 2018). Some authors have suggested that knowledge work is completed by understanding the three ways of knowing; knowing-why, knowing-how and knowing-whom (Arthur et al., 2008). This framework can be used to investigate the motivations, skills and expertise and the relational aspects of knowledge workers (Arthur et al., 2008). The challenge for knowledge workers, is to decide on which work is completed, how to perform these tasks, whilst interacting with teams and systems and under time pressure (Clark and Sousa, 2018). I assert in this section that working in urgent care can be described as knowledge work that exerts a cognitive load.

Cognitive load was defined in cognitive sciences to describe how working memory was affected by reasoning and decision-making work (Shachak et al., 2009). The links between cognitive load and the limits of working memory were first described by the experimental psychologist John Sweller in the 1980s (Sweller, 1988). He identified cognitive load as the effort used in the working memory to solve problems or to acquire new knowledge. His theory explained three ways in which cognitive load affects learners; the intrinsic effort of learning new material, the extraneous effects of learning material presentation, and the germane effect of mental work to

incorporate the learning. Sweller (1988) suggested that that reducing cognitive load would improve students' learning.

> "*Both experimental evidence and theoretical analysis suggest that conventional problem solving through means-ends analysis may impose a heavy cognitive load*"(Sweller, 1988)[7]

In addition to cognitive load, Herbert Simon described how decision makers work in conditions of "*bounded rationality*" where is it impossible to comprehend all the available information related to a decision (Simon, 1982). Hence decisions are often made using a "*satisfycing*" heuristic, searching through the available information until enough evidence is found to support the decision (Simon, 1982).

These two theories show that the cognitive capacities of the decision maker and the available information work together to limit the amount of accessible information for decision-making. The clinical impact of this was described by Byrne (2011) as mental workload, which he defined as the interaction between the task and the clinician.

> "*Most researchers regard the maximum rate at which an individual can process information as their workload capacity, and the amount of this capacity in use at any one time as their mental workload*." (Byrne, 2011)

Working at a high mental workload for clinicians was not synonymous with poor performance, but could be associated with increased risk of error (Byrne, 2011). Previous studies have sought to examine mental workload experimentally using task intensity, physiological or psychological measures and subjective operator measures (Table 3) (Byrne, 2011). However few studies have considered qualitative measures to understand the experience of working under cognitive load or examined the impact on clinical behaviours.

[7] Page 284

Table 3 Measuring Cognitive Load, adapted from Byrne (2011)

Measurement of Cognitive Load	Examples of measure
Primary Task Intensity	Number of cases seen Task analysis
Objective Physiological Measures	Heart rate Response time Skin conductance Eye-blink rate
Objective Psychological Measures	Secondary Tasks Observed error rates
Subjective Operator Measures	Surveys NASA TLX form Borg Workload Scale
Qualitative Measures; Objective and Subjective Measures of Experience and Perception[8]	Ethnographies Interviews Focus groups

UC settings are known to be "*error-prone*" environments (Kuhn, 2002, Croskerry and Sinclair, 2001). The reasons for this include environmental, time, and health system pressures, which exert a further cognitive load. These factors work together to provide a challenging environment in which to make clinical decisions.

> *"Emergency physicians see multiple patients in an unscheduled time frame, many of whom are unstable so that treatment is instituted prior to the complete gathering of information. Information may be difficult to acquire as patients are frequently unable to*

[8] I use this classification to classify the quantitative studies contained in this review but have also added qualitative accounts of cognitive load to capture the experiential element of cognitive load (Table 3)

give a complete or accurate history due to the serious nature of their illnesses and medical records are often unavailable. Finally, many of the patients examined are admitted or discharged before the diagnosis is certain."(Kuhn, 2002)

Authors have explained that in UC, clinicians are faced with high numbers of decisions (decision density), cognitive load and diagnostic uncertainty, which in combination, further increase the likelihood of clinical error.

"*decision density (the number of decisions that the physician must make during a shift) and cognitive load (the background information that the physician must bring to bear on those decisions) appear to underlie many cognitive errors. Common ED problems such as weakness, dizziness, and chest or abdominal complaints have a wide differential diagnosis and carry a high degree of diagnostic uncertainty. The combination of high decision density and diagnostic uncertainty leads to high error prevalence*" (Croskerry and Sinclair, 2001)

Hence, clinicians working in UC settings face considerable clinical uncertainty whilst working in conditions promoting cognitive load but the relationships between cognitive load and decision-making in UC have not been explored in detail in the medical literature. This chapter systematically examines the published literature for relationships between cognitive load and the UC environment in urgent healthcare. The chapter uses a framework approach to thematic analysis (Ritchie et al., 2014) and narrative synthesis (Popay et al., 2006) to investigate these associations and the impact of UC environments on clinical decision-making in urgent and emergency care. This review aims to understand how urgent healthcare environments contribute to cognitive load.

2.2 Systematic Review and Narrative Synthesis

To understand how the UC environment affects cognitive load I critically reviewed the published literature. In this section I describe the systematic review and narrative synthesis methodology

used to understand the relationships between cognitive load and decision making in urgent and emergency care.

2.2.1 Aim

This aim of this systematic review was to understand how cognitive load affects clinical decision-making in UC. I explored the literature to find the causes, factors and mechanisms by which cognitive load affected clinical decision-making in emergency healthcare settings.

2.2.2 Objectives

I investigated the relationships between cognitive load and clinical decision making, to discover; the factors involved in clinical decision-making, how these factors contributed to cognitive load in urgent and emergency healthcare, and the outcomes on clinical behaviours in UC.

2.2.3 Research Question

The literature was analysed using the following question as the basis for the search "*How does cognitive load affect decision-making in urgent care*". This was operationalised using the search terms and synonyms in Figure 4.

Figure 4 Search terms

SEARCH ((("error") OR ((("cognitive load") OR "cognitive burden") OR "cognitive strain")))

AND (((((("emergency") OR "acute care") OR "emergency department") OR "acute illness") OR "hospital admission"))

AND (((((("decision") OR "decision making") OR "shared decision making") OR "clinical judgement") OR "clinical reasoning")

2.2.4 Methodology

A systematic search of the published literature for quantitative, qualitative and mixed methods research was undertaken. I used a narrative synthesis (Popay et al., 2006) approach to understand the factors involved in cognitive load in decision making in UC to understand and their relationships.

2.2.5 Search Criteria

A systematic search of 4 databases (Cinahl, Embase, Ovid Medline and PsychInfo) was completed in May 2017[9]. The search was based on the research question and used the terms "*cognitive load*", "*emergency*" and "*decision-making*" and their synonyms (Figure 4). This search strategy yielded 489 articles, which were systematically screened (Table 4).

[9] These searches have been updated in 2020, however the 2017 version is presented here as this section discusses the development of the analytic framework used in this thesis.

Table 4 Search results

Database	Interface	Coverage	Date	ARTICLES
Cinahl	EBSCOHost	1982-current	26/05/2017	85
Embase	OvidSP	1974 to 2017 May 25	26/05/2017	332
Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R)	OvidSP	1946-present	26/05/2017	226
PsycINFO	OvidSP	1967 to May Week 4 2017	26/05/2017	129
Total:				**772**
Duplicates:				283
Final total:				**489**

Table 5 Inclusion and Exclusion criteria

	Inclusion criteria	Exclusion criteria
Article type	Review articles Quantitative articles Qualitative articles Conference papers Dissertations	Letters
Setting	Emergency Department Urgent Primary Care	Primary Care Hospital medicine Intensive Care
Senior Decision Maker	Physician ED Doctor General Practitioner	Nursing Emergency practitioners Paramedics
Decision types	Treatment decisions Management decisions	Nursing Triage
Cognitive Load	Qualitative Measures: • Clinician experience • Observed cognitive load • Cognitive Task analysis Quantitative Measures: • Task Intensity • Task completion Time	

2.2.6 Selection and Appraisal of the Articles

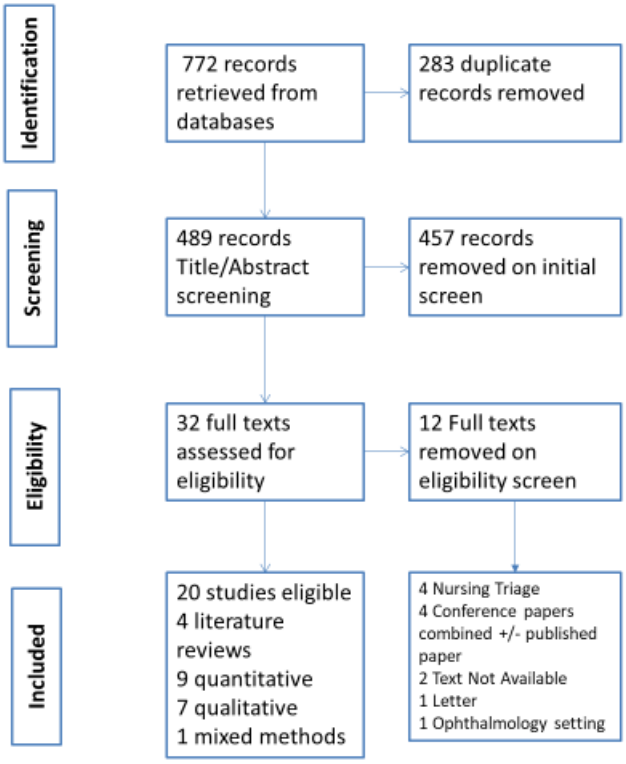
After screening by two independent assessors (SM and DL[10]) 457 records were removed (Figure 5). The inclusion and exclusion criteria (

Database	Interface	Coverage	Date	ARTICLES
Cinahl	EBSCOHost	1982-current	26/05/2017	85
Embase	OvidSP	1974 to 2017 May 25	26/05/2017	332
Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R)	OvidSP	1946-present	26/05/2017	226
PsycINFO	OvidSP	1967 to May Week 4 2017	26/05/2017	129
Total:				**772**
Duplicates:				283
Final total:				**489**

Table 5) aimed to capture physicians' experiences of cognitive load and decision-making in urgent healthcare settings and so routine hospital and primary care studies were excluded. In addition, nursing triage decisions were not included in the scope of this review as these often occur before patients enter the emergency department environment. The remaining 32 full text articles were appraised by both assessors using the inclusion and exclusion criteria and reduced to 20 eligible studies. Any differences in screening or full text review were resolved through discussion. This included 4 literature reviews, 9 quantitative studies, 7 qualitative studies and 1 mixed methods study. 12 records removed on eligibility screening including 4 conference papers which were combined with published papers, 2 texts not available, 1 letter and 1 emergency ophthalmology clinic.

[10] Dr Daniel Lasserson

Figure 5 PRISMA chart for Cognitive Load Systematic review



2.2.7 Assessment of Rigour

I assessed the rigor of the studies included using the Weight of Evidence (WoE) Framework (Figure 6). This assessment tool was chosen as it was flexible enough to assess multiple types of study using three different criteria to judge quality. The WoE framework rates the trustworthiness, study design and relevance to the review, leading to a global rating of Low, Medium and High (Gough, 2007, Barclay et al., 2011) (A1 Cognitive Load in Urgent Care: Weight of Evidence Assessment).

Figure 6 Weight of Evidence Framework (Gough 2007)

- A: Generic on quality of execution of the study
    - Transparency, accuracy, accessibility, specificity
- B: Appropriateness of method
    - Purposivity
- C: Approach of Study to review question
    - Relevance and Propriety

2.2.8 Data extraction & Framework analysis

I completed the full text review and extracted data onto customized tables (Table 4). I used a framework approach to thematic analysis was undertaken to organize the data from the literature using "*a priori"* and data-derived themes (Ritchie et al., 2014). The literature was analysed using the five stages of framework analysis; familiarization, identifying a thematic framework, indexing, charting, mapping and interpretation. The initial themes were based on the research question looking for environmental factors which may cause cognitive load. These "*a priori"* codes for indexing included the patient, physician, setting (site, resources and time) and health system that affected cognitive load. By charting these themes, I was able to gain an overview of the data to understand how researchers had previously understood cognitive load in UC and map out areas needing further development (Table 6). For example, one data-derived theme included the impact of the UC team on cognitive load. In addition, significant gaps were found on the contribution of the patient to cognitive load in UC. Further iterative analysis was done during the mapping and interpretation stages complemented by the narrative synthesis process.

Table 6 Framework analysis: Thematic chart of cognitive load in urgent care

How does cognitive load affect decision-making in urgent care (UC)?		
A priori themes	Themes from the literature	Narrative synthesis
Environment: Time	High volume Low time Interruptions	High task load and low time contribute to cognitive load in UC (2.4.1)
Environment: Space	Overcrowding Unfamiliar spaces Patient flow	Clinicians need spaces to work and think in UC (2.4.2)
Environment: Resources	Access to information Information presentation EMR records	Access to information can contribute to cognitive load in UC (2.4.3)
Environment: Health system	Patient Demand Access to UC Impact on health outcomes	Competing pressures from patient demand and open access to urgent care contribute to cognitive load and increase error rates (2.4.4)
UC People: Patient	Reduced time for patient care Unclear presentations Complexity of Multi-morbidity	Unclear presentations and Multi-morbidity causing clinical uncertainty (2.4.5)
	UC People: Teams Communication Interruptions Interactions	Tension between team communication and interruptions (2.4.6)
UC People: Physician	Job demands, strain and error rates Clinical experience	The cognitive, emotional and personal challenge of working in UC (2.4.7)

2.2.9 Narrative synthesis

Following indexing and organising the data using the framework analysis method outlined above, I used the narrative synthesis method to analyse the research question and construct possible explanatory mechanisms. The narrative synthesis process has four main stages (Figure

2); developing theories, preliminary synthesis, exploring relationships and assessing robustness (Popay et al., 2006). I considered the causes, effects and outcome of cognitive load on UC decision-making to understand how environmental factors might affect decision making in UC.

Figure 7 Stages in a Narrative Synthesis (Popay 2006)

- Developing a theory of how the intervention works, why and for whom
- Developing a preliminary synthesis of findings of included studies
- Exploring relationships in the data
- Assessing the robustness of the synthesis

The preliminary synthesis using '*a priori'* themes revealed initial relationships in the data. It also showed what study types had previously been studied to understand how cognitive load. I then explored in the narrative synthesis how environmental factors contributed to cognitive load in UC in the literature (Table 4). This synthesis identified key factors affecting cognitive load and examined what was known about the clinical effects of these factors (2.4). Finally, I assessed the robustness of the synthesis in two ways; the assessment of the weight of evidence in each individual study (A1) and secondly critical reflection on the narrative synthesis in discussion with the supervisory team.

2.3 The findings of the Systematic Review and Narrative Synthesis on Cognitive Load in UC

2.3.1 A summary of the document characteristics

Twenty studies from eight countries (USA, UK, Australia, Israel, Canada, Ireland, Taiwan, Netherlands) were eligible for inclusion in the review (Appendix A2). The study types included four literature reviews (Croskerry and Sinclair, 2001, Kuhn, 2002, McCarthy et al., 2016, Skaugset et al., 2016), 8 quantitative articles (Agarwal et al., 2013, Barnett et al., 2016, Body et al., 2014, Gevers et al., 2010, Kuo et al., 2013, Laker, 2017, Mohan et al., 2014, Westbrook et al., 2018), 7 qualitative studies (Adams et al., 2017, Balla et al., 2012, Laxmisan et al., 2007, McRobert et al.,

2013, Park et al., 2012, Politi et al., 2017, Shachak et al., 2009) and one mixed methods investigation (Bishop et al., 2015).

2.3.2 Characteristics of the Qualitative Studies on cognitive load in UC

Four of the eight qualitative studies used ethnographic methods with a combination of interview and observational data (Laxmisan et al., 2007, Park et al., 2012, Politi et al., 2017, Shachak et al., 2009). These ethnographies lasted between two months and two years with between six and 105 doctors as participants. One study used solely interview data from 21 participants (Balla et al., 2012) and another article combined 20 doctor interviews with focus group data (17 doctors) (Adams et al., 2017). Two studies used cognitive task analysis (CTA) techniques including protocol analysis with 18 to 30 participants (McRobert et al., 2013, Shachak et al., 2009). One mixed methods investigation used participatory action research techniques to co-design a new electronic medical record (Bishop et al., 2015).

2.3.3 Characteristics of the Quantitative Studies on cognitive load in UC

The eight quantitative articles included four experimental designs with one before-after test (Kuo et al., 2013), one randomised cross-over study (Agarwal et al., 2013) and two case control studies (Laker, 2017, Mohan et al., 2014). The remaining four studies included one prospective cohort study (Body et al., 2014), one cross sectional analysis (Barnett et al., 2016), one cross-sectional survey (Gevers et al., 2010) and one case study observation of error rates (Westbrook et al., 2018).

2.3.4 Study Methods to measure cognitive load in UC

Cognitive load was frequently measured using task analysis (13/20), investigating the time or task intensity involved. This was particularly seen in the experimental designs or in studies examining the electronic medical records. In five of the qualitative studies, data on the experience of cognitive load for the clinician was obtained. Two articles investigated clinical error. Five of the qualitative studies reported on the experience of cognitive load for the clinician.

2.3.5 A subgroup of articles investigating the cognitive load of Electronic Medical Records In UC

A subgroup analysis of the impact of Electronic Medical Records (EMR) included six papers; three qualitative (Park et al., 2012, Politi et al., 2017, Shachak et al., 2009), one mixed methods (Bishop et al., 2015) and two

quantitative (Agarwal et al., 2013, Laker, 2017). These studies used four different ways to operationalise cognitive load; task completion time, computer "*clicks*", CTA and error rates. Task completion time was measured by all studies. Three studies equated a decrease in task time with a reduced cognitive load (Bishop et al., 2015, Kuo et al., 2013, Agarwal et al., 2013). Two studies showed increased time using EMR during a patient consultation (25-50% consultation) (Shachak et al., 2009) and that documentation time increased from two minutes to nine minutes (Park et al., 2012). One paper measured computer clicks before and after redesign of their EMR system. A reduced number of clicks was described as improving efficiency and therefore reducing cognitive load (Bishop et al., 2015). CTA was measured by two studies, but they differed in their approach. One used a computational walkthrough to measure task time before and after changes to the machine interface (Kuo et al., 2013). Another measured the NASA task index for prescribing tasks (Agarwal et al., 2013). An observational study observed error (Shachak et al., 2009) and one measured the error time period (Kuo et al., 2013).

2.4 Factors affecting cognitive load in UC

2.4.1 The effect of time on cognitive load in UC

The effects of time on cognitive load in UC was discussed by most studies (17/20). UC settings such as ED have been described has having substantial mental workloads due to high decision density (Croskerry and Sinclair, 2001, Kuhn, 2002). The review articles highlighted how high decision density was driven by the high volume and low time nature of UC assessments (McCarthy et al., 2016). In addition to time, frequent task switching also further reduced clinical time (Croskerry and Sinclair, 2001, Skaugset et al., 2016). The effects of high decision density, low time and task switching on cognitive load are discussed.

2.4.1a High decision density in UC

Clinicians in UC have concurrent demands on their attention due to high numbers of tasks and decisions (Skaugset et al., 2016, Croskerry and Sinclair, 2001). A study measuring doctors' workload in the emergency department noted high task loads, particularly for the senior doctors (Laxmisan et al., 2007). They were noted to be working in several roles simultaneously including documentation, consultation, patient assessment, teaching and supervision of junior staff (Laxmisan et al., 2007). Junior staff in contrast often had a high administrative burden (Park et al., 2012).

2.4.1b Task switching and cognitive load in UC

The most experienced staff had the highest rate of multi-tasking and role switching (Laxmisan et al., 2007). However, doctors were often unaware of the cognitive challenges associated with working in UC (Croskerry and Sinclair, 2001, Kuhn, 2002). Task switching was found to affect working memory and increase cognitive load (Skaugset et al., 2016).

2.4.1c The effects of low time on clinical decision-making in UC

Clinicians described how they felt under pressure to see several patients and how this reduced their time to think (Adams et al., 2017, Balla et al., 2012). This caused junior doctors to reduce the information gathering stage and initiate management plans earlier in their patient consultation (Adams et al., 2017). Time pressure was also noted to reduce direct patient contact (Balla et al., 2012).

2.4.1d High task load and low time contribute to cognitive load in urgent care

In summary, clinicians experience a high mental workload under time pressure in urgent care due to the high decision density present in UC decision-making. The direct effects on clinical outcomes are not well characterised but there is some evidence for reduced clinical assessment time and dysfunctional behaviours such as reduced information gathering, initiating premature management plans and double-checking behaviours.

2.4.2 The effect of space on cognitive load in urgent care

Practical factors that affect cognitive load in urgent care decision-making include the physical layout of the ED space and the resources used. Observed environmental pressures included noise (Kuhn, 2002) or overcrowding (Croskerry and Sinclair, 2001). Doctors described these environments as high risk for clinical error (Balla et al., 2012). They also felt it was more difficult to practice in an unfamiliar environments (Balla et al., 2012).

2.4.2a Physical arrangements

The impact of the setting on cognitive load was described by four of the qualitative papers (Laxmisan et al., 2007, Shachak et al., 2009, Balla et al., 2012, Park et al., 2012) but none of the quantitative papers. They described the complex physical arrangements with multiple spaces within the ED (Laxmisan et al., 2007). Patients are allocated assessment spaces in ED, but frequently patient flow was difficult to track (Laxmisan et al., 2007). Two studies commented on doctors' workspaces within the ED, these "*brain centres*" (Laxmisan et al., 2007) were where the doctors completed either paper or computer-based documentation (Park et al., 2012). The position of the computer in the consultation was also associated with promoting either a doctor or patient-centred consultation style (Shachak et al., 2009).

2.4.2b Spaces for clinicians to work and think in urgent care

Physical arrangements and organisational process management affected cognitive load. Physicians needed a combination of places to assess patients and places for deep thinking. Evidence of direct impact on clinical decision-making was hard to find, but studies have shown that the physical aspects of the setting, e.g. computer position, directly affected consultation style.

2.4.3 The effect of resources on cognitive load in urgent care

The main resource for decision-making in urgent care was clinical information. The articles concentrated on three aspects of this; access to patient information, information presentation and retrieval and the impact of electronic medical records.

2.4.3a Access to Patient Information

Access to patient clinical records in an emergency was often described as challenging with clinicians often having incomplete clinical records (Kuhn, 2002, Croskerry and Sinclair, 2001). The reasons for missing patient information included severity of illness, limited access to medical records and patient communication factors (Croskerry and Sinclair, 2001, Kuhn, 2002). An ethnographic study observed the limited patient information available in the ED (Laxmisan et al., 2007). GPs also echoed the lack of background information available in the UC environment (Balla et al., 2012). Some EMR observation studies felt that computerised records improved the information quality, legibility, and searchability of clinical records (Shachak et al., 2009, Park et al., 2012, Balla et al., 2012).

2.4.3b Information presentation and retrieval

The quantitative studies concentrated on how information presentation affected clinicians and cognitive load. Simple interfaces for clinician facing machines such as observation monitors (measuring blood pressure, oxygen saturation, pulse and respiration rate reduced machine operation time and clinical error, however the before-after design of the evaluation weakens the significance of their results (Kuo et al., 2013). The organisation of electronic prescriptions by symptom rather than drug class or free text searches was also associated with reduced time and task load (Agarwal et al., 2013). A case-control experiment used "*emphasis-framing*" to highlight important clinical information in a simulated case vignette (Laker, 2017). Although diagnostic accuracy was improved, clinician decision-making time in the intervention was increased significantly from the control (Intervention 421 seconds: Control 266 seconds T test -1.86, $p<0.05$). During simulation, high levels of patient contextual information was associated with greater diagnostic accuracy (McRobert et al., 2013).

Some clinicians described how information retrieval was improved by EMR. There was an increased volume of patient information available, readability was improved, and records were easier to find (Shachak et al., 2009, Park et al., 2012). Access to a computer improved access to

decision aids and improved documentation standards (Shachak et al., 2009). Electronic prescribing was improved when drugs were indexed by presenting symptom (Agarwal et al., 2013). However, EMR also introduced errors of automaticity due to incorrect patient charts, typing errors, drug prescription errors and template entry errors (Shachak et al., 2009).

2.4.3c Electronic Medical Records

The impact of resources on decision-making was discussed in relation to the introduction of an EMR system. This often gave ED departments an opportunity to assess their task load as paper processes were being replaced by computerised systems. One study discovered that EMR was used for 49 different clinical tasks split between clinical and administrative jobs (Bishop et al., 2015). EMR was mainly used for discharge letters (50% clinician time), writing clinical notes (18%) (Bishop et al., 2015) and checking test results (Politi et al., 2017). The most effective EMR systems for reducing cognitive load appeared to be clinician-designed. One mixed-methods study suggested that when a clinician-designed EMR system was introduced, a 40% reduction in EMR time was noted and average task time reduced from 59 to 35 seconds, potentially saving the team 23 hours per day (Bishop et al., 2015). Prescribing time was significantly reduced by EMR (Agarwal et al., 2013).

Non clinician-designed systems were associated with an increase in task time as documentation duration increased from two minutes to nine minutes per patient (Park et al., 2012). Direct patient contact was sometimes reduced by increased EMR documentation time (Shachak et al., 2009, Park et al., 2012). One study estimated that clinicians used EMR for 25-50% of the consultation. Task load could be reduced by information organisation (Agarwal et al., 2013) and clinician designed systems reduced the number of clicks per task (Bishop et al., 2015). Different use profiles were also noted showing the trade-off between volume and speed of information retrieval (Politi et al., 2017). Most clinicians had "*quick and basic*" use profiles when using EMR reflecting need for speed when reviewing clinical information in ED (45%) (Politi et al., 2017). In

this profile, doctors were more likely to be reviewing organised information in clinical summaries such as discharge letters (Politi et al., 2017).

2.4.3d Improving information access and retrieval using clinician designed systems

The literature demonstrated that efficient access to critical clinical information in the ED was critical for clinical decision-making. Some studies showed that process mapping in preparation for EMR provided opportunities for streamlining pre-existing procedures but needed to be clinician designed to optimise efficiency. Clinician designed processes and information retrieval systems can improve the quality of clinical information and diagnostic accuracy, but health information systems need to be wary of introducing errors of automaticity.

2.4.4 The effect of demand on cognitive load in urgent care

The effect of patient demand on cognitive load was a taken-for-granted part of the articles in this narrative review. The main themes included access and the impact of demand on the service provision. Patient demand was often described as being due to the "*open door*" access and volume of patients (Laxmisan et al., 2007, Balla et al., 2012, Adams et al., 2017). An article described emergency care as the most error prone of practices because of high demand (Kuhn, 2002). The high demand reduced the assessment time and so clinicians are required to "*think and act quickly*" (Croskerry and Sinclair, 2001). UK doctors particularly described feeling under pressure to avoid patient delays and hospital admissions (Balla et al., 2012, Adams et al., 2017). Studies often felt that the high demand-low time state was an inevitable part of working in urgent care (Skaugset et al., 2016). Therefore studies concentrated on how individual and environmental risks could be reduced to mitigate cognitive load, without changing systemic pressures on emergency care (Skaugset et al., 2016).

Research with an experimental design examined how patient demand could be managed, often looking at how patients be safely been discharged from urgent care. One study investigated the outcome of combining clinician judgement with laboratory tests to safely reduce admission rates for patients with myocardial infarction (Body et al., 2014). In this article, clinical judgement

in combination with test results could effectively reduce a quarter of hospital admissions with cardiac sounding chest pain (Body et al., 2014). A second study used serious game technology to investigate the effect of critical information on location of care for simulated patients (Mohan et al., 2014). This study suggested that when demand increased, applying higher cognitive loads, clinicians made decisions based on heuristics which worsened the outcome for patients with atypical presentations.

2.4.4a Competing pressures from patient demand and open access to urgent care contribute to cognitive load and increase error rates

There was a tacit understanding that increasing patient demand and access were unavoidable in urgent care. Demand often increased cognitive load and increased the error rate in the UC setting. Experimental studies looked at how to manage patient demand by enhancing clinical judgement with test results, noting that increased clinical load from high demand may increase reliance on heuristic-based decision-making.

2.4.5 The effect of patient factors on cognitive load in urgent care

Few papers evaluated patient factors impacting on cognitive load. Three subthemes generated by this synthesis were; reduced time for patient care, the effect of unclear presentations and the complexity of multi-morbidity. The articles concentrated on the relative lack of patient information available in the ED (Laxmisan et al., 2007, Croskerry and Sinclair, 2001, Kuhn, 2002). Direct patient contact time was often reduced by time pressure (Balla et al., 2012) or increased EMR documentation (Shachak et al., 2009, Park et al., 2012).

Some papers commented on how patient complexity and multi-morbidity affected the application of guidelines. One article described how patients with unclear presentations, multi-morbidity and uncertainty prognosis felt cognitively challenging to the clinician (Balla et al., 2012). Some papers commented on how clinical behaviours differed where patient complexity was present. Junior doctors also described how they used a different information gathering strategy “chunking” when faced with patients with complex multi-morbidity (Adams et al.,

2017). Only one of the articles investigated the direct effect on clinical decision-making. A simulated game manipulated patient complexity and acuity to increase cognitive load experimentally (Mohan et al., 2014). Doctors in the game were less likely to appropriately transfer atypical trauma causes when cognitively overloaded (38% control, 26% cognitive load p=0.03).

2.4.5a Unclear presentations and multi-morbidity increase clinical uncertainty and cognitive load in UC

The effect of patient factors on cognitive load in urgent care was investigated infrequently. Urgent care settings were often associated with conditions that reduced time for patient care. Clinicians felt that complex patients with multi-morbidity and unclear presentations were more cognitively challenging and simulation data showed that this affected the clinical management of atypical cases.

2.4.6 The effect of the team on cognitive load in urgent care

The interaction of the senior decision maker within other team members revealed a key tension within the ED; how do teams balance effective communication with interruptions to interact effectively (Skaugset et al., 2016, Croskerry and Sinclair, 2001). Three of the qualitative studies captured team interactions with the senior doctor (Laxmisan et al., 2007, Bishop et al., 2015, Adams et al., 2017). The senior clinician was the most affected by time pressures due to the larger volume of tasks and their accessibility to all team members (Laxmisan et al., 2007). They were frequently multi-tasking whilst working in multiple roles simultaneously. Interruptions were observed every 7 to 9 minutes (Laxmisan et al., 2007, Westbrook et al., 2018). Clinical documentation (Park et al., 2012) and prescribing tasks (Westbrook et al., 2018) were particularly associated with interruptions. Multi-tasking and interruptions increased prescribing errors in the ED (Westbrook et al., 2018).

2.4.6a Interruptions and cognitive load in UC

The frequency and duration of interactions with the senior doctor differed between the team members; nurses interrupted more often for a shorter duration whereas junior doctors interrupted less often but for a longer duration (Laxmisan et al., 2007). One quantitative study also mapped the association between job strains and self-reported teamwork behaviours and concluded that job strains (particularly acute emotional) could inhibit effective teamwork (Gevers et al., 2010).

2.4.6b The effect of EMR on team working in UC

Team interactions and roles were all affected by the introduction of EMR. Often EMR increased administration tasks, particularly for junior doctors (Park et al., 2012). Teams worked in different ways after the introduction of EMR. EMR could facilitate handover between clinicians (Politi et al., 2017) but increased documentation time was often associated with reduced team interaction (Park et al., 2012). Often interactions between the doctor and team were reduced and teaching time for junior staff was visibly reduced (Park et al., 2012). Interruptions to the senior doctor by team members often caused errors of automaticity (Shachak et al., 2009). The role of the pharmacists to notice and report these prescription errors increased in importance (Shachak et al., 2009).

2.4.6c Tensions exist between team communication and interruptions in urgent care

The complex relationship between the senior doctor and the ED team affected cognitive load. Managing which information was shared with whom and at which time point was challenging for effective team dynamics, patient safety and clinician's mental workload.

2.4.6 The effect of cognitive load on the clinician in urgent care

The literature described personal factors affecting cognitive load in relation to the individual experience of uncertainty and the emotional strain that this caused. For some clinicians this combination of personal and emotional uncertainty was associated with stress responses due

to job demands. Job strains were associated with increased error rates but could be reduced by greater clinical experience.

2.4.6a Job demands, job strain and error rates

Working in emergency departments is associated with varied rota patterns, shift work and sleep disruption. These job demands (the cognitive, emotional or physical effort required in work) have been recognised to impact on cognitive processing (Kuhn, 2002). One study examining prescription errors showed that below average sleep (less than 6.7 hours) increased the risk of error significantly compared to clinicians with average sleep (RR16.44 $p<0.001$) (Westbrook et al., 2018). Doctors with a higher capacity for working memory (measured by Operation Span Task - OSPAN) were protected against error (Westbrook et al., 2018).

A cross sectional survey investigated the interaction between job demands and strain (stress response) (Gevers et al., 2010). Their analysis demonstrated that high job demands were associated with acute stress responses. In addition, regression analysis showed that chronic emotional demands were associated with cognitive ($\beta = 0.41$, $p<0.01$), emotional ($\beta = 0.28$, $P<0.10$) and physical strain ($\beta =0.25$, $p<0.1$). Finally a further cross-sectional analysis established that full time clinicians were less likely to undertake time intensive tasks such as smoking cessation or weight reduction counselling at the end of the week, demonstrating decision fatigue (Barnett et al., 2016). This effect was not seen in part time workers.

2.4.6b The experience of cognitive load for clinicians

The main factors described by doctors to affect their experience of cognitive load in emergency care were the pressures of time and volume (Laxmisan et al., 2007, Balla et al., 2012, Adams et al., 2017). The relative lack of patient information was also felt to increase cognitive strain (Balla et al., 2012). Additionally, diagnostic uncertainty frequently caused anxiety (Adams et al., 2017). Cognitive load was worsened by a lack of learning from adverse event reports (Croskerry and Sinclair, 2001, Kuhn, 2002). Urgent care general practitioners reported the lack of feedback on their patient outcomes unless there had been an adverse event (Balla et al., 2012).

2.4.6cThe effect of clinical experience on cognitive load in UC

Differences between the mental workload of junior and senior ED doctors in the ED demonstrated how experience level affected clinical decision-making when working with clinical uncertainty (Park et al., 2012, McRobert et al., 2013, Adams et al., 2017). Increased experience was associated with better diagnostic accuracy (McRobert et al., 2013). When senior doctors were observed in simulation settings they posed more diagnostic hypotheses and generated their definitive diagnosis later in the scenario (McRobert et al., 2013) This is in contrast to an older study by Barrows et al (1982), where more rapidly generated diagnostic hypotheses were more likely to be correct. Junior doctors instead stated they learnt by reflecting on cases whilst writing their notes and from presenting cases to senior colleagues (Adams et al., 2017). They often needed cognitive breaks and sometimes worked on other tasks deliberately to facilitate this, which included seeing other patients (Adams et al., 2017). Diagnostic uncertainty was described to cause considerable anxiety and often lead to double checking behaviours (Adams et al., 2017).

2.4.6d There are cognitive, emotional and personal challenges associated with working in UC

In conclusion, job demands in emergency care can contribute to cognitive strain, stress responses and anxiety. Job demands may also change clinical behaviours. Clinicians may be protected by their working memory capacity, but adequate sleep is essential for safe clinical work. Experienced doctors may have some protection against this cognitive burden and junior staff in urgent care are likely to require cognitive breaks and time for optimal decision-making.

2.4.7 The clinical outcome of cognitive load in emergency healthcare

The clinical effect of cognitive load on clinicians was demonstrated in three main ways; altered task completion time, error rates and changed behaviours.

2.4.7a Altered task completion time

Quantitative studies often used time to measure task completion. Task completion was longer if clinicians were cognitively overloaded (Mohan et al., 2014). Increased task completion time

was often associated with increased documentation time (Park et al., 2012). In some cases this was an appropriate clinical response, e.g. when key information was emphasised (Laker, 2017) or during results review (Politi et al., 2017). Time saving measures included clinicians designed EMR systems (Bishop et al., 2015), having multiple doctors review the record (Politi et al., 2017) or sorting prescriptions by presenting symptom (Agarwal et al., 2013).

2.4.7b Increased error rates

Cognitive load could increase error rates due to relational (interruptions), cognitive (multi-tasking) and personal factors (sleep and working memory) but few papers measured this. Only one paper related error to factors involved in cognitive load and measured prescribing error within the ED (Westbrook et al., 2018). Interruptions were significantly associated with increased clinical errors (2.82 p=0.015) but not legal or procedural errors (1.08 rate ratio p=0.66) (Westbrook et al., 2018). They noted that 4.6% time was multi-tasking, but this increased to 20.1% of prescribing time (Westbrook et al., 2018). Multi-tasking while prescribing was associated with a significant increase in legal and procedural errors (1.86 rate ratio p=<0.001) but not clinical errors (1.96 rate ratio p=0.154) (Westbrook et al., 2018). A higher working memory capacity (OSPAN) associated with reduced clinical and legal errors (0.98 rate ratio p=0.002 and 0.98 rate ratio p=<0.001) (Westbrook et al., 2018). Clinical error rates were significantly higher with below average sleep (mean reported sleep 5.6 hours in 11 participants 20% (RR 16.44 p=<0.001) (Westbrook et al., 2018).

2.4.7c Altered clinical behaviours

Two papers discussed changes in clinical behaviour due to cognitive load. The first investigated clinical decision-making depending on the day of the week (Barnett et al., 2016). They noted a statistically significant odds ratio of GPs prescribing opiates for back pain (OR 1.16 p=0.04) and sedatives prescribing (OR 1.17 p=0.01) at the end of the week (Barnett et al., 2016) for full time physicians. However antibiotic prescribing for upper respiratory tract infection was unaffected (Barnett et al., 2016). The second paper manipulated cognitive load using a serious game

simulation. They modified cognitive load by increasing interruptions and reducing patient room availability (Mohan et al., 2014). This had little effect on the case completion rate or frequency of death but did reduce their likelihood of recognising atypical trauma cases in the simulation (Mohan et al., 2014).

2.4.7d Altered clinical behaviours, task completion and error rates under cognitive load in UC

This section outlined the direct effect of cognitive load on clinicians and their practice. The outcomes seen included altered task completion time, error rates and changed behaviours. The findings of this literature review suggest that the urgent care settings are associated with higher cognitive load for clinicians and that this can have a direct effect on clinical practice.

2.5 Discussion

In summary, multiple sources of cognitive load are present in the urgent healthcare environment (Table 7Table 7 How does cognitive load affect decision-making in urgent care; a thematic framework of results). The main causes explored in the literature relate to environmental factors in urgent care settings including time, space, demand, disruptions and clinical uncertainty. There is some evidence that cognitive load can alter clinical outcomes by changing clinical behaviours, task completion and increasing the risk of error. Cognitive load is experienced by the clinician as increased mental workload with cognitive and emotional demands. Excessive job demands including mental workload are associated with stress and anxiety. Experience level and working memory may mitigate these effects. Clinicians need to be aware of the increased cognitive pressures of working with complex patients with multimorbidity, atypical presentations and uncertain prognoses and consider how this may affect their clinical decision making in urgent care. This chapter establishes the need for research on how cognitive load may affect decision-making in urgent care settings and Table 7 outlines where the literature presented here links with chapters later in this thesis.

Table 7 How does cognitive load affect decision-making in urgent care; a thematic framework of results

How does cognitive load affect decision-making in urgent care?				
A priori themes	**Themes from the literature**	**Narrative synthesis of themes**	**Key factors causing cognitive load** (chapter ref)	**Clinical effects of Cognitive Load** (chapter ref)
Environment: Time	High volume Low time Interruptions	High task load and low time contribute to cognitive load in UC (2.2.3a)	**Time and Demand** (4.1.2b&c)	**Altered clinical behaviours** (4.1.3c) **Altered task completion** (Chapter 4.1.3b) **Altered risk perception** (4.1.3e)
Environment: Space	Overcrowding Unfamiliar spaces Patient flow	Clinicians need spaces to work and think in UC (2.2.3b)	**Disruptions** (4.1.2d) **Clinical Uncertainty** (4.2.3 & 8)	
Environment: Resources	Access to information Information presentation EMR records	Access to information can contribute to cognitive load in UC (2.2.3c)	**Disruptions** (4.1.2d)	
Environment: Health system	Patient Demand Access to UC Impact on health outcomes	Competing pressures from patient demand and open access to urgent care contribute to cognitive load and increase error rates (2.2.3d)	**Time** (4.1.2b)	
Urgent Care People: Patient factors	Reduced time for patient care Unclear presentations Complexity of Multi-morbidity	Unclear presentations and Multi-morbidity causing clinical uncertainty (2.2.3e)	**Clinical Uncertainty** (5.1.1a & 8)	
	UC People: Teams Communication Interruptions Interactions	Tension between team communication and interruptions (2.2.3f	**Demand and Disruptions** (4.1.2d)	
Urgent Care People: Physician	Job demands, strain and error rates Clinical experience	The cognitive, emotional and personal challenge of working in UC (2.2.3g)	**Space** (4.1.2c)	

2.5.1 Comparison with existing literature

The literature on emergency medicine has previously discussed cognitive load in terms of the stressors faced (Pickering et al., 2012, Kallberg et al., 2017). As in this review, time pressures and high workloads were associated with the perception of working in a high-risk environment and clinician stress (Kallberg et al., 2017, Pickering et al., 2012). However, this review is, to my knowledge, the first article to systematically review the literature for the effects of cognitive load on clinical decision-making in UC.

This literature review complements articles on clinical workload carried out in other medical settings. Direct patient care such as attending emergency calls and transferring unstable

patients had the highest associated mental effort (Lamba et al., 2010). Similar to this review, workload patterns in urgent primary care also demonstrated that increased workload often increased stress and reductions in staff retention (Lattimer, 2010). Like emergency care, mental workload in intensive care and general medicine was similarly felt to be cognitively taxing and authors have called for standardised measures to allow comparison (Byrne, 2011, Lamba et al., 2010). This review would also recommend that qualitative and mixed methods research are needed to study the cognitive load in context.

2.5.2 Strengths, limitations and future research directions

One of the strengths of this review was the systematic approach to synthesising the literature from multiple fields including cognitive sciences, psychology, health informatics and emergency medicine. In addition, this study was able to synthesise evidence from varied study types including experimental, qualitative and mixed methods research. This narrative review has expanded the theoretical base for understanding factors that affect cognitive load in urgent care to aid further research. This synthesis would recommend that qualitative measures of cognitive load are required in addition to experimental measures, to understand the effect on the clinicians' internal cognitive processes. This review also establishes a need for further studies to explore the relationship between cognitive load and clinical outcomes.

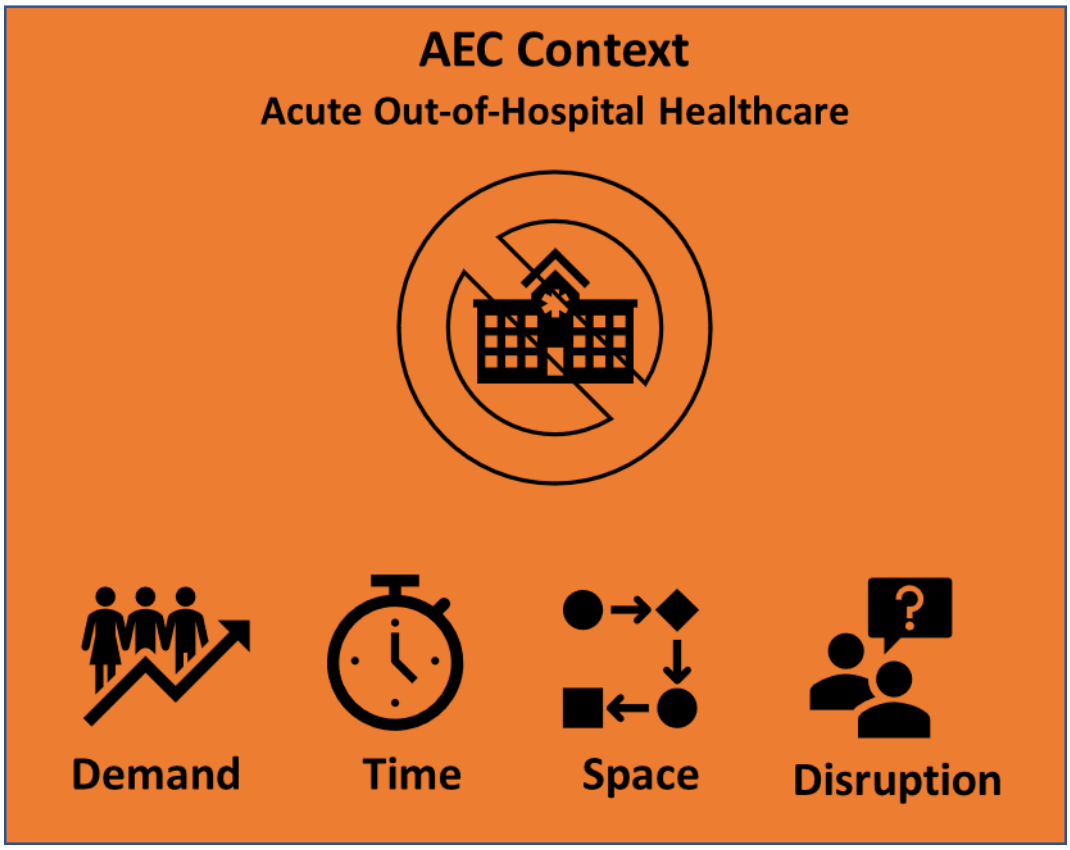
2.5.3 Conclusion and recommendations

This review demonstrates how multiple factors in UC contribute to a cognitively loaded environment. The narrative synthesis suggests three mechanisms by which cognitive load causes clinical impact; altered task time, changed behaviours and increased error rates. It also shows how environmental pressures and "*time to think*" is affected by working in emergency care. Unfortunately, system, resource, and work pressures in emergency medicine often work together to reduce clinician thinking time. Expert clinicians in urgent care were often unaware of risks to their cognition processes due to environmental factors affecting their clinical judgement. In urgent and emergency care, cognitive breaks and places for thought and reflection are a necessity for safe practice. Further investigation is needed into the outcomes of cognitive load in uncertainty including patient safety as the most vulnerable patients are likely to benefit most a from better understanding of uncertainty in clinical decision making. This review sets out in detail the causes and effects of cognitive load and demonstrates the need for further studies of decision-making in UC.

2.6 Updated thematic framework and conceptual map

Following this literature synthesis, I updated the thematic framework (Table 7) and conceptual map (Figure 8) to analyse this study of clinical decision-making in AEC. The literature review identified sensitising factors in the environment which could affect clinical decision making in ambulatory emergency care (demand, time, space and disruptions), these are discussed in Chapter 4.1.2. The literature also identified two other key themes; the importance of the team interactions (4.1.3d, 5.2.2) and the clinical uncertainty present in urgent care (Appendix Chapter 8). The methodology chapter discusses how the thematic framework and conceptual map were used in this thesis (3.5.1).

Figure 8 Environmental sources of cognitive load in AEC



Chapter 3: Methodology

3.1 Introduction to the Methodology chapter

Chapter three outlines the methodology used to understand the clinical decision-making work of clinicians working in ambulatory emergency care setting. This exploratory ethnographic case study aimed to understand the components of the AEC complex intervention and how clinical decision-making was performed in the environmental context of AEC. This chapter discusses and justifies the methodological framework, study conduct, data analysis methods, trustworthiness and ethical considerations.

3.2 Methodological Framework

3.2.1 Qualitative approaches to healthcare research

I chose qualitative methods for this study due to the nature of the research question, the phenomenon under consideration and the relationship with participants. Qualitative approaches to healthcare research explore phenomenon which cannot be easily removed from their context (Popay and Williams, 1998, Black, 1994, Yin, 2009) and are often naturalistic enquiries to understand the social world (Patton, 2002)[11]. The scope of qualitative research to understand processes and systems in new and unknown areas of practice was of particular value in this investigation to understand clinician and team-based decision-making (Britten et al., 1995). As discussed in Chapter 1, AEC is an emerging medical speciality and currently lacks the conceptual understanding to support other methodological approaches. I therefore chose a qualitative method as it could explore the conceptual uncertainty in my research question (Black, 1994, Popay and Williams, 1998).

Qualitative research in healthcare is often effective when investigating complex phenomenon such as the AEC CI (Black, 1994, Ritchie et al., 2014)[12]. Understanding the "*taken for granted*"

[11] Page 46

[12] Page 245 RITCHIE, J., LEWIS, J., MCNAUGHTON NICHOLLS, C. & ORMSTON, R. 2014. *Qualitative research practice : a guide for social science students and researchers,* London, SAGE Publications Ltd.

practices involved in clinical decision-making required methodology which could account for the complexity involved in the social, behavioural and community aspects of healthcare (Popay and Williams, 1998, Lincoln, 1992). The methods also permitted exploration of the relationships between the components of the AEC complex intervention.

Finally, qualitative research enabled investigation into human questions in their social world (Ritchie et al., 2014, Atkinson, 2017). With this methodology I could explore the perspective of the social actors involved by immersion within the setting (Bryman, 1984). This study aimed to illuminate AEC clinical practice by interpreting practitioner narratives "*to showcase what and how they reveal, clarify, distill, elaborate, extend, complicate, confirm, refute, explain, reframe, personify, individualize, specify, sensitize, persuade, evoke, and provoke*" (Sandelowski, 2004). This allowed examination of the phenomenon of clinical decision-making within the broader context of the ambulatory emergency care setting (Rich and Ginsburg, 1999).

3.2.2 Ontological and Epistemological approach

This study used a constructionist approach to understand the social world of the clinical decision-making in ambulatory emergency care. This perspective on social reality is summarised below:

> *"that social reality exists as individuals' experience it and assign meaning to it. This understanding is created through social interaction with other individuals via a continual process of interpersonal communication and negotiation"* (Appleton, 2002)

Constructivism is used to describe epistemological considerations focusing exclusively on the meaning making of the individual mind, whereas Constructionism concentrates on collective generation and transmission of meaning (Crotty, 1998). In the constructionist approach, meaning is created through interaction with participants and the researcher (epistemological subjectivism), with an appreciation that observed phenomena may only partially explain reality (ontological critical realism) (Levers, 2013).

I considered other epistemological approaches including post-positivism and interpretivism. I knew that a post-positivist approach also has a critical realist ontology, however the objective epistemological nature for post-positivism would suggest that reality was independent of human subjectivity (Crotty, 1998). I felt that this approach would be insufficient to explain the complex human interactions and interpretation required in clinical decision-making. In contrast, the Interpretivism paradigm uses a subjective epistemology and relativist ontology to acknowledge subjective reality with multiple meanings (Levers, 2013). I felt this this standpoint to be incongruent with the research question, which seeks to construct a conceptual model of AEC decision-making based on observation.

Instead, I chose a constructionist approach as this paradigm combines aspects of critical realism with epistemological subjectivism, allowing meaning to be co-created by the researcher and participants (Levers, 2013). As such, the findings were a "*construct produced by the interaction between the interpreter and the interpreted as situated in society*" (Levers, 2013). The constructionist paradigm affected the conduct of the study in four main ways; the study methodology, participant-researcher relationships, study quality and communication (Carter and Little, 2007).

The constructionist approach depends on study findings being developed through interaction with participants (Guba, 1990). I used this methodological principle throughout the study; starting with initial discussions with practitioners and stakeholder groups, throughout the research interaction and ending in dialogue with participants (Appleton, 2002). As a constructionist inquiry, the study used ethnographic case study methods to understand the culture of the AEC professional group and the tacit decision-making processes. Data was generated from field observations, with in-depth interviews used to verify the interpretation and obtain participant's explanation for the phenomenon of clinical decision making.

The main mechanism that allowed co-construction of meaning in this constructionist study was the researcher-participant relationship. In this study the researcher used both observation and

interview techniques to closely examine the tacit processes involved in clinical judgement (Gold, 1958) (Chapter 3.8.4). A constructionist approach allows the researcher to interpret *"the multiple meanings that individuals may attach to their own care, behaviours, attitudes and practices*" (Lincoln, 1992). Researcher reflexivity and the effect on the research is discussed in Chapter 6 and the effect of the epistemology on trustworthiness are discussed in 3.6.1.

Communication and interpretation of the study findings were considered in line with constructionist principles; careful consideration was taken to display the variation in clinical decision-making and to understand where consensus or deviation were seen, rather than uncover an objective reality. This approach allowed acknowledgement of the subjective nature of truth with a critical realist understanding that the new conceptual knowledge generated may only reflect part of the phenomenon. However, the conceptual knowledge developed may aid understanding of working in the AEC complex interaction, providing clinicians with the principles of AEC decision-making.

3.2.3 Ethnographic approaches to healthcare research

The tradition of ethnography was established with anthropological and sociological studies in the late 19th century (Ritchie et al., 2014)[13] (Green and Thorogood, 2018)[14]. The main principles of ethnographic research include understanding the perspectives, local meanings and "*webs of significance*" within the cultural context (Prasad, 2005)[15]. Key methodological practices include immersion and prolonged contact with the field, making the familiar strange and capturing the multiple viewpoints (Prasad, 2005)[16]. The ethnographic tensions created by the insider "*emic"* and outsider "*etic"* perspective, require researchers to balance immersion in the field with distance and detachment (de Jong et al., 2013, Prasad, 2005). Ethnographic methods use the familiar and strange to challenge perceptions and gain insight into the examined culture.

[13] Page 244
[14] Page 178
[15] Page 87
[16] Chapter 6 Page 83-104

> *"Seeing the extraordinary-in-the-ordinary may help to elicit curiosity about people's 'strangeness', as well as challenge the taken-for granted logic of things: 'theirs' as well as 'ours'" (de Jong et al., 2013)*

Clinical ethnography has been described as "*culturally- and clinically- informed self-reflective immersion in local worlds of suffering, healing and wellbeing to produce data that is of clinical as well as anthropological value*" (Ziebland et al., 2013)[17]. This type of ethnography requires some clinical understanding rather than a naïve approach to understand the medical aspects of the case under examination (Ziebland et al., 2013)[18]. However allied to this an "*open minded and self reflective*" approach is recommended to understand the variation in individual responses to health and illness (Ziebland et al., 2013).

Clinical ethnographies range from auto-ethnographies of living with illness to explorations of psychiatric institutions, personal understandings of topics including disease processes to healthcare policy, and examinations of culture and rituals within physicians and surgeons throughout their training (Ziebland et al., 2013, Green and Thorogood, 2018, Pope, 2002). Hospital-based ethnography has been used to understand the 'culture' of the hospital (van der Geest and Finkler, 2004), how professionals interact (Atkinson, 1995) and acquire knowledge (Smith et al., 2003).

Health services researchers have used ethnographic methods to develop and understand how services could better address the health needs of particular populations (Rapley et al., 2019). In implementation research, ethnographies have been used to understand CI delivery (Green et al., 2015). Ethnographies have been conducted alongside clinical trials to review fidelity, barriers and facilitators (Palinkas and Zatzick, 2019). In addition, ethnography has improved our understanding of decision-making including the different roles in health consultations (Rance et al., 2020) and perceptions of healthcare communication (Manhas et al., 2020).

[17] Chapter 3, pages 16-26
[18] Chapter 3, page 19

Focused ethnography (FE) has been used in healthcare settings to examine pre-defined and time-bounded phenomena (Bikker et al., 2017, Jones et al., 2016). In FE there is an emphasis on investigating a particular community, organisation or phenomenon, and the research is problem-focused and context-specific (Higginbottom et al., 2013). FE usually involves short term intense episodic field visits concentrating on pre-selected topics rather than the longer term experiential immersion (Knoblauch, 2005). This approach has particular utility for healthcare research where findings are often used to inform and develop clinical practice (Higginbottom et al., 2013).

I chose an FE approach for this thesis as the focus of the study was to examine the decision-making of senior clinicians. Although a traditional ethnographic approach would have allowed examination of AEC culture, this was beyond the scope of the project. Instead, I felt that the focused clinical ethnography was congruent with the constructionist approach as it allowed examination of the phenomena decision-making through interaction with the AEC clinicians (3.2.2). The examination of tacit clinical decision-making in the AEC environment could only be studied in context and therefore an ethnographic case study allowed a more holistic assessment than using solely interviews or quantitative methods. A similar methodology was used in 2002 to examine "*taken for granted*" practices in surgery, and both observational and interview data were required to illuminate the nature of contingency in surgical planning (Pope, 2002). A typology of the factors affecting the decision to operate were noted during observations, whilst the interview data allowed exploration of the meaning of this phenomenon of contingency on the surgeon's implicit decision-making (Pope, 2002).

In summary, after review of the methodological literature and research question, focused clinical ethnography was selected to illuminate the clinical decision-making in the AEC setting. The next section will discuss the unit of the ethnographic study, the 'case'.

3.2.4 Case Study approaches to healthcare research

Case study research has been defined as a "*detailed, intensive study of a particular contextual, and bounded, phenomena that is undertaken in real life situations*" (Luck et al., 2006). Case study research is defined by the "*case*" under examination, Table 8 describes the differences between a "*case*" and "*a case of*" (Luck et al., 2006). Case studies can also be classified based on their subject, purpose, approach, process and timescale (Table 9) (Thomas, 2016). Case study in healthcare research have been underutilised but are useful to understand how complex interventions work, the appropriateness of the intervention for the context and to understand how impact varies with context (Paparini et al., 2020). Despite this a recent study employed case study methods to understand the patient, practitioner and service evaluation effects on senior clinicians making decisions about acute admissions (Pinkney et al., 2016).

Table 8 Definitions in Case Study Research

Phenomenon	Ambulatory emergency care decision-making
The "Case"	Clinicians making clinical decisions in AEC
"A Case of"	AEC decision makers in three sites
The Case Study	Examining AEC decision-making in three sites

Although not tied to any particular epistemological paradigms, two key authors Yin (Yin, 2009) and Stake (Stake, 2005) had contrasting epistemological approaches to Case Study research. Yin viewed case study research from postpositivist epistemological standpoint, whereas Stake's approach was consistent with a constructionist approach (Boblin et al., 2013). The core principles in a constructionist case study include; a holistic approach to the phenomenon, prolonged interaction with participants, an "*emic*" perspective, inductive, flexible and naturalistic inquiry and acceptance of the divergence and variation in participants' viewpoints (Boblin et al., 2013, Stake, 2005, Luck et al., 2006). Whereas a postpositivist approach recommends an independent researcher with a detached approach, triangulating different

sources of evidence to develop causal explanations of the observed reality (Boblin et al., 2013). In keeping with the epistemological approach discussed earlier, this research study uses a constructionist approach as discussed by Stake rather than the postpositivist approach of Yin (Stake, 2005, Appleton, 2002).

Table 9 Types of Case Study adapted from Thomas 2016[19]

Subject (Case)	Purpose	Approach	Process	Timescale
Special or outlier	Intrinsic	Testing a theory	Single Case	Retrospective
Key	Instrumental	**Building a theory**	**Multiple Case**	**Snapshot**
Local knowledge	Evaluative	Illustrative	**Nested**	**Diachronic**
	Explanatory	**Descriptive**	Parallel	
	Exploratory	**Interpretative**	Sequential	

Using Thomas' classification of Case Studies (Table 9), this thesis examined a key case as an example of local knowledge, to describe, explain and interpret the phenomenon of clinical decision-making with the aim of building theory. The boundaries of the case were defined as relating to the participants (AEC clinicians), time (observation period) and context (AEC). This research study is an example of a "*collective case study*" where multiple perspectives on the phenomenon of clinical decision-making were sought (Appleton, 2002). I aimed to use an ethnographic case study approach to investigate the clinical decision-making process at work in ambulatory care and the multiple influences upon the decision makers.

3.2.5 Methodological Approach

In summary, this qualitative ethnographic case study aimed to explore the intellectual processes underpinning clinical decision making by clinicians working in ambulatory care. The investigation sought to understand what the clinical work of ambulatory care was and how the ambulatory environment influenced clinical practice. Using focused clinical ethnography the study combined

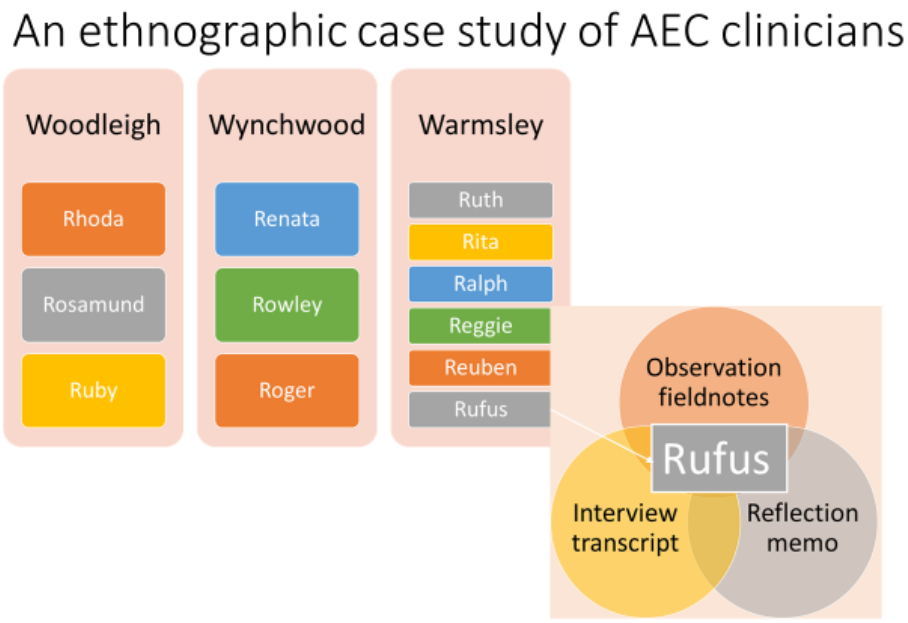
[19] Catagories used in this thesis to define the case study highlighted in **bold**

observation and interviews to understand "*how professional knowledge is locally produced in particular settings*" (Savage, 2000). A case study approach was used to compare how clinicians worked at three different ambulatory healthcare sites for older patient to explore the phenomenon of clinical decision-making in ambulatory emergency care. By exploring these examples of ambulatory care, "*taken for granted*" clinical practices were explored within their naturalistic setting (Popay and Williams, 1998). The "*particularity*" of these ambulatory cases (Abma and Stake, 2014) was that they provided complex healthcare interventions for older patients at the interface of traditional primary and secondary care, a critical example of working with clinical uncertainty.

3.3 Outline of Study Conduct

Using an ethnographic approach, I collected detailed descriptions of the participants, the environment and the processes involved in ambulatory care decision-making. Collecting data from these real world encounters allowed me as the investigator to understand the social world of ambulatory care decision-making and how the actors involved co-produced healthcare in that setting, understanding the tasks involved and understanding the negotiated boundaries involved (Atkinson, 2017). This was complemented by a focused interview with the clinician at the end of the observation period. Clinicians were asked to reflect on the cases seen within the shift and describe their clinical decision-making processes and their thoughts on the factors that influences this, including any perceived effect from the ambulatory care environment. For each participant or "*case*", data was obtained from ethnographic fieldnotes, interview transcripts, and reflective memos, an illustrative example is shown in Figure 9. The objectives tables below show the relationship between the research questions, data collection method and the expected outcomes of framework analysis (Table 10 & Table 11).

Figure 9 An ethnographic case study of AEC clinicians[20]



The study was designed to use both observational and interview data to gain a deeper understanding of the ambulatory care decision-making process. Observational data was used principally to allow the researcher study the context of the ambulatory setting, whereas the interview data explored the cognitive processes of the clinician at work (Ritchie et al., 2014). The design allowed comparisons to be made between the researcher and participants view of events (Atkinson, 2017) and the use of a peer researcher aided the understanding of the participants descriptions of their clinical reasoning (Ritchie et al., 2014, Smith et al., 2003). A case study approach was chosen to allow cross-site comparison (Pinkney et al., 2016).

[20] The cases were anonymised and named according to the gender of the participant e.g. Rufus. The sites were also anonymised and named Woodleigh, Wynchwood and Warmsley (3.3.3 and 3.7.4)

Table 10 Objective 1 To understand how clinicians working in ambulatory care settings make clinical decisions

Research Question 1	Objectives	Expected outcomes	Data Collection
To understand how clinicians working in ambulatory care settings make clinical decisions	What types of clinical decision-making processes are observed in practice?	To describe the clinical decision processes used in ambulatory care	Observation of the patient-clinician interaction
		To explain when and how different techniques may be used in practice	Direct observation of ambulatory context & description of environment
	What information is used by clinicians to make decisions & how is this information critically evaluated?	To define a typical data set of clinical information used by clinicians working in ambulatory care	Observation of types of information collected by clinician
		To describe how clinicians critically evaluate the information sources and use this information to base their decisions	Focused interview with clinician to reflect on cases seen
	What communication do we see between clinician, patient, carer, and clinical team and how does this affect clinical decision-making?	To describe how communication between patients, carers, clinicians and clinical teams and any effect observed in the clinical decision-making	Observational data recording communication and information exchange between the parties involved in decision-making
		To explore clinicians' thoughts on communication and information exchange with patients and the clinical team	Focused interview with clinician

Table 11 Research Question 2 To understand how the ambulatory care setting affects how clinicians make clinical decisions

Research Question 2	Objectives	Expected Outcomes	Data Collection
To understand how the ambulatory care setting affects how clinicians make clinical decisions	How does the ambulatory environment affect decision-making processes?	To define a detailed description of the ambulatory care environment	Observational data on the ambulatory setting. Descriptions of the environmental factors including the physical environment, resource availability, benefits/limitations of non-bed based care and external pressures
		To record any perceived differences in clinical care in the ambulatory environment and describe impact on clinical care (observed by researcher or expressed by clinicians)	Interview data from clinicians describing similarities and differences of ambulatory care with usual care (primary or secondary healthcare) and whether any perceived difference in clinical practice

3.3.1 Participant Sampling Strategy

Senior AEC decision-making clinicians were defined as the "*cases*" under examination (3.2.4). Based on similar research, a target sample size of 10-15 participants was chosen to allow for in-depth ethnographic investigation (Patton, 2002, Ritchie et al., 2014). Three AEC sites, Woodleigh, Wynchwood and Warmsley, were chosen as sampling frames for this study as they were healthcare providers of AEC in one geographical area. (Ritchie et al., 2014)[21]. The site names were anonymised to improve privacy (3.7.4) and aid the researcher to have an "*etic*" perspective during analysis (3.2.3) (de Jong et al., 2013). Within these sampling frames, a stratified purposive sampling approach was used to recruit clinicians with senior decision-making capacity (doctors, nurse practitioners and emergency practitioners) working in ambulatory care. The primary goal of this sampling approach was to capture the variation in key variables including gender, experience level and specialist training of the clinician. Finally a targeted sampling approach "*theoretical sampling"* was used to refine themes generated by the

[21] Page 121

analysis (Ritchie et al., 2014). Clinicians who worked across 2 or more AEC sites were targeted as information rich cases (Rosa, Ralph, Reggie, Rufus and Roger, Appendix A3 & A4). Two participants were observed in other urgent healthcare sites; the Emergency Department and Out of Hours General Practice (Ruby and Reuben). Data saturation was reached by participant 9 (Rowley) with no new data-derived themes arising (Appendix A3).

3.3.2 Access, Recruitment and Consent

The sampling strategy was implemented by approaching the Clinical Leads working at two NHS Foundation Trusts to facilitate access to the ambulatory sites. An invitation to participate leaflet was sent to potential participants by the Clinical Leads at each of the sites. Visits to each site and attendance at monthly meetings for clinicians provided an me with an opportunity to invite individuals to participate. Potential participants were invited to contact me by email, telephone or verbally to discuss the study and book a suitable date and time. Consent forms and the invitation to participate leaflets were sent by email at least one week prior to the planned fieldwork day. The Participant Information and Informed Consent detailed the exact nature of the study, what it would involve for the participant, the implications and constraints of the protocol and any potential risks involved from taking part and are included in Appendix A5. On the day of the observation and interview, the participant was invited to ask questions about participation before signing the latest approved version of the Informed Consent form before any study specific activities were undertaken. In total, 18 participants were approached, two declined to participate and four made no further response to the invitation to participate.

3.3.3 Participant Demographics & Research Sites

Twelve Participants were recruited from three AEC sites over a 14-month period (A4). The participants were asked to provide details on their site of work, background training, experience in AEC and their additional work roles to understand the impact on their clinical decision-making (4.1.1a).

The three sites chosen for this study provided ambulatory care for the local population in one county; Woodleigh, Warmsley and Wynchwood. Wynchwood was the oldest site (2010), with Woodleigh (2014) and Warmsley (2016) developing later. Woodleigh and Wynchwood were based in local community hospitals and Warmsley is situated within a large teaching hospital.

Four scoping visits were carried out to arrange site access, orientate the researcher and assess study feasibility. Two of the community sites were known to the researcher previously and so an hour was spent with the clinical lead at each site to discuss the study (Woodleigh July 2017, Wynchwood Feb 2017). As the hospital site, Warmsley, was new to the researcher, two longer scoping visits for site orientation were needed. For Site 2, seven hours of orientation time was divided over two visits in Nov 2016 (2.5 hours) and Feb 2017 (4.5 hours).

3.4 Data Collection Methods

The case study protocol outlined the data collection procedures, topic guide and data collection tools (Appendix A6-A9). I aimed to have two observation periods of 4 hours and focused interviews with each participating clinician (A9). I recorded observational data in the form of fieldnotes (A8) by the researcher including rich descriptive data about the environment and interactions observed (Spradley, 1980). These notes included timelines of patients' journeys and the doctors' actions, recording examples of types of decision-making seen, and how the environment affected these decisions (Crandall et al., 2006). These notes were typed into a Microsoft word document, removing any potential identifiers and analysed thematically with data management support from the NVivo computer programme.

At the end of these observation periods, I conducted a short interview asking clinicians to reflect on their decision-making for the index patient cases seen. The questions were based on the topic guide (A7) which was developed from the sensitising framework described in the literature review and key "*a priori*" themes. The initial part of the interview aimed to understand the decision-making processes using the participants' description of the index patient case. The second half of the interview asked clinicians to reflect on wider influences on their reasoning

such as the environment, uncertainty, guidelines and the nature of AEC working. A digital audio recorder was used by the researcher to record the reflective interview and the information transcribed by a university approved transcriber. The resulting word documents was analysed using NVivo as before.

Throughout the research process, I recorded a reflective journal to capture thoughts, feelings and reflections throughout the research process. Reflective memos were also recording during the fieldwork and analysis phases and were imported into Nvivo.

3.4.1 Modifications to Fieldwork Conduct

Due to participant and researcher availability and winter pressures in the NHS the observation periods were reduced, but each participant was observed at least once. On average each participant was observed for 5 hours, during one observation period, however 3 participants had two observation periods. Interviews were carried out after the first observation period in most cases, with two conducted at the second visit.

In total, over fourteen months, 101.5 research hours were spent at the three sites with participants. Of this, 61.0 hours was direct observation with participants, 7.5 hours of recorded interviews, 24.0 hours of preparation and closing fieldwork sessions and 9.0 hours in orientation visits. Interviews were carried out after the first observation period in most cases, with two conducted after a second visit. Most observations were held spanning the morning and afternoon (between 10am and 5pm) capturing the busiest times in AEC. Four observations took place in the afternoon and evening (between 12noon and 10pm). The remaining observations were morning, afternoon or evening sessions.

Due to researcher availability and workload many of the observations were carried out on Monday (5 sessions) or Thursday (4 sessions), but the remaining days of the week, weekends and bank holidays were also included. Interestingly four of the fifteen observation periods took place in a time of unprecedented winter pressures for the NHS in autumn and winter 2017-2018. However, in the fieldnotes, I only marked four sessions as “quiet” with most sessions described

as “busy” due to increased patient numbers in ED, large volumes of referrals from primary care, or lack of hospital bed availability.

3.5 Data Analysis and Synthesis

This qualitative investigation used focused ethnography (Higginbottom et al., 2013) within a case study approach (Stake, 2005) to explore the intellectual processes underpinning clinical decision-making in the environment of ambulatory emergency care. By critically examining these cases, using ethnography and cognitive task analysis, the study aimed to discover whether there were differences in the clinical decision-making practices in ambulatory care compared to the clinician’s usual role.

3.5.1 Framework analysis & conceptual map

The thematic framework (Table 7)Table 7 How does cognitive load affect decision-making in urgent care; a thematic framework of results and conceptual map (Figure 8) described in the Chapter 2 were used to inform the data collection in the topic guide and fieldnotes and supported data analysis, abstraction and interpretation (Ritchie et al., 2014). This was further supported by the “*a priori*” themes identified in the topic guide; discussion of the index case, stages in decision-making, and factors influencing clinical decision-making. These were developed into a coding manual to label the data in the NVivo computer programme (Table 12 and Appendix A10). Data from the typed field notes, interview transcripts and verbal reports were coded with data management support from the NVivo computer programme and these codes developed into wide themes (Robson, 2011).

Table 12 Aggregated Analytic Coding Manual for AEC Decision-Making

Analytic Code	Subthemes
Ambulatory Emergency Care	AEC Clinicians AEC Environment AEC Teams
AEC Clinical Decision-Making	AEC Decision-Making for Index Patient Cases Continuity of Care Clinical Uncertainty

Analysis was ongoing throughout the study and designated analysis time periods were allocated to ensure adequate time for case analysis. A framework approach to thematic analysis was used and the five stages of familiarisation, thematic framework development, indexing, charting, mapping and interpretation completed (Pope et al., 2000). One particular strength of this approach was its application to areas of knowledge where some of the sensitising concepts were already known such as in healthcare settings (Ritchie et al., 2014). Data were coded and indexed using "*a priori*" and inductive data generated themes. Charts summarised the data and provided an overview of the data. Written summaries of the case, site and theme were used to explore and interpret the data. This framework approach allowed systematic evaluation of the factors affecting AEC decision-making by critically examining; environmental factors influencing cognitive load (2.4), decision tasks, decision modifiers (4.2) and the strategies clinicians used to manage clinical uncertainty (Appendix Chapter 8). These charts and summaries were regularly shared with the supervisory team to establish trustworthiness (3.6.2)

3.5.2 Within-Case and Across-Case Analysis of ethnographic data

The study process used ethnographic observation techniques with clinician during their AEC shifts to provide a "*thick description*" of the participant, roles, decision-making and environment (Geertz, 1973, Atkinson, 2017). The observation periods were contrasted with focused interviews discussing the index cases to investigate how practitioners reflected on their underlying cognitive processes and behaviours (Crandall et al., 2006).

Participant summaries[22] were prepared after the interviews and observational data had been coded and indexed. The interview and observation notes for each participant were reviewed and the data provided summarised based on the thematic headings in Table 12. These summaries outlined the participant characteristics, description of the index case discussed, the observed environmental effects, team interactions, management of clinical uncertainty, ambulatory decision-making and continuity of care. These summaries distilled the participants thoughts, actions and feelings about the themes identified for within-case analysis. The constant comparative method was used to facilitate across-case analysis to find patterns across the data (Hammersley and Atkinson, 2019)[23]. This method allowed identification of the constant and variable components of clinical decision-making in AEC (1.3.3). Comparison of the decision-making for each index patient case demonstrated which decision-tasks were fixed in each AEC consultation. The participant summaries were then cross-examined for explanatory factors which might explain variance.

3.5.3 Process Tracing to test causal relationships between environment and decision-making

Process tracing is an ethnographic method which seeks to characterise causal relationships by assessing patterns, actions and events progressing through time (Hammersley and Atkinson, 2019, Mahoney, 2012)[24]. This method was used to understand the relationships between the AEC environment, cognitive load and the impact on decisions making discussed in Chapter 4.1. This process started with the literature review described in Chapter 2 which identified the sensitizing concepts of time, demand and space (Blumer, 1954). Process tracing methods were used to establish whether the environmental pressures influenced decision-making by altering cognitive load, and what outcomes resulted (Chapter 4.1).

[22] Examples available on request
[23] Page 177
[24] Page 182

3.5.4 Analytic induction to define CDM in AEC

Analytic induction allows the development of theories to explain relationships generated by the data (Hammersley and Atkinson, 2019). There are six main steps in this process; making an initial definition, examining cases where the phenomenon is seen noting potential explanatory factors, posing a hypothetical explanation to identify common factors, testing further cases against the phenomenon, refining the theory or the phenomenon to new data, finalising the definitions of the phenomenon and explanatory theory. In this study, analytic induction techniques were used to understand the phenomenon of 'clinical decision-making' in this ethnographic case study of AEC clinicians. Analytic induction of the cases was used to understand the distinct features of clinical decision-making in this complex intervention (Chapter 4.2).

3.5.5 CTA & the Critical Decision Method for Index Case Analysis

The index cases were also analysed separately using CTA. Timelines were prepared using from the observational data on each index case using Critical Decision Methods from CTA (Crandall et al., 2006). These timelines were adapted from methods outlined in Critical Decision Methods for "*Here and Now*" incidents (Crandall et al., 2006)[25]. In this method, a critical incident is selected to construct a timeline, the researcher then asks further questions to deepen understanding and consider alternative courses of action (Crandall et al., 2006). This method is useful when experts are able to discuss an incident that they have directly observed (Crandall et al., 2006). These timelines were used to map and construct stages in AEC decision-making discussed in Chapter 4.2. Sociograms were also used to detail the connections and information exchange between team members (Thomas, 2016).

[25] Page 85

3.6 Trustworthiness

Trustworthiness was considered in terms of epistemological approach, study conduct and data analysis. This section will first examine how the constructionist paradigm influenced the study, followed by a discussion of how quality and rigor was maintained during the research process.

3.6.1 Trustworthiness & Epistemological Approach

As discussed earlier, knowledge produced within a constructionist paradigm is co-created with participants and meaning understood within the values framework of the researcher and participants (Patton, 2002, Appleton, 2002). This had several implications for the inquiry and the nature of the findings which are discussed below (Table 13).

Table 13 Trustworthiness in Constructionist Inquiries

(Guba and Lincoln, 1989) from (Patton, 2002)[26]	
Nature of Truth	Is a matter of consensus between informed constructors rather than a representative of an objective reality
Facts	Facts only have value within a value framework
Cause and Effect	Are implied rather than experimentally verified
Phenomenon	Can only be understood in context
Data	Adds to the consensus
Ontological relativism	Research statements are made within a world view
Epistemologically subjective	The researcher is engaged in social construction rather than a search for truth

Firstly, constructionist studies focus on the collective generation and transmission of meaning between participants, rather than concerning themselves with an objective reality or truth.

[26] Pages 123-124

Therefore, I concerned myself with understanding where there was consensus and difference between participants understanding of the phenomenon of decision-making in the context of AEC (4.2). Secondly, data concerning facts could only be understood within a value framework, consequently I considered the positionality of the participants (4.1) and myself as the researcher (6.3). Thirdly, cause and effect in the data were associative relationships co-constructed from the findings rather than experimentally demonstrated. Hence, the analytic relationships between the themes I proposed were to aid understanding rather than demonstrate truth. Fourthly, data was understood within the context of the phenomenon. I addressed this by studying the decision-making processes within the context of AEC and considering the impact of the environment (4.1 & 4.2). Fifthly, the values of the researcher and participant impact on the data and any assertions are made within the context of this world view, ontological relativism. Ethnography was particularly useful in this regard, as positionality of the researcher and participants are key aspects of this approach (Creswell and Miller, 2000). Researcher positionality is discussed in Chapter 6.3 and the impact of participant experience on their AEC clinical practice in Chapter 4.1. Finally, the aim of the study was to collect data that added to the consensus on clinical practice rather than describing an objective reality. The epistemologically subjective nature of this study was considered at each stage. I did this by remembering during the study that I was the research instrument and so engaged in social construction of meaning, rather than a search for an objective truth.

Patton also described the ten core elements of a constructionist inquiry in his textbook of qualitative methods. I describe the strategies that I used to address these fundamental tenets in this study of AEC decision-making in Table 14. In general, the principles of constructionist studies were aligned with ethnographic and case study methodology.

Table 14 Ten Core Elements of a Social Construction Inquiry Framework (Patton, 2002)[27]

Core elements of Social Construction Framework	Strategy used in this ethnography
Enquires into the perceptions of reality shared by different groups of people	Ethnographic observation and interviews with AEC participants sampled for background, experience and site worked
Enquires into what is perceived as real and its consequences	Exploration of what the participants understood by the nature of ambulatory care and the consequences for decision-making
Captures multiple perspectives to understand multiple realities within and between groups of people	Analysis explored the similarities and differences in AEC clinical practice and decision-making (4.2)
Reviews how social groups came to share a worldview	Interviews explored the development of a locally negotiated community of practice (4.1)
Is sensitive to the context to understand the social construction of reality and the impact of social, political, cultural, economic and environmental context	Scoping visits and observation over time provided the wider healthcare context and data analysis explored the impact of environment on AEC decision-making (4.1)
Tracks how social contexts and worldviews change with time	Prolonged engagement with the research sites over 14 months of observation and 4 years of overall study involvement
Attends to the language used by participants to share their perceptions of reality and worldview	Interview transcripts and observed reported speech captured in this ethnography and direct quotes used to support assertions
Enquires into how power affects and shapes social construction	Researcher positionality was considered in terms of position, background and experience (6.3)
Reflects on how the subjective perspectives of the researcher affects the choice of methods, the findings and their understanding of the social constructive investigated	Researcher positionality was considered in terms of position, background and experience (6.3)
Enquires how social constructions develop and are affected by relationships, including that between participants and researcher	Positionality considered throughout the study (6.3). A reflective diary by the researcher charted the development of social relationships

3.6.2 Trustworthiness in Study Conduct & Data Analysis

Trustworthiness was considered in terms of the study conduct and the data analysis. Lincoln and Guba provided a useful framework to assess the quality in study conduct (Lincoln and Guba, 1985). I considered this framework throughout the project; from research design, through data collection and analysis to final reflections on the study. Table 15 summarises the strategies I used to meet Lincoln and Guba's criteria for trustworthiness in study design. Please see Chapter 6.2 for the full discussion of how these strategies were used.

[27] Page 127

Table 15 Trustworthiness of Study Conduct, adapted from (Lincoln and Guba, 1985)[28]

	Quality Test	Strategy
Credibility	Conduct of fieldwork	1. Prolonged engagement of 14 months 2. Persistent observation 3. *Triangulation (sources, methods, investigators)* ***not used*** 4. Instead contextual validation of sources and methods
	Peer debriefing	Use of supervision meetings Feedback meetings with participants and sites
	Negative case analysis	Systematic search for variation supported by framework analysis techniques 1. Index Case summaries 2. Participant summaries 3. Thematic summaries 4. Data display tables
	Referential adequacy	Anonymised raw data including fieldnotes and interview transcripts available on request, participant summaries included within the appendices
	Member checks	Patient participation group prior to study Informal feedback during observation & interview Informant feedback meetings with participants and sites
Transferability	Thick description	Thick descriptions of cases, sites and decisions from fieldnotes and transcribed interviews Participant summaries
Dependability	Dependability audit	*Halpern Audit; raw data, data reduction and analysis, data synthesis, process notes, research proposal and instrument development* ***not used*** Audit of code and theme development Systematic within and cross case analysis using analytic framework Supervision meetings and member checking
Confirmability	Confirmability audit	
Reflexivity	Evidence of reflexive activity	Use of reflexive diary Supervision meetings

I also considered Miles and Huberman's criteria to assess the quality of data analysis to ensure the trustworthiness of the analysis (Table 16) (Miles and Huberman, 1994). After mapping the strategies required of both frameworks, I considered that both had overlapping premises, but decided that Lincoln and Guba's approach was more comprehensive, as it considered both study

[28] Page 328

conduct and data analysis. I also thought this holistic approach was most aligned to the ethnographic, constructionist study design. The framework by Lincoln and Guba in Table 15 discusses the main standards for trustworthiness; credibility, transferability, dependability, confirmability and reflexivity (Lincoln and Guba, 1985). Chapter 6 discusses how each of the trustworthiness standards in Table 15 were reached.

Table 16 Trustworthiness of data analysis (Miles and Huberman, 1994)

	Quality Test	Strategy
Data Quality	Representativeness	Multiple sources of data Use of supervising colleagues
	Researcher effects	Reflexive diary Use of supervising colleagues
	Triangulation	Multiple data sources
Testing patterns in the Data	Outliers	Use of outliers, extreme cases to test theoretical explanations and test rival theories
	Rival theories	Use rival theories and alternative explanations as a test
Testing explanations	Replication of findings	Comparison with other ambulatory care sites e.g. ED and OOH GP
	Testing theories	Test possible relationships and findings e.g. checking for differences in practice if a clinician works at different sites
	Feedback from informants	Discussion of findings with supervising team and representatives from the ambulatory care sites

3.7 Ethical Considerations

Ethical approval was granted by the NHS Research Ethics Service with Health Research Authority approval obtained (HRA approval IRAS Project ID 212750, 22/2/17). Research design and conduct adhered to the principles of Good Clinical Practice (GCP) in keeping with the Helsinki declaration of 1964 (Rickham, 1964). The nature of the research question and study methodology highlighted aspects of anonymity, confidentiality, consent, participant impact and service impact. These are discussed using Hammersley and Atkinson's principles for ethical ethnographies; procedural concerns, contextual issues, privacy, harm, exploitation and reciprocity (Hammersley and Atkinson, 2019)[29]. The section closes with foreshadowed ethical dilemmas.

[29] Chapter 11 page 215-237

3.7.1 Procedural concerns

Ethical considerations in the study conduct and procedures were considered throughout the process from recruitment to participant selection, study process and data analysis (Figure 3). In keeping with GCP, key procedural issues ensured that processes protected participant anonymity and confidentiality. In common with the Helsinki convention, participation in this study was voluntary and there were no consequences for participants who declined this study. AEC Clinicians working within the ambulatory care environment were invited to participate in three main ways; gatekeeper access, email invitations and direct recruitment at clinical meetings.

Other significant procedural considerations included data security. All documents were stored securely and only accessible by study staff. Anonymity was initially maintained using a participant identifier key, and I was responsible for the security of participant details. Participant identifiers were removed from fieldnotes and interview transcripts once typed.

3.7.2 Contextual issues

The main contextual issue was how the study could be conducted within an urgent healthcare setting. This included considering how the environment might affect study conduct and the impact on clinicians at work. As discussed in Chapter 2.2, urgent care environments contain several challenging aspects for cognitive work including time pressures, high patient turnover, acutely unwell patients and noisy overcrowded environments (Croskerry and Sinclair, 2001). I considered the implications for the participant and the researcher here, the impact on service delivery is discussed in the section on harm.

Participants were observed in their workplace to understand their normal working practices. It was intended that the study should not impact on clinical work, but it was noted that observation could cause stress or anxiety for participants. However, I anticipated that as the participants were experienced clinicians this would be minimal, as observed practice is a normal teaching practice. As an experienced clinician, I watched for situations when clinicians were

under pressure, allowing breaks as necessary and if required, rearranging the session. The clinician was aware they could also end the observation at any time.

In addition to affecting the clinician, the impact on the researcher was also noted. I used four scoping visits were used to orientate myself to the surroundings which aided researcher safety as these are working clinical areas. Observation also required long periods of concentration and I noted the fast pace of work in the fieldnotes. After the first few observations, I found that shorter observations concentrating on one index case were more useful.

> "*Fast pace of work if following the co-ordinating senior doctor and so short fieldwork notes followed by detailed write up afterwards.* [Scoping visit November 2016]

The volume of notes generated by the fieldwork was also noted during the initial scoping visit. This led to modifications to the fieldnotes process. Initial fieldnotes were handwritten with typed notes to follow. This was changed to using scanned electronic versions of the handwritten fieldnotes for analysis and typing time concentrated on the index cases. In addition, I judged four hours of observation time to be the ideal duration for an observation, balancing volume with researcher cognitive burden.

> *"2 hours observation generated >1400 words, feel that 4 hours observation feasible to follow volume of data observed*" [Scoping visit November 2016]

3.7.3 Consent

Informed consent is a key tenet of GCP. This study had a detailed informed consent process including with verbal and written information for participants on the objectives of the study, risks and benefits of participation (Appendix A5). A signed consent form was required for all participants. I invited participants to ask questions prior to the observations. Patients were asked to give verbal consent to a researcher to observe their care (3.7.5).

3.7.4 Privacy

Privacy was considered in terms of anonymity and confidentiality. Participants data were anonymised using a participant identifier key. During the analysis process, pseudonyms were chosen to describe the participants. This was to aid the discussion between the "*emic*" and "*etic*" and to make the familiar participants strange to the researcher. Due to the small sample and as some participants were known to the research team, cases were discussed at an aggregate level with the supervision team. Broad labelling descriptions were used when reporting the data during information feedback meetings. Where anonymised cases needed discussion at an individual level, this was done with senior supervisors who work outside of AEC, to reduce the risk of inadvertent data release.

The main concern for confidentiality was to ensure that the participant interview remained private. A suitable room was chosen with the participant to ensure that the clinician could speak uninterrupted and conversations were not overheard. However due to the clinical commitments of the senior clinician, some interruptions during the interview were noted, but the recording was stopped and restarted when the clinician was ready.

3.7.5 Harm

As the study took place in a clinical environment, potential consequences that could result in patient harm or service disruption were considered. As the focus of the research was the clinician's decision-making, patients' written consent was not explicitly obtained for this study. Only anonymised non-patient identifiable data was collected to aid discussion about the observed clinical decisions. However, as patients were passive participants in the research, I considered how principles of GCP applied to this group. Individual patients were asked whether they were happy for their care to be observed by a researcher by the participant, gaining verbal consent. Posters were placed on the ward to ensure that patients are aware that a study was taking place. The units are all within Foundation Trusts which have trainees regularly and patients were used to both medical students and trainee doctors observe their care.

The study planned to minimally disrupt patient flow and service delivery through the ambulatory care wards. The main effect was thought to be the effect of the presence of an observer on the participant. During the observation periods I made notes on the decision-making processes and practices seen but I often asked questions during the observation period to clarify the thought process of the clinician. I carefully considered when to ask questions and if an interruption at that point might unduly influence practice. The interview also provided another opportunity to ask questions. The shorter observation periods also aided the participant, by reducing the time burden of having an observer. If service delivery slowed or the participant felt delayed by observer, both parties were able to close the observation period.

3.7.6 Exploitation and reciprocity

Ethnographies have often been accused of exploiting their participants, with little benefit returning to the informants (Hammersley and Atkinson, 2019). I considered how to manage this relationship, as I was known to some participants and worked in the local area. I made it clear to the participants that I was attempting to understand their decision-making work and used feedback meetings to disseminate the findings with the participants and local AEC community. Other benefits for the participants, were certificates to document continuing professional development hours, in recognition of their professional time. I felt that rewards or monetary incentives would have changed the relationship to a financial transaction rather than educational experience.

3.7.7 Foreshadowed ethical problems

The main foreshadowed problems were conducting research in one's workplace and maintaining professional integrity as a doctor. I have a clinical background, completing my training as a GP, prior to starting a research career and the impact of this is discussed in Chapter 6.3 on positionality. I had been a trainee doctor in one of the sites and was a professional colleague of some of the participants. I was concerned that some participants might feel under pressure to take part due to this prior relationship. Therefore, I chose a combination strategy of

gatekeeper introductions, education meetings and emails to emphasise that this was a research study rather than organisational evaluation of their or the AEC units' performance. I stressed to participants that they were under no obligation to take part and their participation would have no effects on the current or future professional relationships.

Prior to the study, I and the supervision team considered what I would do if I were to observe clinical practice that I felt was harmful. On reviewing the GMC guidance, although working as a researcher, I would still be bound by professional responsibility to report poor practice and avert potential patient harm. In collaboration with the team, a standard operating procedure (Appendix A11) was developed for situations where professional integrity and responsibility could be challenged by observed clinical behaviours. In the first instance, were any behaviour harmful to patient care or staff be observed, this would have been discussed with the individual clinician and reported to the clinical leads at the site to take any appropriate immediate action. This would have been followed by a discussion with the study supervisors within 24hrs of the incident taking place so that they can ensure appropriate action has taken place. This would require breaking of a participant's confidentiality due to the risk of harm involved and was detailed in the patient information leaflet. These episodes would have been recorded and reported to the relevant authorities as appropriate.

In summary, ethical considerations were considered using Hammersley and Atkinson's principles for ethical ethnographies (Hammersley and Atkinson, 2019) and the Helsinki Declaration of Good Clinical Practice (Rickham, 1964). These issues of anonymity, confidentiality, consent, participant impact and service impact were considered in terms of their impact on patients, participants and the health system. I reflect on these ethical issues, comparing foreshadowed problems with unanticipated challenges in the discussion (6.2)

3.8 Chapter Summary

This chapter has discussed the methodological framework, study conduct, analytic methods, trustworthiness and ethical considerations used in this thesis. Constructionism was chosen as

the epistemological approach and the impact of this considered throughout the study process. An ethnographic case study methodology, congruent with constructionism, was selected to understand the phenomenon of clinical decision-making in the context of ambulatory emergency care. Cases were purposively sampled across three sites providing this type of care to understand the cognitive processes involved. Data collection involved interview and observational data and analysis combined ethnographic and CTA to gain a holistic perspective of clinical decision-making, constructing knowledge with participants. Trustworthiness and ethical issues were considered and are reviewed in Chapter 6. In Chapter 4, I discuss the impact of environmental factors on cognitive load and decision making, then consider the constant and variable components of clinical decision-making in ambulatory emergency care.

Chapter 4.1: The effect of cognitive load on clinicians working in AEC

4.1.1 The AEC clinician in context

This chapter will discuss the environmental factors present in the AEC setting and the effect on the decision-making of AEC clinicians. The chapter starts with a discussion of the characteristics of the participating clinicians (Table 17), the training required to work in AEC (4.1.1b), the work roles of the AEC clinician and the key attributes required to work in AEC (4.1.1d). Section 4.1.2 then explores how the factors of high demand, time, space and disruptions in the AEC environment affected the cognitive load of the senior decision-making clinician (Figure 8).

The literature review (2.2) proposed three main ways in which clinical practice could be modified by cognitive load; by altering task time, changing perceptions of risk and changing clinical behaviours. In 4.1.3, I consider whether empirical data in this ethnography supports or challenges these insights. This section considers whether the AEC clinicians are observed to alter their clinical practices in response to environmental pressures when performing the AEC complex intervention. Finally, this empirical study considers the mechanisms which allow clinicians to mitigate the impact of environmental pressures.

4.1.1a Characteristics of the AEC Clinicians

As discussed in Chapter 3.3.3, the twelve participants worked across the three ambulatory sites Woodleigh, Wynchwood and Warmsley (Table 17). The participants and sites were given pseudonyms to maintain privacy and analytic distance (3.7.4). Most of the participants had worked across at least two AEC sites and one participant frequently worked across all three sites regularly. The sample contained five GPs and five Hospital Consultants and two Coordinators. Most of the participants had complementary roles in Accident and Emergency (4 participants), Acute Medicine (6 participants) and Out of Hours General Practice (3 participants). Half of the participants had managerial positions in addition to their clinical responsibilities. Across-case

analysis (3.5.2) demonstrated that when discussing roles, background experience often explained how participants defined their AEC clinical practice.

Table 17 Characteristics of the participating AEC clinicians

Participant pseudonym	Site worked	Experience	Self-Description of their AEC work
Community AEC sites (Woodleigh & Wynchwood)			
Rhoda	Woodleigh	GP & ED	*"putting the jigsaw together and coming up with a plan"*
Rosa	Woodleigh	Coordinator	*"I've seen how people do cope at home"*
Ruby	Woodleigh	GP	*"it's the medical needs and psychological and emotional support as well*"
Renata	Wynchwood	Consultant Medicine & Geriatrics	*"Complicated medicine's what I like to do"*
Rowley	Wynchwood	Consultant Medicine & Geriatrics	*"you read and work out what's been proven to work for some people and then you have to you decide whether to apply it in your patient in front of you"*
Roger	Wynchwood	Coordinator	*"Any pinch points try and iron them out"*
Hospital AEC sites (Warmsley)			
Reggie	Warmsley, Woodleigh &Wynchwood	GP	"*It's not about numbers"*
Ruth	Warmsley	GP	*"Make sure that the patient gets in the right place"*
Ralph	Warmsley & Wynchwood	Consultant Medicine & Geriatrics	"*My feeling is that pretty much the majority of what we do has in it a degree of uncertainty*"
Rita	Warmsley	Consultant Medicine & Geriatrics	"*it's about changing that mindset*"
Rufus	Warmsley, Woodleigh &Wynchwood	Consultant ED & GP	"*the clinical problems that we deal with are fairly sort of standard medical problems we're dealing with in a different way*"
Reuben	Warmsley & Wynchwood	Consultant Medicine & Geriatrics	*"It's explaining to patients and families, what you're doing and why you're doing it and what the support's going to be"*

4.1.1b The experience and training of the AEC clinicians

The AEC clinicians often worked in more than one clinical area, but for most ambulatory care was the predominant role. The ability to work across clinical boundaries appeared to be essential to their work in AEC. For example, Rufus is an experienced GP and Hospital Consultant who has worked across multiple AEC sites, who described how over time his roles have merged over time.

> *"I think over the years you get more confident about letting the things [roles] bleed into one another"* [Rufus interview]

Some participants particularly enjoyed the variety that working in AEC allowed. Renata realised that having several roles was challenging but enjoyed the variety of clinical practice. Renata specialises in geriatric care and her roles included; medical consultant, educational supervisor and clinical manager. She enjoyed the patient contact in ambulatory care but would find it tiring to do every day. As she has these responsibilities, she was observed to provide advice for multiple health professionals.

> *"I think it keeps me fresher for my various roles because I change around it a little bit. But it is difficult when you're trying to, like the phone call that I was getting today, which is about a patient from three weeks ago in a different hospital doing different things."* [Renata interview]

Ruth also explained how her non-clinical roles in management influenced her AEC practice. She felt her ambulatory work was beneficial when working in other contexts. She called herself a "*hybrid physician*" and used her knowledge of AEC when commissioning healthcare.

The participants felt their clinical training and experience in other areas influenced their AEC practice and many also used their experiences in AEC in other roles. Some felt that they practiced in a similar way between sites and others felt their practice varied. Often the most experienced AEC clinicians who worked across multiple sites (Rufus and Reggie) felt they practiced in a similar

way across their scope of clinical practice. Most clinicians found it easy to describe the variation in their clinical practice in different roles, however others found this harder to define.

Each group of participants felt that they brought key skills from their background training to AEC; GPs discussed communication training, Geriatricians spoke about complexity management and ED trained doctors highlighted flexibility. The GP participants often described the enhanced communication skills gained in GP training. Rufus used communication skills from his GP background to help him explain treatment plans to patients and his clinical reasoning. Reggie felt that in acute care, patients were often not able to participate fully in discussions regarding their care (due to the severity of illness) and careful communication with family was important. Both agreed the importance of *"allaying fear and finding out what people's expectations are"* [Reggie interview].

The geriatricians in the sample described their ability to manage complexity as the main skill they brought from their clinical role. They enjoyed considering complex problems and making flexible individualised patient management plans.

> *"It's one of the reasons I became a geriatrician is because I like the complexity of it and I like that there are lots of different options of treating people and it's based on each individual person and their circumstances and their wishes."* [Renata interview]

Renata also described that her geriatric training increased her confidence to work beyond clinical guidelines. Rowley described the elements of his geriatric practice that he needed to manage complexity; his knowledge of presentations of illness in older adults, the importance of the functional assessment in discharge planning and involving the family in healthcare decisions.

Emergency Medicine clinicians felt they had an enhanced appreciation of patient flow, adaptability and leadership skills. Rufus felt the fast-paced and changeable nature of the emergency department had taught him to be able to respond "*flexibly*" to urgent situations. He

felt this was where he gained the leadership experience and confidence needed to manage emergency situations.

During the interviews, the AEC clinicians described the diversity of clinical background as a strength for their clinical teams. They thought this allowed them to learn from one another and flexibly respond to patients needs but were aware that this could also cause variation in service provision.

> *"And our consultant team is very different. We've got quite different backgrounds which is definitely a strength for AEC, and I think we're conscious of it, and we regard it as such. But, but it also sort of throws up, … that people have a different take on things and you have to sort of be a bit, temperamentally I think, able to roll with that. The, the idea that there's many ways to do things right, you know, rather than only one particular way."* [Rufus interview]

Across-case analysis of the experience and training of the AEC clinicians identified that the main similarity in training was having a varied background experience. There appeared to be no single pathway to ambulatory care and participants felt that a broad scope of practice benefitted their AEC role. However, as the analysis relied on participant self-reporting and observed behaviours, this analysis is unable to differentiate whether the novel nature of the work attracts these change-makers or if is an artefact that clinicians with diverse experience are retained in the AEC services.

4.1.1c The work roles of AEC clinicians

Early in the observations, the participants started to demonstrate very different work roles in AEC. The fieldnotes for Rosa described how she would often switch between working as a nurse, a coordinator and expert clinician.

"Multiple roles for the ANP: often can switch roles during one task e.g. when discharging patient B from the unit, is explaining the discharge plan to patient and relative but then goes to get the catheter bags from the ward" [Rosa fieldnotes]

Similarly, Rhoda and Ruby were noted to change between supervisory and expert clinician roles. I used the term expert clinician to describe the direct AEC consultation work with patients. By the fourth participant Ruth, four distinct roles were noted from the observations.

a. *Triage – patient allocation, severity assessment, location of care*
b. *Supervision – overseeing team. Spectrum of hands on to hands off*
c. *Coordinator – resource and time allocation*
d. *'Expert Clinician' – patient-doctor consultation* [Ruth memo]

In total, six roles for the AEC clinicians were developed during the analysis; triage, expert clinician, supervisor, teacher, supervisor, coordinator and management. Although one additional role, nursing, was noted, as the focus of the study was on the medical decision-maker I have not discussed this further. Table 18 summarises the roles worked by each clinician during their observation. These AEC roles are defined in the appendix (A12) and flexibility required for role switching is discussed next.

Table 18 Participant Roles

Participants												
Roles	*Rhoda*	*Rosa*	*Ruby*	*Ruth*	*Ralph*	*Reggie*	*Reuben*	*Renata*	*Rowley*	*Rita*	*Rufus*	*Roger*
Senior clinical	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	

Management		*Y*					*Y*	*Y*		*Y*		
Triage	*Y*		*Y*	*Y*		*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
Supervisor			*Y*		*Y*		*Y*	*Y*	*Y*	*Y*	*Y*	
Teaching			*Y*				*Y*			*Y*		
Coordinator		*Y*						*Y*				*Y*
Nursing		*Y*										*Y*

4.1.1d AEC clinicians and flexibility

Flexibility was one of the key attributes of the AEC clinicians. This attribute was constructed from the ethnographic data using analytic induction (3.5.4). It allowed the clinicians to provide individually tailored AEC care plans in the AEC complex intervention (4.2.3b). This capacity to respond to change was seen to affect the implementation of the AEC CI in three different ways; management of task switching, responding to new information and working with contextual awareness.

Responding flexibly to task switching in the AEC environment

Cognitive task analysis of the fieldwork demonstrated that the AEC clinicians were flexibly switching tasks and roles throughout their shifts (4.1.1c). The literature on cognitive load demonstrated that task switching often increased cognitive load (Chapter 2.2). However, the participants in this study varied in their attitudes towards this.

Rufus reported that he was not conscious of working in the three different roles during the shift. For him they were three simultaneous and interlinked processes that allowed him to flexibly respond to the situation. However, he did jokingly explain how this role required lots of coffee!

Interviewer: Today I saw you working in sort of three main roles. So, you did some triage, some supervision and you were also sort of the expert clinician. How do you juggle all that?

Rufus: I don't know. [laughs] Not, not very well probably. [laughs] Yes, with a great deal of difficulty and a lot of coffee … I don't really notice when I'm doing these things. [laughs] It's just a question of you just responding to the situation, I suppose, with what it needs. I suppose, in most given moments, you're doing a combination of all of them really, aren't you?... I think they're often all rolled into one, so I don't think I see the roles as consciously different. [Rufus interview]

Rosa however found role switching was very challenging. She worried that she was "*letting everyone down*" [Rosa Fieldnotes]. Early in the shift she attended to her emails in her management role, before switching to direct patient care. In the observation, I noted that she would take on nursing and healthcare assistant tasks for example, change a catheter bag, which a doctor might not think to do.

"So, I'm trying to co-ordinate the Unit and I know I've got somebody else coming in. You're trying to sort of bear those things in mind as well and you're sort of jumping between those. So that, I think there's two things there that make it feel like it's not just a nice linear thing." [Rosa interview]

Some participants actively managed the cognitive stress of task switching by dividing the roles between them. Paired consultant working was observed in Warmsley to provide additional clinical flexibility when demand was high. This was possible at Warmsley as more clinicians were available, but not feasible in the community AEC units due to reduced numbers of senior doctors.

Responding flexibly to new information in the AEC CI

The participants displayed considerable flexibility in response to new clinical information. This was seen throughout the constant components of AEC decision-making and the impact of this on the development of the AEC clinical plan is discussed in 4.2. New information often led to modification of the AEC clinical plan through negotiation (4.2.2c and 4.2.3a). AEC clinicians were able to respond to new information and flexibility incorporate this into their tailored treatment plans in negotiation with the patient, family and AEC MDT.

> *"Initial plans are often refined as further information becomes available, but by the end of the case the senior doctor has made a problem list and short summary of the patient"* [Rhoda memo]

Responding flexibly to the AEC environment: Contextual awareness

Clinicians also responded flexibly to the cues in their environment. In this section, I explain how this contextual awareness (Gabbay and Le May, 2011) of the AEC environment allowed clinicians to respond flexibly to individually tailor their management plans. This contextual awareness was most often described when clinicians contrasted their ambulatory care role with their other roles.

The clinicians felt that skills learnt in AEC were useful in their other roles. These skills included assessment of disease severity, community orientation and team management. Assessment of disease severity was often described by the participants in terms of threshold levels of concern. Most GPs thought that the AEC patients were more unwell that the ones they routinely assessed in General Practice. Ruth described how her threshold for concern had changed; test levels that would worry her in General Practice she now interpreted differently.

> *"We all know that sometimes the numbers can be quite frightening and actually working here, I've got less worried about, you know, CRPs[30] of 90 but I do worry about CRPs of 300. So, it's, it's sort of shifted my worry level."* [Ruth interview]

Those trained in ED felt they had to lower their threshold for hospital admissions as the patient population in the community was different to AEC. Rufus described situations where he had managed unwell patients in AEC and considered whether he should have referred those cases to hospital. In general, hospital doctors felt that patients seen in AEC were less unwell than those needing hospital admission.

Those trained in ED and Acute Medicine felt they gained a greater understanding of community care. The acute medics felt their work in AEC had changed their work practices and their knowledge of alternative pathways for patient care. Roger, an advanced practitioner felt he had a greater awareness of the community treatments and assessment pathways from his time in AEC. He also felt more confident in understanding the significance of clinical information in context.

Both community and hospital clinicians felt that team working was a significant part of their role in AEC. Ruth thought these team-based discussions help her make clinical decisions and manage the uncertainty in AEC (Chapter 6).

> *"We tend to work as a team here. So, you will see us talking amongst ourselves about what's the right thing to do for patients or you're just trying to support one another with making sort of quite difficult decisions really about whether people are better off at home or here".* [Ruth interview]

Most participants described the impact of the AEC setting on their clinical practice and how this influenced their other clinical roles. This was often described in terms of altered thresholds for medical intervention and their greater understanding of what could be achieved outside the

[30] C-Reactive Protein, a marker of inflammation

hospital. This contextual awareness had allowed them to develop their AEC community of practice and work flexibly in the AEC environment.

4.1.1e Summary of the AEC clinical practice

A key characteristic of the AEC generalists was the ability to work across professional boundaries and participants appreciated the diversity of background of the clinicians working in AEC. The AEC clinicians worked in six different clinical roles, often switching between several roles during each shift. AEC clinicians were able to work flexibly in response to role switching, contextual awareness and new information. This flexibility in approach allowed them to tailor individual AEC clinical plans. This section also demonstrated that AEC clinicians had considerable contextual awareness of the AEC environment and how this differed from their routine clinical practice. The participants felt that AEC working altered their thresholds for concern and increased their community orientation. They valued the input of their teams providing support for clinical decision-making in AEC. The next section investigates whether the AEC participants altered their tasks, time, behaviours and team roles in response to the pressures of demand, time space and disruptions in the AEC environment.

4.1.2 The Environmental Factors in AEC that affect clinical uncertainty & cognitive load

This section describes how the AEC setting affects clinical practice and how environmental factors might interact to contribute to cognitive load for the senior clinician. In chapter 2, the literature established four main factors causing cognitive load in the urgent care; demand, time, space and disruptions (Figure 10**Error! Reference source not found.**). These factors from chapter 2 formed the analytic framework which informed the development of the fieldwork observations (3.5.1). I discuss the impact of these sources of cognitive load on the AEC clinicians (Table 19).

Figure 10 Environmental sources of cognitive load in AEC

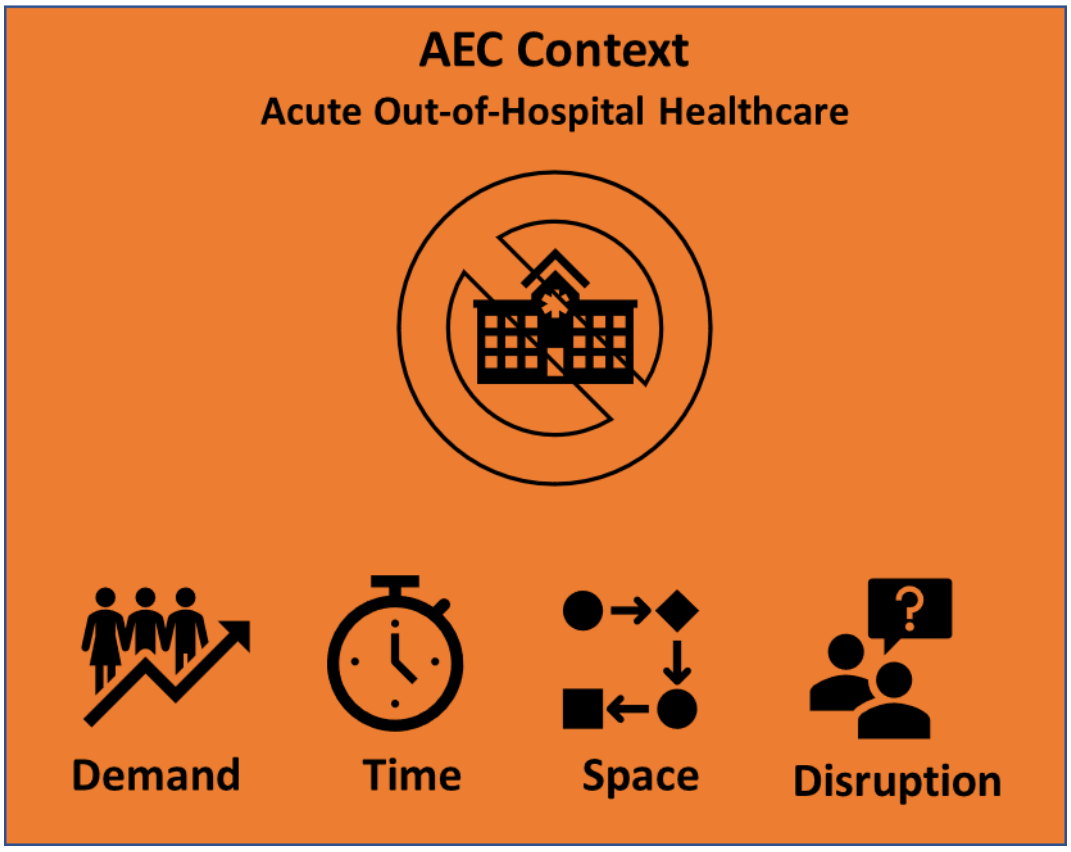


Table 19 Factors causing Cognitive load in the AEC environment

Environmental Sources of Cognitive Load	Factors affecting the AEC clinician	Chapter reference
Demand	High patient volumes	4.1.2a
Time	Time of day and day of the week	4.1.2b
Space	Patient flow	4.1.2c
Disruptions	Interruptions	4.1.2d

4.1.2a The Effect of High Demand in the AEC environment on Cognitive Load

The effect of high patient volumes on cognitive burden

Frequently the observed shifts were extremely busy in AEC; patient assessment spaces were often full, and patients were waiting for a senior doctor assessment. Rowley's observed shift captured the difficulties of a busy AEC shift. He had already seen several patients, but more were waiting and there were no bed spaces left to assess patients. Rowley was helped by his team: an experienced junior doctor, a nurse with history taking skills and an experienced coordinator able to assess patients with serious illnesses. Rowley managed this situation by prioritising the patients using their "*track and trigger*" score[31] and assessed the patients in turn throughout the afternoon.

> *"A Monday afternoon shift…10 patients are on the board and 2 in the waiting room, 2 are yet to arrive. All the bed spaces are already in use. The senior doctor runs through the board and has already seen 5 patients compared to the 1 patient seen by the junior doctor. Track and trigger scores for each patient are also highlighted to help prioritise. Rowley sees 4 patients between 3 and 6pm."* [Rowley Fieldnotes]

The number of patients referred to AEC varied, and Reggie explained how this affected his decision-making to accept patients for AEC. He found it hard to explain to referring GPs this

[31] An early warning score based on measurement of patient observations including heart rate, blood pressure, oxygen saturation, respiratory rate and temperature

flexibility in decision making, where triage decisions altered in response to patient demand and AEC capacity.

> *"The most difficult part of that is though, some days I will accept something whereas another day I won't, and that's because I'm very, very busy and I don't, I won't accept somebody who is 80% likely to then they'd stay in. Whereas if I've got an empty Unit…then I will see that person and they will get a very good service...that's a difficult, that's a difficult thing to, a difficult message actually to give to the GPs."* [Reggie interview]

All the participants could recall when their cognition was affected by high patient demand. This was particularly illustrated during observation period in the winter months of 2017-2018 ("*winter pressures*"). Three participants discussed how these seasonal pressures caused an additional cognitive burden. The participants described altering their decisions on patient capacity and resource use in response to high demand, altering their referral thresholds. For example, Renata explained how the risk-benefit ratio for hospital admission versus ambulatory care altered when the hospital was full, and patients were waiting in corridors. She felt that under winter pressures patients were at higher risk of iatrogenic harms in hospital when demand exceeded capacity.

> *Interviewer: And how have the winter pressures affected your decision making over the year?*
>
> *Renata: Well, that's an uncomfortable question. [um] So, when the big hospital is in sort of a terrible state and you know that patients are waiting in ambulances, on trolleys for fourteen/fifteen hours at a time, you do sort of think a little bit about, 'Well actually, they're, the downsides of going into hospital in terms of their increased risk of delirium and their increased risk of other things is higher, so therefore, the risk/benefit balance changes a little bit'."* [Renata interview]

4.1.2b The Effect of Time in the AEC environment on Cognitive Load

The effect of timing on AEC decision making

The day of the week and the time of day impacted on clinical decision-making in AEC. Ruby illustrated how the day of the week directly impacted on her clinical thinking. This observation was taking place on a Friday afternoon, before a bank holiday weekend. The team started preparing a handover and specific patients had altered follow-up appointment dates to avoid the holiday period.

> *"The effect of the day of the week clearly seen as this observation was happening on a Friday afternoon. This had the following effects:*
>
> 1. *Team behaviours preparing a handover for the weekend include explicit discussions about preparing for the weekend and leaving written plans on the board for the next day*
>
> 2. *The plans for patient A are directly affected by the weekend, with blood test arranged for Sunday to have the information available Monday and the [blood] transfusion arranged for a Tuesday which is a less busy day."* [Ruby Memo]

The time of day altered decision-making particularly in the evenings. Acceptance thresholds were altered, with patients who were felt to be too unwell for AEC being diverted to alternative services. One example was observed during a late telephone referral taken by Rufus. His concern was the distance between the patient and the hospital and whether they would arrive before Warmsley closed. He prepared a contingency plan that the patient would be assessed in a different part of the hospital if there was any delay.

> *5.08pm Telephone call to Rufus*
>
> *"Is she someone who…[could ambulate?]. Time of day – where about are you?*

[Town name] – (sharp intake of breath). Rufus says "if she gets here quickly then she can be seen in Warmsley but Medical team if later" [Rufus fieldnotes]

In addition to problems seeing patients in the evening due to the AEC unit closing time or transport issues, participants explained the cognitive challenge of seeing patients later in the day. Renata explains that it is easier to manage complicated case earlier in the day as key information is accessible.

"If you're only hearing a bit of information which somebody else hasn't realised is crucial, at 6 o'clock when you needed to be hearing it at 11 o'clock, it's no good." [Renata interview]

Rowley also felt that time of day made a real difference to his assessments. He explained the earlier a patient was seen, the sooner he would obtain test results and observe treatment effects, and Rowley could close the unit on time allowing staff to finish their shifts in a timely way.

"So, time of day definitely makes a, a difference and you have to decide, it gets much more difficult triaging people out, the later in the day it is, because you know that if you have to send that patient to the [hospital], then one of the staff members at least is going to be stuck here for some time, and may well leave late because of it. So that definitely makes a difference. It doesn't give you time to see if the patient's getting better on the treatment you're giving them. So time of day makes a huge difference. The other thing that makes a difference is sometimes if you send lab bloods off first thing in the morning you can see them later that day" [Rowley fieldnotes]

Reuben explained that older patients were disproportionately affected by being seen later in the day. He has found it much harder to make ambulatory care plans for frail older patients in the evening due to a lack of transport, care and the increased risk of complaints.

"So, for some patients, time of day makes no difference. So, if you're young or you don't have any serious, you know, life threatening type illnesses or worrying illnesses then you make a diagnosis, you start your treatment and you let the patient go home and that happens twenty-four seven all the time.

If you're older, frailer, living alone, then the time of day makes a big difference. So, trying to discharge an older person out of ED or AEU at three a.m in the morning is not really a practical process unless they are very well, and they want to go home, and they've got their family with them and the family want to take them home, you know. Broadly, we don't see those types of patients. [laughs] So, but you can, so you've really got to cut off 'till about 10ish or so and if you can get patients out sensibly before then ,then you'll get them out and it's, there's a process and, and you can get hold of people and transport as well is, is available.

Once you get beyond that and then you're really struggling because the risks go up. The risk of complaints go up and you can put a lot of effort in and then you won't be able to get the patient home because there's no transport or families then come out and say, "No, thank you." So, I think you have to put your effort into the pre-ten o'clock period not the post ten-o'clock period. Then once you've gone past ten, I think they're in." [Reuben interview]

4.1.2c The Effect of Space in the AEC environment on Cognitive Load

The effect of the physical layouts on cognitive burden

The physical layout and resulting patient flow through the AEC setting also increased the cognitive burden for clinicians. If the AEC unit was full, for example during winter pressures, staff would use any available space for patient assessments.

"So, it was a, I think it was a weekday evening and the hospital was full. We were either on stage 3 or 4 escalation[32] and there were, there was a full assessment unit (AU). The waiting room was full. I think all three cubicles in the assessment area of the AU were also full, and ED was very busy…with people in trolleys in the corridor, sadly…so one had to find space wherever you could. So, we often use the, when the cubicles are all used up and the bed spaces are all used up, ultimately, we end up using the consulting room which is usually used for psychiatric, psychological assessment for, for patients. We often use that in a flexible way and there is a sneaky room with a blood/gas analyser which we sometimes use because there's enough space there to sit down on and you can see patients. Difficulty is there's no reclining couch, so formal more detail physical examination, you can't see patients in there who need that." [Reuben interview]

In Woodleigh, Ruby and Rhoda explained how the layout directly contributed to their cognitive burden. They explained that having the telephone on their desk provided considerable disruption (Figure 1).

"Well it is very open plan and so our sort of workstation, if you like, is right slap bang in the middle of things. It's very easy for people to kind of come and we've got the phones right next to us as well which is, I suppose is deliberate because ideally, you'll meant to, the, the most senior decision maker should be taking the, the referrals. So hence the reason phone is there but it, it does sort of stop you in your tracks quite a lot" [Rhoda interview]

The effect of managing patient flow on cognitive load

Patient assessment spaces in AEC were often limited and clinicians needed to consider the flow through the unit. This role mainly fell to the coordinators but during most observation periods the senior doctor and coordinator were in constant communication. Roger was a key informant as an experienced clinical coordinator. He was always looking ahead to the next patient, trying

[32] A measure of the occupancy level of the hospital, level 3 and 4 suggests high demand on the hospital

to troubleshoot and "*make the day run as smoothly as possible"* [Roger interview]. He talked about helping colleagues at crucial moments. For example, by taking a blood test for a nursing colleague, Roger sped up the patient's assessment, and then he returned to concentrate on coordinating.

Roger's observed shift occurred during a weekday afternoon and more patients had arrived than were expected. Over the course of the observation period Roger allocated tasks to his team and managed to reduce the wait considerably.

> *"A Monday afternoon shift. The unit is busy but appears calm. It is busy as there are several patients on the board and bed spaces filled. However, the nurses are able to sit and complete their notes. There are no loud voices and no rushed behaviours are seen.*
>
> *Three of the six bed spaces are already in use and one allocated. When I arrive at 2pm the coordinator explains that he is trying to free beds as they are expecting a high number of people today. 3 were booked into the diary but now there are 10 patients to be seen today. Two of these were unexpected with the GP letters but no referral telephone call. Roger wonders whether they had forgotten to ring. By 2.40pm all but 1 patient have been seen but all the beds are now in use. By 4pm only 3 patients are left to be seen, which Roger feels is very good."* [Roger fieldnotes]

The coordinator also managed resource use, access to beds, point-of-care blood machines or radiological testing. Roger described deciding whether patients need chairs or beds for their assessment.

> *"if you're taking the referrals and you can look at the history and…you'll know that the doctor will want to examine the abdomen and all your beds at the time of the referral are full with patients, you know, that when they do arrive they need somewhere to lie flat for the doctor to examine them. It's working out who am I going to, who am I going to move off the bed…and speaking to their staff member saying, "I will need your bed.*

Your patient is the most mobile." So, it's planning ahead ready for that, so as soon as the patient arrives on the stretcher, we've got a bed ready." [Roger interview]

Like Reuben in 4.1.2b, Roger was very aware throughout the afternoon of the pressure that the time of day puts on patient transport and how this would affect flow through his unit. He would often ask referrers to see whether family could transport the patient, rather than use the oversubscribed patient transport system.

"So, in the morning you're, because you have more time, you're more, you're able to take more referrals that have transport. By that I mean, PTS (patient transport service) transport dependent. As the day moves on and you get, say, past two o'clock, the referrals you're taking are very much dependent on, "Can the family or a neighbour bring you to the Unit?" unless you're going to use emergency front line vehicles, which we can use, but then you're in the back of your mind, you're thinking about how we're going to get that patient home. So, you have to have a discussion with whoever the referrer is, is, about getting the patient out because obviously, you know, we shut at eight o'clock. So, as the day moves on your thought processes move very much more towards transport, otherwise you can get caught out with a patient here until half past eleven." [Roger interview]

4.1.2d The Effect of Disruptions in the AEC environment on Cognitive Load

AEC clinicians often had their patient work disrupted by another team member or a telephone call which changed their focus of attention. All the participants felt that interruptions affected their cognitive workload. Rufus described this as "*getting it from all angles*" [Rufus fieldnotes] whilst taking calls on two telephones, his mobile phone and the Warmsley bleep. Rhoda thought that she had frequent interruptions because she was the senior doctor on duty at Woodleigh.

"It felt very bitty today but as I say I think that's because there was a lot of interruptions. I think normally you would probably get a slightly clearer run at looking at all the bits and sort of putting the jigsaw together and coming up with a plan without, without as

many interruptions as there were today. It really felt like, you know, you sort of took a step forward and two back. So it, it did seem to take an awfully long time" [Rhoda interview]

Rhoda described the impact of these interruptions on her cognitive tasks as being distracting, slowing her down and disrupting the flow of thoughts. She was interrupted five times during her assessment; with a telephone call from the ward, queries from the junior doctor and writing the discharge paperwork for another patient. I observed how the constant ringing of the telephone dictated the workload in AEC.

There is a pressure of telephone calls, starting in the morning meeting and continuing all day. The telephone is on the doctor's desk and the doctors and care coordinators take it in turns to answer the telephone depending on what they are doing, rather than formally dividing up this role. [Rhoda fieldnotes]

Like the others, Rita also noticed the effect of interruptions on her cognition. She found the hardest aspect was multiple concurrent conversations.

"If they're happening once at a time and you focus on that, then I think, you know, that's okay. It's the multiple conversations that stop the, the coherent processing, you know" [Rita interview]

The interruptions were partly as a result of the simultaneous and sequential nature of patient assessments in AEC. For example, Rowley saw several patients during his shift. He initially assessed patient A which took 150 minutes but was interrupted by a telephone call from the hospital. He then used the treatment time for patient A, to supervise his junior doctor and nurse who had assessed Patients B and C. Rowley then reviewed Patients B and C whilst Patient A was having treatment. A nurse then interrupted his assessment of Patient C to ask about the final discharge plan for Patient A. During this period, he also interacted with the physiotherapist. Even

when we stopped for a drink at 4.30pm for five minutes, this was interrupted, just as he was telling me about the cognitive rest, he gained from a tea break.

4.1.2e Personal and emotional responses to cognitive burden from the AEC environment

Most of the participants described what it felt like to think and work under conditions promoting cognitive load. When under pressure, the AEC clinicians described three main personal responses; fear, forgetting and frustration. The main fears discussed were the worry of overlooking an important task or forgetting key information. This effect of anxiety on cognition was explained by Renata.

> *"I often say, "Look can you just stop for just 5 seconds. Let me finish my point or I'm going to forget to do something. Like, I monitored pain on this patient, I'm going to forget to write it down, forget to tell you". So sometimes it can be a bit much."* [Renata interview]

Ruth and Ralph considered how the number of patients affects their decision making. At the end of a long day seeing several patients Ruth could not remember the details of their care. Ralph sometimes felt that not being able to remember one's impact on patient care was demotivating.

> *"So, it, it is very unsatisfying getting to the end of the day feeling like, like you're exhausted by the number of the decisions that you've made and none of them have been particularly deep or good or uninterrupted"* [Ralph interview]

Occasionally my perception of the days demands contrasted with that of the participant. For example, Rowley felt that day was not particularly busy, in contrast to my observations. He described the effect of interruptions on his cognitive load but reiterated that he did not feel the observed shift was demanding. However, he did worry about the potential for error as a result of the interruptions that he faced and the associated cognitive burden.

> *"there do come points in busy days, particularly if you're on your own here, then it's very hard to take in all that information and make the correct decision based on it. And that's*

when you start to feel not safe, when you're already cognitively burdened from making loads of decisions, and you get lots of information at the same time and need to make lots of decisions. And…that's probably when you make mistakes, get things wrong." [Rowley interview]

4.1.2f Summary of the environmental factors that affect cognitive load

This section has focused on the environmental factors that contribute to cognitive load in AEC with high demand, low time and disruptions increasing the cognitive load. Pressure from high patient volumes increased the cognitive load of working in AEC and could alter referral thresholds. Time also increased the cognitive pressures for AEC clinicians as closing times reduced assessment time, reduced clinical information, transport and home care. Some participants felt at increased risk of complaints. The physical environment also affected the clinician; lack of space and interruptions were often disruptive. This increased cognitive load by creating additional non-clinical challenges. Effective management of space and patient flow by the coordinator could reduce cognitive load by allowing the AEC clinician to concentrate on the patient assessments. Interruptions were a challenging aspect of AEC working and particularly affected the senior doctor. Clinicians described the negative consequences of working under cognitive load as fear, forgetting and frustration. The next section 4.1.3 examines the clinical responses of the senior doctor and their decision-making when working under cognitive load in AEC.

4.1.3 The effect of cognitive load from the AEC environment on clinical decision-making

In this section I investigated whether clinicians altered their clinical decision-making to manage the cognitive load. I examined whether these clinical responses to cognitive load were altered in ways predicted by the literature (2.2), or whether other factors were observed. This ethnographic study observed four main clinical responses to cognitive load; altered task time, altered work tasks, altered clinical behaviours and altered team roles (Table 20).

Table 20 Clinical responses to Cognitive Load for AEC clinicians

Clinical response to Cognitive Load	Observed responses	Chapter reference
Altered task time	Variation in task time	4.1.3a
Altered work task	Modify referral thresholds	4.1.3b
Altered clinical behaviours	Variation with context	4.1.3c
Altered team roles	Team support	4.1.3d

4.1.3a Altered work time under cognitive load in AEC

Variation in task time was observed when working under cognitive load in AEC. Process evaluation (4.2) revealed differences in the patient assessment time between the community (Woodleigh and Wynchwood) and hospital (Warmsley) assessment times. The longest patient assessments (Rhoda and Rowley, Woodleigh and Wynchwood) had the most frequent interruptions and consequently increased task time. Task time would also vary with demand. Reuben demonstrated how with high patient demand, under winter pressures (chapter 4.1.2a), safe discharge planning was a longer work task.

> *"the difficulty is discharge, making a discharge decision takes slightly longer than making an admission decision and making a discharge sensible, to do all the bits that you need to do, takes a bit longer."* [Reuben interview]

Differences in the organisation of patient assessment processes were noted between sites. In Warmsley, a junior doctor completed an initial assessment and the senior doctor managed the overall clinical plan. This reduced the direct contact time between the senior doctor and the patient, increased patient turnover but also required considerably more space and staff. In contrast, in the community (Woodleigh, Wynchwood) the senior AEC clinicians often simultaneously switched between telephone calls and patient assessment, whereas in Warmsley, clinicians concentrated on triage or patient care (4.1.1c).

4.1.3b Altered work tasks under cognitive load in AEC

Most participants modified their acceptance rates for ambulatory care in response to cognitive load. By controlling their patient flow, clinicians could change the AEC workload for the whole unit and the wider hospital system. Ralph explained how he would divert patients from the emergency department to Warmsley when AEC had capacity. Similarly, when Ruth felt there were too few doctors available in AEC at Warmsley, Ruth diverted patients to be seen by the acute medical team to save her resources.

4.1.3c Altered clinical behaviours under cognitive load in AEC

Senior AEC clinicians also explained how they altered their personal clinical behaviours to manage their workload when under cognitive pressure. Some changed their consultation style to increase patient flow through the units (Chapter 4.2). Others shared their personal routines to manage cognitive burden, these included list making, reviewing notes and accessing team support. These tools were developed with clinical experience.

For example, Rufus head learnt to make lists to help him remember when working in ED. He felt that the interruptions were a constant part of the urgent care workload which his ED training had prepared him for.

> *"It's just constant. I never got to do one thing straight away. I don't think any doctor intends to do one thing and then get to do it without being bounced around and it's helpful because it gets you used to doing better at remembering at what you're supposed*

to be doing. Like, I have my little lists that I carry around with me and my little ways of remembering, my little rituals I go through to try and remember. But it also means that it doesn't throw you and you're able to flick from patient to patient, and actually that comes with lots of years of practice I think" [Rufus interview]

Rita aided her recall by reviewing the clinical notes and discussing the case with the junior doctor, immediately before assessing the patient.

"And I think even if I may have had conversations before I would go back and I would reassess just before I go and see them because I think you're right, I think if you're having multiple conversation, on a day like today were good, but if there's fifty patient AEUs session then doing that is quite exhausting and does affect your kind of cognitive processing, I think" [Rita interview]

Rita used her team differently when working under pressure. I observed her working on two different shifts with very different caseloads. On the first day in March the shift was busy and eleven patients were waiting at 3pm when the observation started. Knowing that the unit was very busy, Rita rang colleagues on the medical team to ask for assistance. Within 10 minutes, a consultant from another team arrived to help. After two hours the number of patients waiting for assessment reduced to three.

In contrast during the May observation, Warmsley had very few patients and the team had a quiet morning. The weather was very hot and there were four doctors on shift with Rita. The team had time to stop and discuss their patients and Rita has supervised the care of nine patients over five hours. However, because the emergency department was very busy with long waiting times, Rita visited the ED and transferred patients from more suitable for ambulatory care from the ED queue.

4.1.3d Altered team roles under cognitive pressure in AEC

When under cognitive load from high demand or time pressures, the senior clinicians considered how they used their team efficiently. Ruby and Rosa both modified the way they consulted when under time pressures from a sequential team assessment to a simultaneous whole team assessment (4.1.2d). Rita also reallocated tasks, asking junior doctors to take bloods to reduce the burden on the nursing team.

Several participants discussed how they felt responsible for their teams when under pressure. During a day with Reggie, I noted that the unit got progressively busier. The registrar told Reggie that he felt *"we're overstretched"* [Reggie Fieldnotes]. The coordinator explained that the team were missing two nurses, and this was having an impact on patient numbers. Reggie noted that the team had left late the previous day as day beds were kept open overnight due to the number of patients in the hospital. Reggie attended the bed meeting with the senior nurse to show his support and aid team recovery.

> *"So, the nurse in charge is very important and today there was, I felt, a lot of powerful stresses and frustration. I think that was partly born out of yesterday and having to stay late…which I knew was going to happen when flexi beds were there and people can't go home on time because that I think is a very stressful and straining on everybody.*
>
> *So that was part of going to the clinical team meeting. I don't normally go to that meeting. I don't particularly like it. I don't think it's that useful for me. But it was to show support."* [Reggie interview]

Ruth also considered how environmental pressures affected her team for example, she explained that sicker patients required more intensive nursing. Ruth realised overloading the nursing team would affect patient care and so she altered her AEC case load to manage pressure on the team.

"the nurses found it very difficult because it's very stressful. They get a lot of sick patients and therefore it's really important that we, we try to triage effectively so that they don't feel they're having to deal with stuff outside of their expertise or alternatively, that it gets so busy that they can't monitor the patients effectively" [Ruth interview]

4.1.3e Summary of the effect of cognitive load from the AEC environment on clinical decision-making

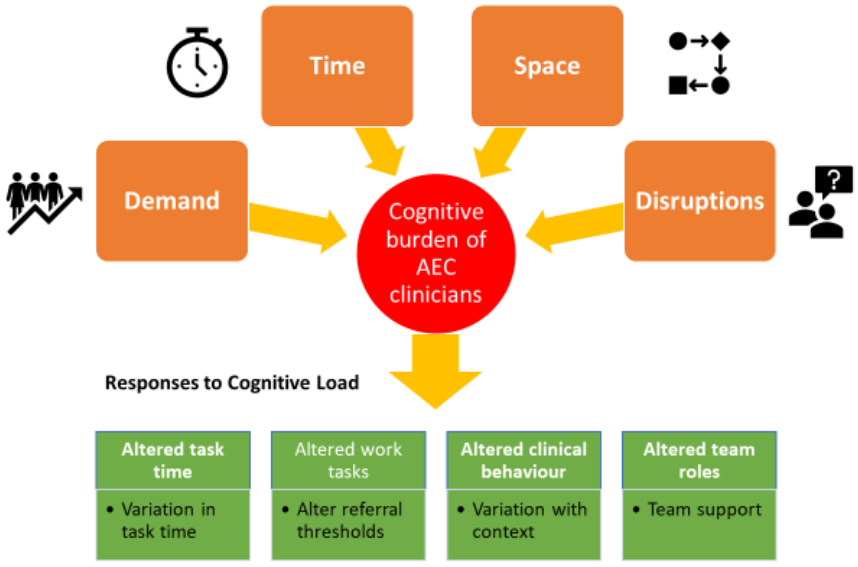
Cognitive load affected decision making through altered task time, referral thresholds, clinical behaviours and team working. Task time altered in response to environmental pressures, particularly disruption and high demand. Differences existed between community and hospital-based AEC depending on the senior doctor's roles and interactions. Work task time varied considerably and increased under cognitive load. Clinicians controlled AEC demand by altering their referral thresholds; reducing patient acceptance rates when demand was high or actively seeking patients when AEC had capacity. These mechanisms allowed them to manage their cognitive load in response to environmental pressure. Some clinicians had developed routines and patterns of behaviour to allow them to cope with cognitive pressures. Recall was improved with habitual routines such as lists, the notes and discussion with a colleague. AEC clinicians also varied their behaviours depending on clinical demand; asking for help when under pressure but also aiding other teams when demand was low. Senior AEC clinicians often varied the work tasks and roles of the team when working with environmental pressures. They also recognised that AEC environmental pressures impacted the whole team and used shared responsibility and mutual support to enable cohesive teamwork.

4.1.4 The Effects of AEC Environmental pressures on clinicians and cognitive load

In summary, the chapter introduced the characteristics of the AEC clinicians and the environmental factors that contribute to cognitive load in AEC; demand, time, space and disruptions. This thesis established that environmental factors in AEC add to cognitive burden for clinicians. These factors are like those presented in the urgent care literature on cognitive

load (2.2) and demonstrate that the ambulatory care environment should be considered as an urgent care environment. The AEC clinicians described their experiences of working in cognitive load as fear of forgetting, frustration and anxiety about the potential for error. This chapter also reviewed the main ways in which cognitive burden from the AEC environment is managed by clinicians. They vary the work task, the duration of the task, the way they enact the task and the team members involved in the task. As seen in the literature (2.2), consultation style altered, and task completion time increased with cognitive load from the environment. In contrast to the literature, increased interaction with the patient and consultation times were noted with cognitive load. The impact of teamwork on mitigating environmental pressures in urgent care is a new contribution gained from interpretation of the ethnographic data in this thesis. The next chapter discusses how the clinicians perform the work of clinical decision-making in ambulatory care, outlining the constant and variable components of the AEC complex intervention.

Figure 11 The Cause and Effect of Cognitive Load from the AEC context on the clinician

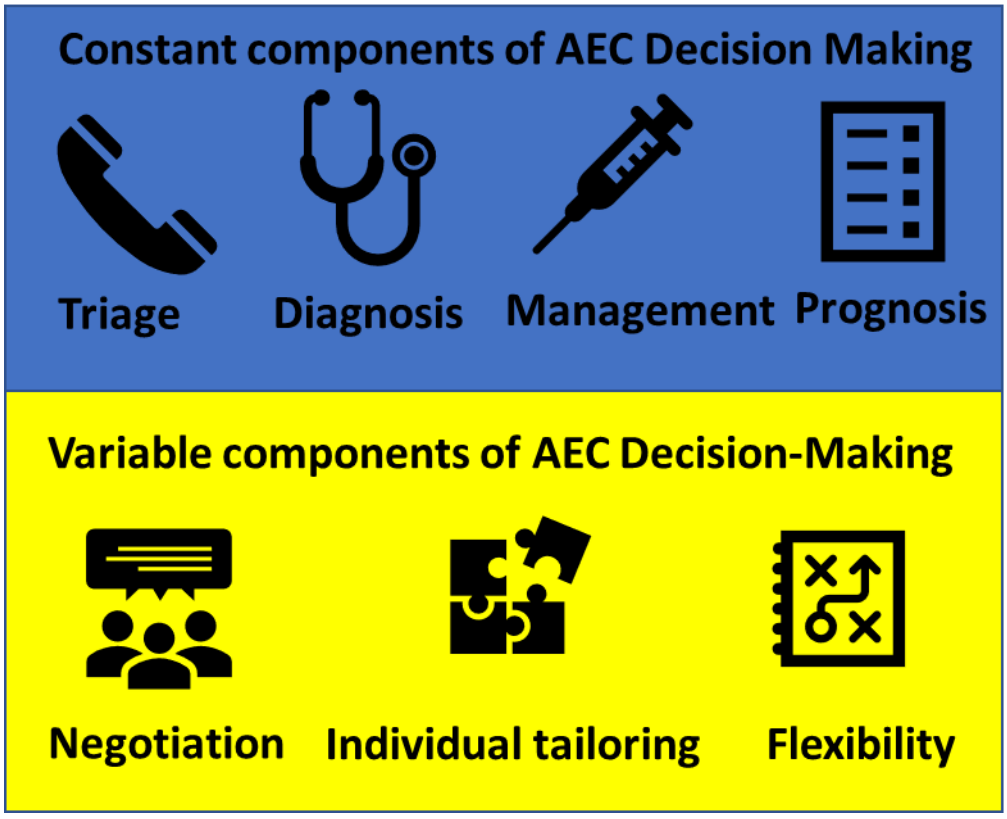


Chapter 4.2 Complex Negotiated Clinical Decision-Making in AEC

4.2.1 Constant and Variable components in AEC decision-making

This chapter discusses how clinicians performed the work of clinical decision-making in the AEC CI. The literature on complex interventions recognised constant and variable components (1.3.3). This chapter investigates the constant and variable aspects of the clinical decision-making in the AEC complex intervention and how these were delivered by the participants (Figure 12).

Figure 12 Constant and Variable Components of AEC Decision-Making



The constant components were identified using CTA (3.5.5), comparing process maps of patient cases assessed by the AEC clinician to understand the decision-making processes at work. This analysis was informed by the literature in Chapter 2.1 on decision types and an awareness of the wider consultation literature (Neighbour and Reade, 1987, Pendleton, 2003, Denness, 2013, Silverman et al., 1998, Reeve, 2015). Four constant component of AEC decision-making were constructed from the CTA; triage, diagnostic, management and prognostic stages (Figure 12 & Table 21). These decision-making stages were complex chains of decisions, negotiated by the AEC senior clinician with patients, families, and the AEC team, to produce an AEC management plan.

The variable components of the AEC complex intervention (decision modifiers) developed from analytic induction (Chapter 3.5.4) and were informed by the literature (Table 22). Three main variable components of AEC decision-making were constructed to explain differences in AEC decision-making; negotiation, tailoring, and flexibility (4.2.3). The chapter starts by discussing the constant components of AEC decision-making.

4.2.2 Constant components in AEC decision-making

The literature on clinical uncertainty in decision-making proposed three main decision types; diagnostic, management and prognostic (8.1.1). However critical decision analysis of the patient cases observed in the ethnography revealed an earlier decision-making stage in AEC; triage decisions. These constant components of triage, diagnostic, management and prognostic decisions are discussed in turn, with reference to the decision-making tasks and people involved in negotiating these decisions (Table 2). Although negotiation as a variable component is discussed in the second part of the chapter, here I demonstrate how AEC decisions are made, through discussion with individuals to achieve the shared outcome of the AEC complex intervention, "*the AEC plan*".

Table 21 Constant Components of the AEC Complex Intervention

Constant components: Stages in AEC decision-making	The AEC decision-making tasks	Negotiating AEC decision-making
Triage Decisions (4.2.2a)	**Suitability for AEC** • *Escalation to AEC* • *Disease severity* • *Alternatives to AEC*	AEC clinician Healthcare Professional (HCP) Patient's wishes reported by the HCP
Diagnostic decisions (4.2.2b)	**Confirming the diagnosis** **Disease severity assessment**	AEC clinician Patient Family AEC MDT
Management decisions (4.2.2c)	**Managing the clinical problem/s** • *Treatment* • *Alternative diagnoses* • *Further tests*	AEC clinician Patient Family AEC MDT
Prognostic decisions (4.2.2d)	**Assessing the response to AEC treatment** **Suitability for AEC** • *Risk of deterioration* • *Ability to cope at home during this illness* • *Alternatives to AEC*	AEC clinician Patient Family AEC MDT

4.2.2a Triage decisions in the AEC Complex Intervention

The triage decisions in the AEC complex intervention started with the initial referral to the AEC clinician. This decision-making process assessed whether the patient was suitable for assessment in AEC. This stage had three main questions: whether the clinical problem required escalation to AEC, a disease severity assessment and a consideration of the alternatives to AEC. The feasibility assessment occurred at 2 stages; firstly, during referral triage and secondly at the end of the AEC assessment (4.2.2d). This section describes the suitability assessment during triage. This decision was often influenced by the environmental context of the day with acceptance rates varying in response to demand and capacity (Chapter 4.1.3b).

Negotiating triage decisions in the AEC Complex Intervention

Triage decisions in the AEC CI were usually negotiated between the AEC clinicians and the patient's GP but sometimes paramedics, nurses or hospital doctors were involved. This usually

took place via a telephone conversation with the referring HCP. The participants explained that this initial handover of the clinical information frequently set the direction of the AEC consultation.

The triage was often dependent on the quality of this negotiated exchange between the AEC clinician and referring clinician. In most cases, referrals were made by the GP who had prior knowledge of the patient and access to their medical notes allowing a direct conversation. Rufus explained that in this triage role on the telephone they rely on the information about the clinical problem from the referring colleague. He regarded responding to a colleague's decision making and making a clinical judgement through negotiation with the external referrer remotely as one of the key skills of the senior doctor.

> *"you sort of have to make judgements about other people's assessments, and whether you respond to them, and of course that happens on the telephone which is a big part of this job"* [Rufus interview]

When negotiation was omitted, the triage process was more challenging. This was observed when referrals were communicated via written notes or during the team meeting. In these cases, the AEC clinicians often struggled with incomplete information, particularly as they were unable to clarify their concerns with the original referrer. This lack of information made it hard for the AEC clinicians to decide on their clinical plan, particularly if the referrer was unsure of the clinical problem or provided minimal details about the severity of disease.

> *"…and I think from a decision-making point there were several difficulties in her (case) which were mainly due to lack of information and there wasn't very much information on the referral. It was unclear who the referral had come from. There wasn't very much information on the paramedics's sheet in terms of, or anything really. It wasn't a helpful document and we hadn't got any, there wasn't, I think the most recent GP interaction hadn't been documented in the GP summary. So trying to piece together the history…really difficult without that information."* [Renata interview]

The importance of the patient's wishes and referring clinicians' expectations of AEC during negotiated triage

One of the key aspects of the triage was to understand the patient's wishes and the expectations of the referring clinician around hospital admission. In some cases, the patient's wishes were made clear to the AEC senior doctor during the triage negotiation with the referring doctor.

> *"If the patient's absolutely declining to go to the [hospital] then community [AEC] would be a step where you can assess them and then make that judgment, even if you think they definitely need to be admitted."* [Reggie interview]

The expectations of the referring clinician were also felt to be important to direct the assessment and to aid communication with the patient and negotiate the AEC clinical plan. Rowley felt it was important to have this direct conversation with the referrer to understand what the patient and their GP expected from the AEC assessment.

> *"I think there's a degree of expectation management because we do, not unfrequently, see people that as generally hospital doctors, we don't consider unwell enough for us to be seeing them and so then when the nurses seen them here and done their observations and they're all right and sort of done their initial assessment and said, "Can't really find much here doctor." Then it's really useful to go and see the patient armed with some knowledge from the GP about what's expected from this consultation, and so that you can feel happy that you've actually done what's needed for that patient, which is in that*

case, often reassurance because then that patient doesn't keep coming back to health care settings to, to keep on being worried." [Rowley interview]

Deciding whether to escalate to AEC during triage

During triage, clinicians needed to assess whether the patient needed an escalation in treatment from their current location to an AEC assessment. From observation, the three main factors leading escalation from primary care to ambulatory emergency care were an inadequate response to primary care treatment, the patients' wishes and need for involvement of the AEC MDT.

A failure to respond to treatment in primary care was often a source of referral to AEC. For Ruby and Rowley's cases, the GPs had started treatment with oral antibiotics but there had been an inadequate response. Some patients such as Rowley's, expressed a direct wish to avoid attending the hospital when unwell. The need for an MDT assessment was directly requested by the referring HCPs in both Rita and Roger's cases. Rita felt that her patient was not suitable for a busy ED department and that the patient would be more likely to return home after the support and assessment of the MDT.

> *"We picked her up from ED because she was in a queue in a busy emergency department and the idea was to see if we could make a quick assessment, get an MDT review and try and get her home with adequate support, if need be, really."* [Rita interview]

Assessing disease severity during AEC triage

Judging severity of illness was a risk assessment process that occurred throughout the AEC CI. In the AEC index cases, the initial severity assessment was made in negotiation with the referrer. The AEC clinician needed to assess disease severity with the patient remote to them, using the description from the referring healthcare professional.

> *"I ask the GP, "What do you think?" because actually the GPs pretty good at saying, "This patient is well. This patient is ill" and actually, making that, helping you make that decision call"* [Ruth interview]

For some cases assessing disease severity was straightforward. For example, in Rosa's case the handover from the GP suggested an urgent response as the patient sounded unwell with a serious infection. This case framing lead her to start the patient's treatment immediately. Rosa described this as a "*sideways-sideways*" assessment as she treated first and formally assessed the history and examination later.

Sometimes disease severity was hard to assess on the telephone. Ruth reflected on a case where she felt she had not made the correct triage decision and explained the challenge of decision-making when there was clinical uncertainty in the triage stage.

> *"And again, you know, there was a pneumothorax, which I didn't quite twig was a pneumothorax otherwise I wouldn't have accepted it on to AEU. So, there are times when it's not, not perfect. But then I'd like to know the times when it does work well and you make a judgement call … based on the information you get, you make the correct judgement call."* [Ruth interview]

Considering alternatives to AEC during triage decision-making

Most of this thesis has concentrated on patients who were seen and accepted for ambulatory care. However, from observation, three main alternatives to AEC were discussed by the AEC clinician and referrer. First, the patient would remain in primary care with additional clinical advice from the AEC team. Second, a referral could be made to an alternative team. Third, the

AEC clinicians recommended hospital referral and admission. The dataset did include examples of alternatives to AEC. These included Ruth and Ruby's descriptions of cases they recommended for hospital assessment as they were too unwell for AEC. In contrast, Reuben discussed using community outreach services to prevent hospital admission. By negotiating with referrers during triage decision-making, alternatives to AEC could also be recommended.

> *"'What are we going to do to this patient overnight? Is it just a roof and a bed or is there something actually that we're going to achieve?' Having outreach services delivers investigations, like, point of care testing at home. If you want a blood test, well we can send somebody over to you to get the blood test done, rather than you to us."* [Reuben interview]

The final principle for assessing the suitability of an AEC referral was considering whether the hospital or an alternative healthcare setting would be a more appropriate place for this person to be treated. This could be due to patient's condition requiring investigations, treatment or specialist input not available in AEC. Renata was concerned about equity of treatment particularly for older patients.

> *"The people that I don't think we should ambulate are the people who would benefit from a more specialist opinion or just because we can ambulate people, that doesn't mean that we should take away their option to see a specialist or an option to have a particular test"* [Renata interview]

Some AEC clinicians had a fixed view of patients whom they considered unsuitable for AEC; most agreed that hospital care was recommended if patients had a specific condition which would have a better treatment pathway (asthma or acute coronary syndrome), required interventions that were difficult to perform in ambulatory care (headache requiring a lumbar puncture) or had a severe illness that warranted intensive care. A few clinicians had a much looser sense of what was suitable for ambulatory care. Rufus felt that AEC was a direct challenge to having specific condition lists.

> *"Warmsley is partly a response to this sort of very opposing cliff face, primary/secondary care where there's sort of very divided idea that there is a right place for everything and I think part of the sort of vagueness and the greyness of ambulatory care has been deliberate, actually. There's been a resistance to writing down protocols for things because there's a recognition that actually that system wasn't working terribly well for lots of people."* [Rufus interview]

Suitability for AEC during triage

Different participants had different tacit principles that they used to assess suitability, which were made more visible by the ethnographic methods. These principles of care also varied in response to the clinical case. The variable components of AEC decision-making were seen to influence the AEC CI. Clinicians demonstrated flexibility (4.2.3c), negotiation (4.2.3a) when individually tailoring (4.2.3b) their ambulatory care plans, sometimes challenging their definitions of suitability to ambulatory care.

Rita described cases which challenged her principles of AEC. One case was a young adult male patient with asthma. She felt uncomfortable managing this case as she felt he was unstable with acute severe asthma and had been transferred from ED. The patient had been described to her as someone who would require nebuliser treatment and monitoring for a few hours. However, on assessment it was clear to Rita that the combination of disease severity and the patient's complicated home life would preclude ambulatory treatment. Rita arranged a hospital

admission because the patient lived alone and would not have help available should he deteriorate overnight.

Another difficult referral was captured in the fieldnotes during Ruby's observation. During the negotiated exchange with the referrer, Ruby felt that the patient was too unwell and therefore inappropriate for AEC. She concluded, after discussion with the GP, the patient had too severe an illness to be managed in the community as there was no bed available, no time to assess the patient, and no blood pressure could be detected, suggesting the patient was too unwell for AEC.

All participants described their AEC suitability criteria, and these varied from clinician to clinician. Most felt that ambulatory emergency care provided an alternative to hospital-based care for suitable patients. Some clinicians had more rigid exclusion criteria and others had less restrictive definitions of suitability. Most participants were able to describe where their triage processes had been challenged by borderline patient cases and were aware of the difficulties at looking at their decisions in hindsight. Typical patients for community AEC usually were older and required a multi-disciplinary approach, whereas in the hospital patients may be accepted on triage to reduce the waiting time in the ED. Finally, a negotiated discussion with the referrer on disease severity frequently aided the feasibility assessment during triage.

4.2.2b Diagnostic decisions in the AEC Complex Intervention

During the diagnostic stage, the constant components of decision-making were confirming the diagnosis and assessing the disease severity (Table 21). This typically involved direct interactions between the patient and the AEC clinicians but could also involve their families. This stage of the AEC consultation started after the patient had arrived in AEC.

Negotiating diagnostic decisions in the AEC Complex Intervention with patients, families and the MDT

Diagnostic decisions were made during the patient assessment in AEC. Most encounters were direct interactions between patient and doctor, but for some of these assessments, relatives were present (Renata, Rowley, Rufus and Reuben). Other relatives provided input by telephone (Renata). Family members often provided key information about recent symptoms. They could recall more of the details of the recent illness and patient's past medical history. Families often asked questions of the medical staff (Rufus and Rowley) and were involved in negotiating the management plan (Renata and Reuben), discussed in Chapter 4.2.2c.

As well as relatives, sometimes other members of the team provided the initial information needed for diagnosis. The hospital site, Warmsley, differed from the community sites as all their patients were initially assessed by a junior doctor. Ruth's case shows a typical interaction between junior and senior doctors. The doctors discussed the cardinal symptoms, the test results and the provisional management plan made by junior doctor.

> *1.40pm The junior doctor has seen one patient and is discussing this with the Ruth*
>
> *The patient is short of breath and had 40mg of intravenous furosemide*[33] *yesterday*
>
> *The junior doctor says they are using 4 pillows [suggesting orthopnoea*[34]*]*
>
> *Ruth asks about the Chest Xray (CXR) – is there fluid?*

[33] An intravenous diuretic

[34] Positional breathlessness on lying flat

They review the CXR together and see fluid and cardiomegaly[35]

The junior doctor describes the symptoms of heart failure (HF) and that the observations are ok. Then discusses the past medical history of ischaemic heart disease and a non-ST elevation MI (NSTEMI)[36]

The junior doctor's plan is for the HF nurses to see, an urgent echocardiogram (echo)[37] *and says the BNP*[38] *is high on the istat*[39] *result*

Ruth checks that the old NSTEMI is the cause for the HF by checking the troponin[40] *level. The troponin yesterday was negative showing no acute heart attack* [Ruth fieldnotes]

Diagnostic decision-making in the AEC Complex Intervention

The constant components of diagnostic decision-making were confirming the diagnosis and assessing disease severity. However, clinicians did display variation in how these decisions were made, demonstrating flexibility in decision-making (4.2.3c) and uncertainty management (8).

Some patients already had a diagnosis (Rufus, Ruth), but other cases needed the senior doctor to decide on the likely cause. For example, Rowley needed to uncover the cause of shortness in breath in a case where the GP was unsure. After gaining the recent medical history and examining the patient he arranged a chest radiograph to aid diagnosis. By arranging further tests, Rowley managed the clinical uncertainty in diagnosis.

In other cases, the examination findings provided key diagnostic information. Renata could only rely on the examination findings to make the diagnosis as very little information was available to her increasing the clinical uncertainty. She felt the patient had swollen legs and fluid overload which suggested to her a diagnosis of heart failure. She then contacted the patient's son by telephone, who confirmed the patient was known to the heart failure team. In this way, she was able to manage the uncertainty in diagnosis.

For Reggie's case, his management plan was abruptly changed after he saw the patient. The junior doctor had delivered his assessment and Reggie had made an initial plan from that description. However, when Reggie entered the patient cubicle, he suddenly smelt ketones and realised there were hidden needs around the patient's diabetes, which changed his assessment. By responding flexibly to the new information, Reggie was able to address the patient's unspoken clinical problems.

"I was, I was thinking that actually this will be quite a straightforward case. That, yes, she'd already got undiagnosed heart failure on the background of diabetes, so you tend to have diastolic failure and with good blood pressure. I think we even joked, "Yeah, easy, give her some diuretics. Get her to improve with diuresis." But when I actually saw her, although that was part of it, she also had a smell to her that was sort of slightly metabolic. Had a feeling that she was going to be a little bit more complicated and then it was … clear that her diabetes wasn't, hadn't been managed for eighteen months, more for her choice. So, I thought there was a little bit more going on." [Reggie interview]

[35] An enlarged heart usually seen in patients with heart failure
[36] Non ST Elevation Myocardial Infarction (heart attack)
[37] Ultrasound of the Heart
[38] B-Natriuretic Protein, a blood test which aids diagnosis of heart failure
[39] Point of Care blood test with results available within minutes
[40] A blood test that is diagnostic for Myocardial infarction if positive

Severity Assessment

Once the diagnosis was made, the clinicians assessed disease severity. This was frequently aided by information from bedside or laboratory tests. Rosa and Ruby felt the infections were severe from their clinical assessment but requested point of care blood tests, with results available within minutes, to corroborate their judgement. In contrast, Ralph was frustrated that his junior doctor had given intravenous antibiotics for an infection that he felt was low in severity.

> *"I think that key bits of information were clarifying that there was insignificant evidence of serious infection that the story in particular did not suggest any more significant infection or a significant risk of a big GI bleed."* [Ralph interview]

Rhoda requested blood tests to judge whether her patient's renal impairment had improved after treatment and compared their results over the past 2 days. Ruth and Rufus had access to blood test results for their patients with heart failure but needed an echocardiogram to assess cardiac function. Reuben used tests to rule out serious causes for his patient's chest pain and felt reassured there was no cardiac cause with negative test results. This section demonstrates that investigations were often requested to assess clinical severity and manage clinical uncertainty.

4.2.2c Management decisions in the AEC Complex Intervention

This section describes the third constant component of AEC decision making, the Management Decision Stage (Table 21). By this point in the AEC assessment the patients had been accepted as being suitable for an AEC assessment and the clinicians had evaluated the patient, deciding on the diagnosis and disease severity. The main aim of management decisions was how to best deal with the patients' clinical problems.

Negotiating management decisions in the AEC CI with patients, families and the AEC MDT

Like diagnostic decision-making, the negotiation in management decisions involved; the patient (Rita), the patient's family (Rowley), the junior doctors (Ruth or Reuben) or the multidisciplinary team (Ruby). However, this stage differed in when and how the negotiation was managed by AEC clinicians. Two main conventions were observed; an initial discussion of the management plan away from the patient between clinicians, followed by a presentation of the decisions to the patient and their families.

Remote planning of the management decisions was felt to be beneficial as it allowed time and space for clinicians to consider the clinical problems. Reuben used this strategy deliberately, to give him and the team space to discuss the case more freely.

> *"Reuben likes to discuss the clinical plan away from the patient to be able to air his and the team's views"* [Reuben fieldnotes]

For Rhoda, making the plan away from the patient allowed her to make sense of the clinical information. She had struggled with the complexity in the case and writing her notes helped her to concentrate and decide on her clinical plan. Once the AEC clinician was clear on their plan, they presented this to the patient and their family. This presentation stage allowed for negotiation between the parties involved.

Managing the Clinical Problem in the AEC CI: Treatment, Alternative Diagnoses and Further Tests

These patient management plans were created by the clinicians based on the information gathered during the diagnostic decisions stage. Three main types of AEC management decisions were observed. First, AEC clinicians made a treatment plan for the patient and their clinical problem/s. Second, they assessed possible alternative diagnoses that could explain the clinical problem/s. Third, they considered whether further information was required.

The following example from Ruby demonstrated how these negotiated interactions with the patient, her daughter and the advanced nurse practitioner (ANP) influenced her management decisions. It also showed the intercurrent and overlapping nature of the constant components in the AEC decision-making.

Ruby's patient was assessed by her ANP and they discussed the patient's past medical history, the current clinical problem and the examination findings. The ANP considered the possible diagnoses and Ruby used follow up questions and a clinical scoring system to assess the likelihood of an alternative serious diagnosis (deep vein thrombosis[41]). This negotiated dialogue between the clinicians was supplemented by information from the medical notes. Once this provisional management plan was decided, Ruby and the nurse practitioner then involved the patient and her daughter.

On discussion with Ruby, the patient expressed her preferences for treatment location locally in Woodleigh. Ruby also sought further information, from the clinical examination and objective measurement of the size of the calf to aid her decision-making regarding a possible diagnosis of DVT. After Ruby assessed the patient, she appeared more confident of an infectious cause for the leg swelling and agreed with the ANP's plan for intravenous antibiotics. The excerpt below shows how the different participants in Ruby's case negotiated the management plan during the AEC CI, with decisions being distributed between the team and developing over time.

> *"Ruby talks to patient to give advice about elevation and ice*
>
> *The plan is discussed between the ANP and Ruby – fluids – wants to give an intravenous antibiotic. Are blood cultures needed? – No as the temperature is not above 38 degrees Celsius*
>
> *The ANP takes a photo of the leg*
>
> *Joking between patient and ANP, patient says "I know it's fat but…"*
>
> *Ruby examines legs and asks whether any recent flights [risk factor for DVT]*
>
> *Calves show a 5cm difference in circumference*
>
> *Ruby checks the base of the foot, a large red patch, the patient's daughter says it came up in the last 2 hours, patient cannot get shoe on*
>
> *Ruby rechecks the history of presenting complaint, whilst marking the leg, then gives advice on elevation and ice.*
>
> *The history is rechecked, patient says felt cold and shivery and using the duvet*
>
> *Sensation and power and movement in the leg checked*
>
> *Ruby explains the patient needs antibiotics now but we need to see you tomorrow*
>
> *Patient says to daughter "not putting me back in [city hospital]" "don't like going there""*
> [Ruby fieldnotes]

This example shows how Ruby negotiated her assessment, decision-making and advice during the management decision process to create the final management plan in conjunction with her ANP, the patient and the family. The fieldnotes show how the stages in the AEC assessment often merged but the common goal for all the clinicians was the production of a definitive plan

[41] Blood clot in the deep veins of the leg

through negotiation. The decision making involved in making "*the AEC plan*" is discussed further in prognostic decisions (4.2.2d).

This case also illustrated how the variable components influenced the constant components of AEC decision-making. Ruby demonstrated tailoring (4.2.3b) and flexibility (4.2.3c) in this case. Ruby expressed uncertainty at the diagnosis on discussion with her ANP; this was reduced by the further questions for the patient, Ruby's clinical assessment and use of a scoring system. Ruby tailored the clinical plan to the patient by treating her locally according to her wishes. Ruby and the ANP demonstrated how the management decisions could be changed by considering the alternative diagnoses during their negotiated interaction.

4.2.2d Prognostic decisions in the AEC Complex Intervention

Prognostic decision-making is the final constant component of the AEC decision-making (Table 21). At this stage the clinical plan is finalised, and the clinicians' direct involvement with the patient ends. During this stage, clinicians assessed the patient's progress and probability of deterioration. The patients' suitability for ambulatory care in this illness was also re-assessed. Like the triage process (4.2.2a), this was a risk assessment process, but the contents of this differed between both stages. In the triage stage, the suitability assessment concentrated on exclusion criteria and severity of illness, whereas, during prognostic decision-making in AEC the risk assessment included assessment of the patient's physical, functional, cognitive and social needs, their ability to participate in out-of-hospital care and consideration of whether hospital admission was required. The main outcome of this component of the AEC CI was to produce a finalised clinical plan. However, this also required AEC clinicians to use the variable components of negotiation (4.2.3a) and tailoring (4.2.3b) to produce contingency plans specific to the patient and their network of care.

Negotiated prognostic decisions in the AEC Complex intervention

The senior AEC clinicians were the main drivers of prognostic decision-making as it involved clinical prediction of likely outcomes and detailed discharge planning. During prognostic decision-making, the finalised clinical plan was directly discussed with the patient and then often separately handed over to the nursing or therapy staff. In most cases, this was a direct face-to-face discussion between the clinician and patient and any next-of-kin.

Clinicians needed to consider whether their patients had capacity to participate in decision-making. Sometimes the patient's wishes were very clear (Rowley's case) but in other cases, clinicians found it harder to interpret their patients' thoughts. In some cases, the relatives were involved instead, usually when the patient had cognitive impairment. A patient's ability to participate in medical decision-making was often difficult in the presence in severe illness and participants worked hard to be clear.

> *"Certainly, it really goes back to can people really give informed consent when they're really unwell…you've got to be clear, I think, when you're going into these conversations what the options actually are because some of the decisions are medical decisions"* [Renata interview]

In other cases, plan modifications were also negotiated with other healthcare professionals. In Warmsley, junior doctors often facilitated prognostic decision-making by recording the senior doctors plans and, in the community, advanced nurse practitioners worked in a similar way. The MDT also provided information on the patients care needs at home, which needed to be integrated into the AEC clinical plan for example, the therapy team was assessed the patient's care needs at home (4.2.3a).

Assessing the response to AEC treatment

AEC clinicians felt that the patient response to treatment was vital for prognostic decision-making. It particularly helped the clinicians make prognostic decisions about the likely trajectory of the illness. Rowley described how helpful it was to review the patient over time, as this allowed him to assess whether his diagnosis and treatment plan were correct.

> *"one of the most useful things is if, is you can very, very quickly tell if your treatment's working or not once you've seen them the day before and you get the build-up of them over a couple of days and you can tell whether you've made the right diagnosis and got the right treatment into them"* [Rowley interview]

Making prognostic decisions in the AEC Complex Intervention

The main decision for clinicians during prognosis stage of the AEC CI was to assess suitability to continue their treatment in ambulatory care. This was a holistic assessment reviewing the patient's medical, physical, functional, cognitive and social needs and contributions from the MDT were key. Rhoda explained how important it was to have the team's views on the patient's ability to cope at home. The AEC clinician often negotiated with the MDT, incorporating their understanding of the patients' needs and community knowledge into the AEC clinical plan.

> "*So the nurses quite often have information that we don't have or, you know, and ideas that we wouldn't necessarily have, especially some of the senior nurses are very good with suggestions about what community pathways are available that you know, you might not know of. I think I did liaise with the OT and the physio…So they'd actually seen her yesterday and made sure that she was physically safe to mobilise and get around*." [Rhoda interview]

Suitability of the AEC Complex Intervention in Prognosis decision-making

Suitability for ambulatory care was considered during prognostic decision-making. All the clinicians had ideas about which patients were suitable for AEC and there were similarities in what they considered appropriate and inappropriate. These tacit principles were distilled into two guiding questions for the clinician:

- Can this person manage at home when unwell?
- Is the hospital a more appropriate place of treatment for this person?

Ability to cope at home during the AEC Complex Intervention

The patient's ability to manage at home whilst unwell was considered by the participants to be crucial when making a clinical plan in the prognostic stage. This subtheme incorporated information about the patients' physical, functional, cognitive and social needs as discussed earlier.

Rowley described the functional and cognitive ability required for patients to be treated in AEC. This view was widely accepted by most ambulatory clinicians as being the threshold for AEC care.

> *…there's things like cognition etc, care needs are the biggest obstructer I think and so if the person clearly can't toilet themselves, feed themselves etc and they haven't got any care or relatives then they're not ambulat-able."* [Rowley interview]

The level of physical and functional health required to be at home when unwell was described by Rhoda, Rosa and Rowley. Rhoda described assessing the mobility of the patient, whereas Rosa and Rhoda were more concerned about the risk of falls. Clinicians varied in the degree of uncertainty they would tolerate in the AEC clinical plan; for most the risk of falls was a

contraindication to ambulatory care. In contrast, Rosa had discussed ambulatory care with patients who were unable to mobilise to the toilet. She instead tailored her clinical plans to allow the patient to be at home.

> *"they'll be patients who say are not safe to get up to the toilet, but we say, "Okay we could send you to the [Hospital] or we could just put a big incontinence pad on you. What would you rather do," and they'll rather, and that lady again, rather stayed at home."* [Rosa interview]

These examples show the variability in performing the constant component of prognostic decision making, as AEC clinicians frequently used negotiation and tailoring to modify their clinical plans.

Alternatives to the AEC CI in Prognostic Decision-Making

Prognostic decision-making also included an evaluation of whether the patient would benefit from an alternative to AEC. A hospital admission was felt to be more appropriate than ambulatory care if the patient was felt to be vulnerable in their own home settings or at risk of deterioration overnight.

Vulnerability to disease rather than age was considered more important when deciding if ambulatory care was suitable. Rhoda explained that what she meant by "*vulnerable*", was a patient who was at risk of not managing in their own home due to their illness. As these patients were normally independent, they had a limited network to aid their care at home. The safety netting for these patients was particularly difficult, and often clinicians used the hospital at home teams to aid with these cases (Rita).

> *"So I think it's that sort of vulnerability of people trying to be independent when, when their physical health is sort of failing them a bit and they can't do what they would normally do and there's, because they're not normally like that there's no real network in place to support them."* [Rhoda interview]

Some clinicians thought the age of the patient would render them more at risk during ambulatory care, but this was mainly if they lived alone. Ruby worried more about older patients being alone at home, and often used community nursing teams to help reduce the clinical uncertainty. Renata felt that older patients who were at iatrogenic risk from being in hospital benefitted most from AEC. In addition to iatrogenic risk, they often had long admissions due to limited social care provision. Rosa felt that people often coped better outside of hospital than clinicians predicted. This was due to her background in community nursing.

> "*And I think with the community as well, that's really valuable because I know all about the community services that are out there, and I'm used to going into people's homes. So that's helped like with the ANP home visits…*
>
> *…and I know how people live out there because I think a lot of hospital nurses will be quite risk adverse because they see someone come in and they think, 'Ah this person can't cope at home.' But I've seen how people do cope at home.*
>
> *…and they might not be coping how I'd want to live but they're coping how they want to live.* [Rosa interview]

Most participants would also refer patients to the hospital if the patient was perceived to be at high of deterioration or needing regular monitoring. This was felt to be an obvious principle of care to most participants.

> *"if I feel that your observations are unstable and they need regularly monitoring every hour or two, then yep, and if your, if something is acutely continuing, like you're continuing to have chest pain or bleeding or something like that then you're not ambulatable, obviously"* [Rowley interview]

This risk of deterioration was usually described as the patient cases that the clinicians would worry about when they got home from work. The suitability for AEC was usually based on tacit mindlines developed in the local AEC community (see 4.3.4b). Rowley compared his ambulatory practice to RCP guidelines, which he felt were "*conservative*". But Rhoda was unsure whether there were any prognostic guidelines to help her decide on the suitability. The observed variation in practice is discussed in 4.2.3 and 5.1.

4.2.2e Summary of the Constant components of AEC Decision-Making

In this section we have discussed all four constant stages of AEC decision-making which were constructed from the observation and participant accounts. The stages were all negotiated social interactions between the AEC clinician, patient, relatives, carers and the MDT.

In triage decision-making, clinicians considered whether escalation from primary care is warranted, that AEC is feasible for the patient in their current disease episode and whether alternatives to AEC were more suitable. The triage stage allowed the AEC senior clinician to make initial predictions of the diagnosis and patient needs based on discussion by telephone with the referring healthcare professional. Where triage negotiation processes were disrupted, patient assessments were less efficient and treatment delays were observed.

During diagnostic decision-making, the senior AEC doctor usually undertook a direct face to face assessments of the patient including the medical history, examination and review of the patient's results. Relatives were often involved to provide addition information. Key diagnostic information was often found during the clinical examination, and tests were frequently used to objectively assess the seriousness of the illness.

Management Decisions in AEC produced a treatment plan which addressed the patients' clinical problems in negotiation with patient, relatives and AEC team. This usually consisted of definite treatment, assessment of alternative diagnoses and consideration of further investigations. The initial treatment plan was discussed between healthcare professionals remote from the patient, but then modified on negotiation with the patient, their family and the AEC MDT. Consideration was given to possible alternative diagnoses by obtaining further information.

Prognostic Decisions in AEC included a risk assessment of suitability for AEC that was produced by the AEC clinician but negotiated with the patient and MDT. Clinicians used the patients' response to treatment to predict likely prognosis. They obtained a multi-disciplinary evaluation of the healthcare needs during this illness to assess the patients' ability to manage at home during their illness and the need for hospitalisation. If the patient remained suitable for AEC, the main outcome for the patient was usually further reviews in AEC until the patient had recovered. Patients who were felt to be vulnerable at home, worsening despite treatment or with no support network at home were usually admitted to a hospital bed.

4.2.3 Variable components in AEC decision-making

The previous section concentrated on describing the constant components of AEC complex intervention. However, it also illustrated the differences in delivery of the AEC CI due to the variable components of negotiation, tailoring, and flexibility. As flexibility was considered an attribute of the AEC clinician this was discussed in 4.1.1e. In this section we demonstrate how

the variable components of negotiation and individual tailoring influenced the AEC decision-making (Table 22).

Table 22 Variable Components of the AEC Complex Intervention

Variable Components of AEC Decision-Making	
Negotiation in AEC Decision-Making (4.2.3a)	An interacted discussion between the AEC clinician and at least one other individual aimed at completing the AEC Complex Intervention
Individual Tailoring (4.2.3b)	The provision of Personalised Illness Care (Reeve, 2015)
Flexibility (4.1.1.e)	The capacity to respond to change (Laureiro Martinez et al., 2009)

4.2.3a Negotiation in AEC decision-making

Negotiation was observed throughout the AEC CI and was often distributed between people and in time. The goal for AEC senior clinicians was to complete the constant components of the AEC CI and deliver an AEC clinical plan. The last chapter showed how this was achieved through discussion with the patient, their family, other healthcare professionals and the AEC MDT at each stage of the AEC decision-making. This section concentrates on who was involved in negotiation and how it influenced the AEC clinician.

Negotiation with patients and families to modify the AEC CI

Observation of negotiated decision-making in AEC demonstrated how plans were modified in discussion with patients and HCPs. The most common reason for plan modification was negotiation with the patient or their family. Often patients had external pressures which influenced how they wished to engage with the AEC CI. The main concern for Ruth's patient, which was elicited by the junior doctor, was that she wished to attend a funeral the following day instead of returning for review at Warmsley. Ruth prepared a provisional plan to manage this with the junior doctor away from the patient (4.2.2c). After discussion with the patient and her husband, all agreed that the patient would take an oral version of the treatment for one day and attend Warmsley for a review the following day.

Frequently patients were tired of visiting the hospital on multiple days; Rufus negotiated the date for a return visit to hospital with his patient and Rowley's patient was adamant that she wished to go home. Following this negotiation with the patient and her daughter, Rowley felt that ambulatory care was possible despite the patient having low oxygen levels. He felt he could manage this clinical uncertainty (4.2.3d) as her daughter was aware of her wishes and was nearby to support out-of-hospital treatment.

> *"I think her daughter could see how much she didn't want to go up to the acute hospital and, and so, you know, it's finding a balance between not wanting to and not taking too big a risk over sending people home."* [Rowley interview]

Negotiation with the AEC MDT to modify the AEC CI

As seen in 4.2.2c, team-based discussions often influenced the delivery of the AEC intervention. Practically, the team aided the individual tailoring (4.2.3) of decisions by providing further information on the patient's needs. For example, Rhoda spoke to the AEC therapy team to understand the patient's care needs at home and was given two options on management to discuss with the patient.

> *"Rhoda discusses Patient A with therapy, who feel she needs once daily visits from a carer*
>
> *They discuss whether an intermediate care bed (ICB) or hospital at home with a healthcare assistant to visit once daily instead."* [Rhoda fieldnotes]

Rita used team-based discussions to ensure patient safety, explaining that a holistic approach would improve patient safety when discharge planning.

> *"So on the ambulatory unit, I think we just tend to work as a big team and I, I feel like I could have made a single decision based on the medical side of things. But, so quite good support from therapies because they've come to see her, and actually our, are doing the assessments that are needed, in order to try and make sure that the discharge is safe"* [Rita interview]

AEC clinicians also used the team to validate their decision-making, with negotiation and feedback informing their clinical practice. Renata felt that "*Sometimes just bouncing ideas off other people is useful*" [Renata interview]. Rowley modified his clinical practice in response to team feedback.

> *"for example, if one of the most, the more senior nurses here tells me something, if I then tell her something that didn't really fit with what she'd told me, she would then look surprised, feed it back to me in some way and then I could rethink it. Whereas, quite possibly some of the other staff would just kind of take it as read and do that. So, it's quite nice, because you have a bit of feedback if you've made the wrong decision or, or the decision that's not in keeping with everything else."* [Rowley interview]

The emotional support of talking to colleagues was also appreciated by the participants. Rosa and the senior doctor liaised closely throughout the day, talking to one another during the patient's assessment to share information, pass on instructions and obtain advice. She found the advice particularly reassuring, *"I suppose when the doctor tells you something that you are thinking then it's just very reassuring really"* [Rosa interview].

Negotiation with other healthcare professionals to modify the the AEC CI

Other health professionals outside the team were also involved in decision-making. Rufus provides an example of negotiating a specialist's recommendations for AEC. Rufus' patient was diagnosed with heart failure and had been assessed by the cardiology consultant earlier that day. The cardiologist recommended that the patient have an echocardiogram and was admitted overnight to hospital. Rufus considered how to "*judiciously interpret*" and apply this advice in the context of the AEC complex intervention.

Rufus discussed the options for an echocardiogram with the patient and his wife. The patient explained that he was fed up of being in hospital and it had already been a long day there. Rufus and the patient negotiated that he would return to hospital the next day for an echocardiogram, mainly because this was needed for the hospital's targets.

> *"Discussed preferences – cardiology would prefer patient to come back for an echocardiogram and to see the heart failure nurses tomorrow or they could return home and be seen next week. Discusses target for hospital needs to be seen within 24 hours. Patient prefers home (sick of hospital) but if better for the doctor's target they will come back in the next day"* [Rufus fieldnotes]

Quality of the Negotiation in the AEC CI

In some of the observed cases, negotiation was challenging due to communication issues including cognitive impairment, severe illness and uncertainty on the patients' views. AEC clinicians needed to consider whether their patients had capacity to participate in decision-making. If the patient had cognitive impairment, their family had an important role in decision-making, particularly when the patient was unable to communicate their wishes.

> *"It always comes much clearer when you get a collateral and speaking to the son gave me a lot more information."* [Renata fieldnotes]

Sometimes patient's wishes were very clear (Rowley's case) but in other cases, clinicians found it harder to interpret their patients' thoughts. Rita worried that her patient did not feel confident to be at home, following cues in their conversation and with the team. Rita acted on these signs by arranging a welfare check on discharge.

> *"I suspect she did feel involved in the sense that she was able to tell us what her, and she did give us quite a lot of clues as to what her normal life situation was like, and I think that was her way of telling us how independent she is usually*" [Rita interview]

Patients' sometimes concealed their concerns from the AEC team as in Reggie's case (4.2.2b). Reggie had noted that his patient had been ignoring her diabetes. When Reggie gently challenged her, she admitted she was frightened of injections and was avoiding her diabetic team. The patient's initial management plan was then modified to include a diabetes team review the following day.

> *"2.15pm Reggie also says "I think it's a little more complicated, I think we need more tests. I'm worried about your diabetes".*
>
> *The patient then admits stopping seeing the diabetes nurse as too many bloods. She says "I know it's my own fault" and tells Reggie they have not been seen for 18 months. She is frightened of injections."* [Reggie fieldnotes]

The effect of Negotiation on AEC Decision-Making

Negotiated interaction between the clinician and patient, allowed alterations to be made to the AEC CI. Clinical decisions were often modified in the light of the patients', relatives' or other healthcare professionals' views or new information from the patient assessment. Some modifications were relatively straightforward, e.g. changing antibiotics in Rosa's case. More complicated alterations were seen in Roger and Rita's cases where a full multi-disciplinary team assessment was required to manage the patient's needs. This negotiated decision-making was essential for the delivery of a tailored AEC intervention. The next section examines how the constant components of the AEC CI were individually tailored.

4.2.3b Individual Tailoring in AEC decision-making

Individual tailoring refers to the capacity of clinicians to personalise illness care for their patient (Table 22). This variable component of AEC decision-making was demonstrated earlier in 4.2.2c, where clinicians were noted to tailor management plans to the patients' wishes and needs. This section provides examples of how individual tailoring was used to treat patients with the same condition (heart failure) in a way that was personalised to their illness needs. This tailoring was often based on the patient assessment, disease severity and the patients' wishes.

The effect of the patient assessment & disease severity on individual tailoring in AEC decision-making

Variation in treatment was seen in patients with heart failure and each case demonstrated how diuretic treatment differed depending on the clinician's assessment and how they tailored care for each individual. During the diagnostic decision-making (4.2.2b) AEC clinicians assessed disease severity: symptom burden from breathlessness, confirmation of the diagnosis from a BNP blood test, chest radiograph or echocardiogram, patient observations[42] (particularly blood pressure) and renal function. This clinical information from the patient assessment was used to individually tailor their management plan.

> *"So, in this case, the context was the fact that she's been coming up for breathlessness on several occasions. She's been identified as having heart failure. She's got a raised BNP, so an urgent echocardiogram has been arranged and the question was whether she could continue with her intravenous furosemide or move onto oral furosemide."* [Ruth fieldnotes]

For example, disease severity informed decisions between oral or intravenous diuretic treatment. In Ruth's case, oral furosemide was felt to be sufficient as her observations were acceptable and the patient had responded to a low dose (40mg) of intravenous furosemide the previous day. For Reggie's, Rufus' and Renata's index cases intravenous furosemide was recommended as the patients had markers that the doctors associated with more severe disease. These signs included high blood pressure (Reggie) and pleural effusions on the chest radiograph (Rufus), which are both signs of fluid overload in heart failure.

The effect of the patients' wishes on individual tailoring in AEC decision-making

In addition to disease severity, patients' and relatives' expectations were also important in tailoring AEC decision-making. In 4.2.2a triage decision making was more difficult when patients' and relatives' wishes were not known. Renata's case demonstrated the challenges of tailoring a treatment plan for heart failure when negotiation was difficult. Her patient was older, has complex co-morbidities, renal impairment and did not know why she was in the AEC unit.

> *"So she's an elderly lady who had got a long standing history of heart failure and had been getting worse over the last, probably about a week or so. It's difficult to secure details, mainly with breathlessness symptoms and she also had an acute kidney injury, so it's always difficult to know if you're going to try treating by taking fluid off or by giving fluid and it's that difficult situation where you actually know no matter what you do you might gain a little bit of time but actually her prognosis is quite poor….."* [Renata interview]

In this case, Renata negotiated the management plan with the patient's son. After this negotiation, Renata felt relieved because she thought the son had realistic expectations about his mother's health and they jointly set limits for treatment.

> *"Renata discusses with me after the telephone call to the patient's son*
>
> *'It's a difficult balance with these patients. The urea is high but if she is given fluids (to rehydrate her and improve kidney function) it will kill her. But she is also fluid overloaded, and her kidneys might not process the furosemide (diuretic).'*
>
> *Renata said she felt better as the ceiling of care had been discussed and set."* [Renata fieldnotes]

[42] Heart rate, blood pressure, respiratory rate, oxygen saturations and temperature

Individual tailoring as creative problem-solving in AEC decision-making

The ability to personalise and tailor patient care was an important aspect in the delivery of the AEC CI. Participants enjoyed problem solving and *"putting the jigsaw together and coming up with a plan"* [Rhoda interview] for their AEC patients. Ruby described this as being "*creative*" in her decision-making. When asked to explain this concept, she describes how she focuses on the patient holistically, with a more generalist approach.

> *"the sort of beauty of this sort of care is it's like being similar to sort of GP, you know, you, it's a sort of acting a bit on sort of pattern recognition and it's the interaction. We're not, were not just looking at medical conditions and churning them through in a hospital saying, "I'm focusing on a dicky ticker and we're just going to look at everything to do with the heart""* [Ruby interview]

For Ruby, a GP, creativity was directly linked to her enjoyment of AEC care. She liked problem solving for individual patients in the ambulatory context.

> "*So creative, thinking outside the box…because everyone's unique and no-one sort of conforms. No-one's text book, you know*" [Ruby interview]

Likewise, Rowley, a medical consultant, also enjoyed working beyond the guidelines, judging when to apply evidence-based medicine to match the individual patient's needs. He compared his clinical practice with his peers and explained he was happy to work "*beyond protocol*"[43]. Rowley felt motivated by the intellectual challenge of AEC decision-making.

> *I don't think any of our patients really fit into the guidelines and also don't fit into the evidence that's available for evidence-based medicine. And so, you, you read and work out what's been proven to work for some people and then you have to decide whether to apply it in your patient in front of you, which is quite a hard decision sometimes. But it's probably the most interesting aspect of geriatric medicine, and again, I kind of compare myself to my colleagues, and there are those that will rigorously apply the evidence from younger people and do all of that in our patients, and then there are those that will say, "This doesn't apply at all. I'm not using any of that." And again, I think I sit fairly towards the middle of that.* [Rowley interview]

[43] Beyond Protocol Working; The development of a conceptual framework to further understand clinical decision making in uncertainty, Society for Acute Medicine Conference 27.5.20

Individually tailoring care was also cognitively challenging for participants (2.2). Renata explained that although the complexity of problem solving in AEC was challenging, this aspect had motivated her to choose geriatric care.

A reflexive locally negotiated community of practice in AEC decision-making

The participants reflected on how they gained AEC experience which allowed them to tailor the AEC CI to their patients. Many had trained together at Wynchwood when this had first opened. Reggie, a GP, described change of "*mindset*" that they developed over time with experience and working with his medical colleagues. Reuben, a consultant, explained how he developed his practice at Wynchwood, learning from his GP colleagues. He learnt what clinical problems were already being managed in the community, but also what acute practice might be possible.

> *"It also gave me good experience on what is actually achievable in the community in that I think we underestimate, 'we' being the Acute Trust, and medics and teams within it, underestimate what is managed and looked after in the community on a daily basis."* [Reuben interview]

These experiences were reinforced by direct feedback. Participants reviewed sequential patients and developed a bank of clinical recipes, which were shared across the community of practitioners.

> *"the experience of working on Wynchwood meant that you gained positive experience from seeing patients go home and come back and not deteriorate overnight, and so, you learnt actually which patients it was sensible and appropriate for, which ones weren't and you got some of that because patients didn't want to come into hospital. They wanted to go home, and so, even though you might have said to stay in, actually patients wanted to go home and actually they did fine, and it's recognising that. Plus, obviously some background in working with local GPs as well because you see some of the patients that they are dealing with on a day-to-day basis and not admitting as much as anything else.* [Reuben interview]

Each practitioner reflexively considered the outcomes of their decision-making. Ruth, a GP, describes how she learnt from cases and why this was important to her. She considered when she had made the correct call for the patient and when she accepted unsuitable cases for ambulatory care

> *"And one of these days, when I get five minutes, I actually plan to actually try and record every call I take and then try to look at the outcome for the patient to see whether I'd made the right judgement about where that patient then ended up. But I've not, not the time to do that. But that's something I might try and do because I think it's important to me to find out whether or not I've got the, I've put the patients in the right place."* [Ruth interview]

Understanding the patient outcomes of their AEC clinical decisions was important to the AEC clinicians. Personal reflections and case discussions allowed the AEC community to collectively develop their ambulatory practice. Despite this evidence of reflective practice, most participants found being observed whilst working, novel. Some stated they had learnt something about their clinical practice in the process, *"it's given me a chance to reflect"* [Rita interview]. They explained that as trainees, most doctors were used to regular observation and feedback but the more senior they become, the fewer opportunities for direct appraisal of their practice or peer assessment were available to them.

The effect of Individual Tailoring on AEC Decision-Making

AEC clinicians tailored their management plans to the individual patient based on their clinical assessment and needs, using creative problem solving and reflexivity. The AEC clinicians personalized their interventions based on the patient assessment, the patients' wishes and disease severity. This tailored approach allowed the constant components of the AEC CI to be delivered flexibly to meet the patients' needs. AEC clinicians valued the creative problem-solving aspect as integral to their work. They used feedback and case discussions to reflexively learn from cases in a locally negotiated community of practice.

4.2.4 Complex Negotiated Clinical Decision Making in Ambulatory Emergency Care

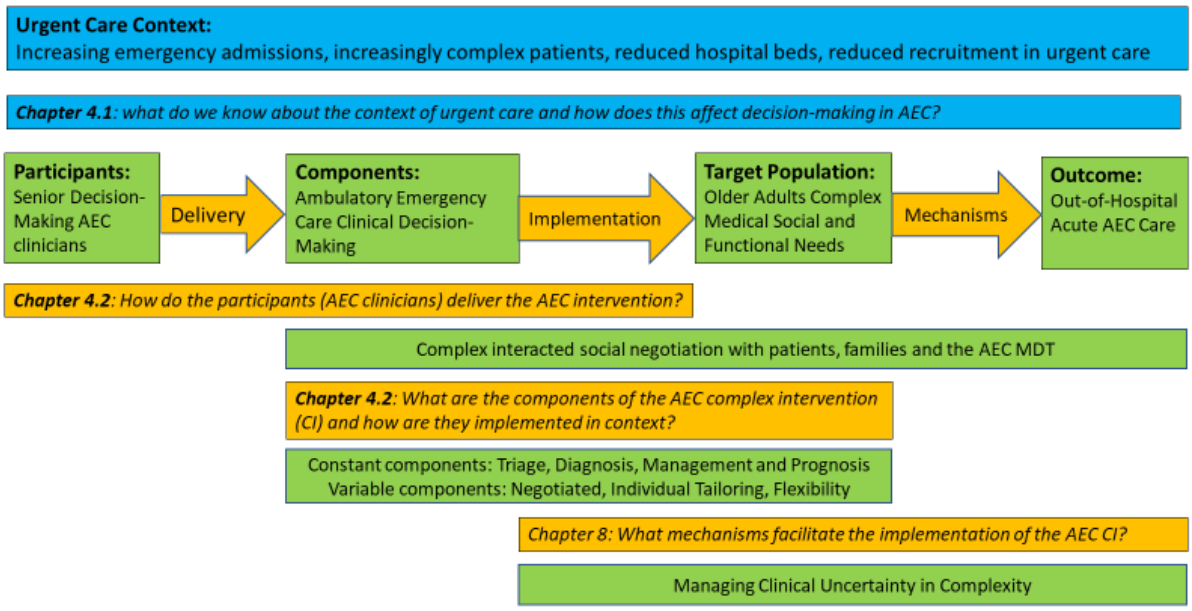
This chapter demonstrated the complex interacted social negotiation involved in delivering the AEC complex intervention. Four constant components of decision making were constructed from the fieldwork; triage, diagnostic, management and prognostic decisions. Variable components in decision making included negotiation, individual tailoring and flexibility. The aim of the negotiated social interaction in the AEC complex intervention was the development of an individually tailored clinical plan for the patient. These negotiated plans involved the AEC clinician, the patient, their families and the AEC MDT and were often distributed in time and place. Complexity in the AEC complex intervention (1.3) was demonstrated by the number of interactions between the components, flexibility and tailoring of the AEC intervention and the number of participants involved (5.2.3).

Understanding the components of the AEC complex intervention is important for several reasons. First, this thesis has identified the core decision-making tasks for AEC clinicians, which is needed to inform education for clinicians wishing to work in this emerging speciality. The variable elements also provide information on the skills, attributes and processes required to deliver an AEC complex intervention. These have implications for the clinicians and teams required for AEC complex interventions, including how to facilitate a learning environment. Finally, when considered together with the impact of the AEC setting on decision making (4.1), clinical environments need to be designed to allow these flexible AEC work processes.

Chapter 5: AEC Decision-Making work: Problem-solving in context

The purpose of this study was to understand how clinicians made decisions in the AEC complex intervention to provide acute care in out-of-hospital settings. Chapters 4.1 and 4.2 discussed the attributes of the clinician, the AEC environment and the impact on decision-making, the constant stages of AEC decision-making (triage, diagnostic, management and prognostic decisions) and the variable components that allowed AEC clinicians to work in AEC (negotiated decision making, flexibility and individual tailoring). This discussion chapter will review these findings in consideration with the existing literature to interpret and construct a new understanding of AEC decision-making as an example of complex, negotiated, distributed decision-making in the context of urgent care.

Figure 13 Decision-Making in the AEC Complex Intervention



In order to construct a new understanding of the AEC decision-making in context I revised the complex intervention framework discussed in the first chapter (Figure 3). The underlying mechanisms that facilitated the implementation of the AEC complex are discussed in the Appendix Chapter 8. These mechanisms were related to how clinicians managed clinical uncertainty and included reducing uncertainty, sharing uncertainty, decision support, team

decisions in uncertainty and continuity of care. Here I update the complex intervention map from 1.3.1 (Figure 3) by reporting the implications of the ethnographic work on the understanding of the participants, components, target population outcomes and context involved in AEC decision-making (Figure 13).

5.1.1a The Participants: The work of the Senior AEC Clinical Decision-Makers

Senior clinical leaders were previously understood to be required for the credible implementation of complex interventions but the skills and attributes required to work in AEC were unknown (Dopson and Fitzgerald, 2005, Lasserson et al., 2018, Hamad and Connolly, 2018). The importance of importance of diversity in the team background and the ability of senior AEC clinicians to work across professional boundaries has been acknowledged in this thesis (4.1.1). This is consistent with the management literature where these individuals were known as "*boundary spanning individuals*" who had internal competence and external reach (Tushman and Scanlan, 1981). These "*skilled clinical leaders*" often had the power to facilitate or impede the diffusion of innovation and were essential for successful implementation of complex interventions in healthcare (Dopson and Fitzgerald, 2005)[44]. Further research is needed into how to develop a future AEC workforce whilst maintaining the diversity needed to work as boundary spanning individuals.

From the findings in this thesis, I constructed a new key attribute for AEC clinicians; the ability to work flexibly in response to environmental context, new information, whilst role and task switching (4.1.1d). This capacity to adapt behaviour to context has been described in the psychology, neuroscience and management literature as "*cognitive flexibility*" (Laureiro Martinez et al., 2009). The cognitive aspects of flexibility have not often been well defined in the clinical context. For example, the UK Geriatric Medicine Curriculum requires trainees to develop "*ability to work flexibly and deal with tasks in an effective fashion*" (JRCPTB, 2010 (Amendments

[44] Page 126

2016)). However, the flexibility they describe solely concentrates on task prioritization rather than the contextual awareness recognized in the management literature.

Analysis of the fieldwork confirms the need for AEC clinicians with cognitive flexibility to work in the cognitively loading environment of urgent care. Three key features of cognitive flexibility were described in the literature; an understanding of alternative approaches, motivation to change and self-efficacy (Martin and Rubin, 1995). These qualities were demonstrated in the findings chapters, as participants understood the alternative options in AEC (4.2), were able to modify AEC clinical plans in response to an individual's needs (4.2.3b) and could change their clinical behaviours in response to environmental factors (4.1.4). Further research is needed to understand the education requirements to develop cognitive flexibility for clinicians working in uncertainty context such as ambulatory care.

Contextual awareness in Primary Care was described as "*contextual adroitness*" by Gabbay and Le May (Gabbay and Le May, 2011)[45]. The authors defined this as an understanding of the clinical setting, or situated knowledge in context, which allowed the clinicians to attain expertise. Contextual adroitness was a key component in the development of "*mindlines*" of medical practice which were specific for time and place (Gabbay and Le May, 2011). They noted that clinicians were continuously updating their knowledge of the environmental context and incorporating this with new information in collaboration with colleagues developing local "*communities of practice*" (Gabbay and Le May, 2011). Their observations resonate with the findings presented in this thesis, highlighting the importance of contextual understanding and the key role of the MDT in providing clinicians with a community of practice to support clinical decision-making in AEC. Further investigation is needed to understand how to develop and support communities of practice within ambulatory care.

[45] Chapter 5 Growing mindlines: cultivating contextual adroitness page 85

5.1.1b The Components of AEC decision making: Constant and Variable

Previous work had shown that AEC decision-making relied on clinicians making appropriate decisions about the suitability, severity and appropriateness of AEC care during based on the medical, social and functional needs uncovered during the patient assessment (Hamad and Connolly, 2018). I additionally constructed four constant decision-making stages based on the thesis findings; triage, diagnosis, management and prognosis (4.2.2). These were complex chains of decision-making tasks essential to deliver the AEC CI. However, these constant components of AEC decision-making were modified by negotiation and co-development of the individually tailored AEC clinical plan, which were the variable components of AEC decision making. The variable elements (negotiation and individual tailoring) explained how these components were performed differently in each AEC consultation. The negotiated nature of the AEC consultation is discussed in 5.3. Analysis of the findings in this thesis identified the core decision-making tasks for AEC clinicians, which is needed to inform education for clinicians wishing to work in this emerging speciality. Sections 5.2-5.4 will discuss the complex, negotiated and distributed nature of AEC decision-making.

5.1.1c The Target Population for AEC: Assessing suitability for AEC

The population requiring ambulatory emergency care has been a source of debate. Previous work has concentrated on ambulatory care sensitive conditions and the potential benefits of treating these conditions outside of the hospital (Tian et al., 2012). The Ambulatory Emergency Care Directory provides lists of conditions which could be managed in an ambulatory way (AECN, 2014). To assess suitability for AEC care, the most recent AEC Directory suggests that clinicians asked four questions (Table 23) when determining patient suitability for AEC (AECN, 2018). This was recommended at the triage stage to identify potential ambulatory patients. As shown in the findings presented in this thesis, three additional factors were constructed that promoted escalation from primary care to AEC in triage decision-making (Table 24). These included, an

inadequate response to primary care treatment, the patients' wishes and need for involvement of the AEC MDT.

Table 23 Suitability for Ambulatory Emergency Care (AECN criteria)

Suitability for AEC criteria (AECN, 2018)
1. Is the patient sufficiently stable to be managed in AEC 2. Is the patient functionally capable of being managed in AEC whilst maintaining their safety, privacy and dignity? 3. Is there an existing outpatient or community service that could more appropriately meet the patients needs? 4. Would the patient have been admitted in AEC was not available?

This ethnography also further extends our knowledge by demonstrating a second stage where suitability for AEC was assessed, not previously recognized by the Ambulatory Emergency Care Network. In this ethnography, suitability for AEC assessments were observed during the prognostic stage to check whether patients remained suitable for out-of-hospital treatment. During prognostic decision-making clinicians were concerned with the risk of deterioration, the ability of the patient to cope at home in this illness and consideration of the alternatives to AEC (Table 24).

Table 24 The Tacit Criteria used to assess suitability for AEC

The Tacit Criteria used to assess Suitability for AEC	
Triage Decision-Making	Prognostic Decision-Making
Inadequate response to primary care treatment	Ability to cope at home in this illness
Patient wishes for alternatives to hospital	Risk of Deterioration
Need for involvement from the AEC MDT	Alternative to AEC required

This findings in section 4.2.2a demonstrated that most clinicians used tacit principles to assess suitability for AEC and these criteria did vary between clinicians. For example, clinicians were able to describe patients who had challenged their AEC suitability criteria (4.2.2a). In contrast to the stated aim that ambulatory care usually treated older patients (1.3.4), some younger patients were seen in AEC. These younger patients (A13) often required a holistic approach as they did not neatly fit into one specialty but were suitable for out-of-hospital care.

These principles for targeting the suitable patients at triage were part of the cognitive "*mindlines*" of AEC clinicians, developed over time and with clinical experience in AEC. This thesis demonstrates the similarities and differences between clinical guidance and the mindlines used in real-life clinical practice. Further research is needed to understand which patient groups benefit from ambulatory care, the clinical outcomes after an AEC intervention and how to improve prognostic decision-making for AEC patients.

5.1.1d The Outcome of an AEC CI: Individually tailored care plans

Chapter 1.3.5 noted that the expected outcome of the AEC complex intervention was the preparation of an individualized care plan (Ellis, 2011, McKelvie et al., 2016). Two recent Cochrane reviews assessed the impact of individually tailored care on patient care (Gonçalves-Bradley et al., 2016, Coulter et al., 2015). One systematic review assessed the outcome of a personalized discharge planning from hospital; for older patients with a medical condition, a reduction in 0.73 hospital days was noted with a small reduction in readmission rates (moderate certainty) (Gonçalves-Bradley et al., 2016). There was no difference in mortality and low certainty evidence of improvement in patient and staff satisfaction (ibid). Individually tailored care plans were also examined in long term conditions where small beneficial effects were found in health outcome such as reduced systolic BP (Coulter et al., 2015). This article noted that the clinical outcomes improved if the intervention increased the contact between patient and clinician, the usual clinician was involved and multiple cycles of care planning were undertaken

(Coulter et al., 2015). However, there was limited evidence on how care plans were created, implemented or individually tailored by clinicians.

Authors have described individual tailoring as healthcare personalized for the patient, co-constructed between the patient and clinician (Reeve, 2015). This thesis establishes how this individual tailoring was constructed in the context of AEC. Clinicians personalized the care plan for the patient based on a clinical assessment of need, incorporating the patient's wishes and disease severity. This is congruent with expert guidance for de-prescribing in multi-morbidity where "*integration of patient preference and context, clinical judgment, and scientific data (where it exists), using a drug prescribing approach that can be customized to each older adult in a fashion aligned with patient-centered medicine ideals*"(Mangin et al., 2018) has been recommended. This ethnography also demonstrates that AEC clinicians also needed creative problem-solving and reflexivity to allow them to flexibly delivery the constant components of the AEC CI to deliver an individually tailored care plan (4.2.2). The AEC plan could also be tailored in response to contextual awareness (5.1.1a) and the incorporation of new information (4.1.1d). Further research is needed on the impact of the individually tailored AEC care plan on long term patient outcomes.

The individual tailoring of the AEC plan was facilitated by negotiation with the patient, their next-of-kin and the MDT (4.2.3a). Negotiation with patient and families allowed discussion of the differing priorities and so that compromise could be reached. The literature on the de-prescribing of medicines has suggested that negotiated compromise is likely to be essential to balance the intended benefits with the demands of the medication regime to improve patient concordance (Duerden et al., 2013). In addition, negotiation with the MDT informed the AEC care plan (4.2.3a). Clinicians gained practical support with supporting information on the functional and social needs to build a holistic picture of the patients' needs. The MDT also provided cognitive and emotional support challenging and validating the senior decision-makers clinical plans. This provided the clinicians with a locally negotiated community of practice

(Gabbay and le May, 2004). Further research is needed on the communication skills required for AEC clinicians and team-based decision-making to individualised care in AEC.

5.1.1e The Effect of the Urgent Care Context on AEC decision-making

There was a recognition in the literature that urgent care is an environment with multiple sources of cognitive load (2.4). The narrative synthesis suggested three ways in which cognitive load caused clinical impact; altered task time, changed behaviours and increased error rates (2.4.7). This ethnography examined sources of cognitive load in AEC and concluded that similar to urgent and emergency care, high demand, limited time and disruptions were environmental stressors (2.5). The participants described the negative consequences of working under cognitive load as fear, forgetting and frustration. Although the literature has discussed the negative consequences of cognitive load in urgent care, this thesis has also recognised the protective and functional responses that mitigate the cognitive load of working in AEC.

The thesis demonstrated that AEC clinicians had mechanisms to manage their cognitive load including altered task time, referral thresholds, clinical behaviours and team working (4.1.2f). The altering referral thresholds has previously been described in the literature (Pauker and Kassirer, 1980, Djulbegovic et al., 2015). The threshold model of clinical decision-making suggested that by assigning probabilities to clinical outcomes, clinicians would be able to better judge the risk-benefit ratios of further testing or treatment (Pauker and Kassirer, 1980). However, like later work (Djulbegovic et al., 2015), this thesis has demonstrated individual variation in decision thresholds based on the way that individuals integrate benefit and harm (5.1.1c). Djulbegovic et al. (2015) suggested "*reflective rationality*" as a method of integrating medical, psychological, social and economic factors to aid decision-making according to patient need. Further research is needed on the outcomes of AEC to derive an evidence base for AEC decision-making. However, whilst this is developed, this thesis has shown how AEC clinicians synthesise their understanding of the medical evidence in negotiation with the patient, flexibly integrating this data into an individually tailored plan.

This section has evaluated how senior clinicians perform their decision-making work in the AEC context. The ethnographic work has challenged and extended the understanding of the socially interacted work of AEC, demonstrating key attributes of the clinicians and team and essential components of AEC decision-making in the cognitively loaded environment of urgent care. The next section will discuss the complex, negotiated and distributed socially interacted nature of AEC decision-making

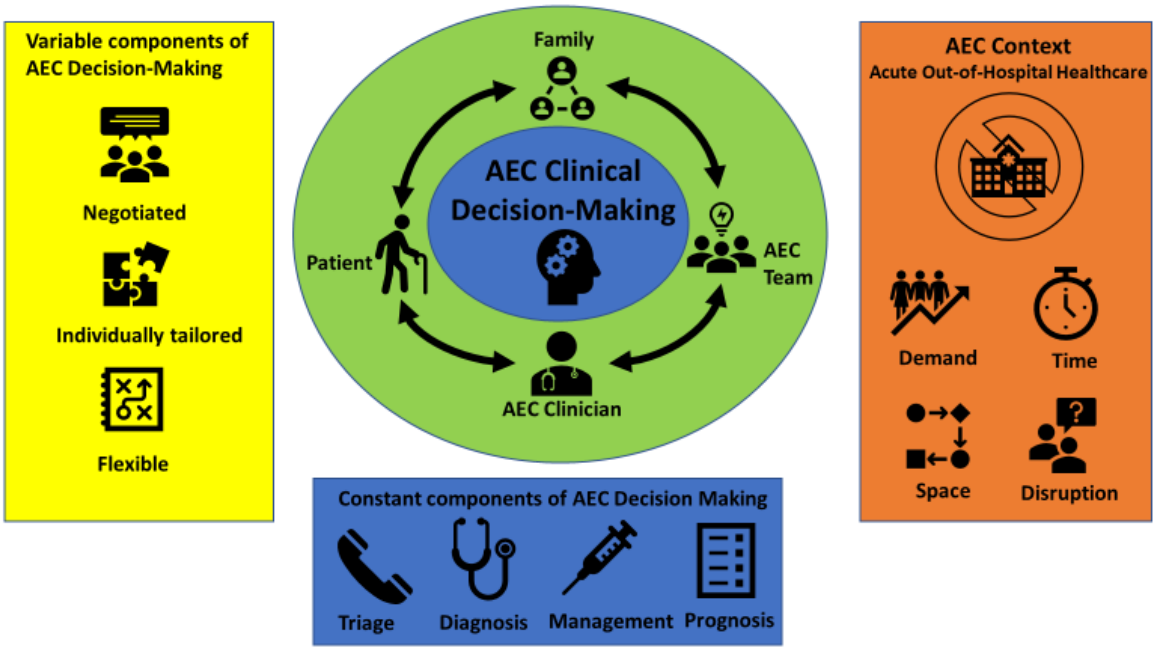
5.2 The complex social interaction of AEC clinical decision-making

One of the aims of this study (1.4) was to develop a conceptual understanding of working in the AEC complex intervention, to provide clinicians with the principles of AEC decision-making in order to help develop further training for this emerging speciality. This ethnography drew on observed clinical practices and participant interview data, reviewed against the literature, to construct a new understanding of decision-making in the AEC clinical environment.

The study of social interaction in medicine has often concentrated on the patient-doctor interaction (Atkinson, 1995)[46]. This ethnography offered new insights by observing these interactions in context and highlighted that other social actors are involved in AEC consultations, particularly the multi-disciplinary team (4.2.3a). These complex social interactions involved negotiation between the participants, patient and MDT to decide on the AEC interventions each patient required. The ethnography observed individual tailoring leading to modifications in the AEC care plan (4.2.2c). However, negotiation between the actors and flexibility in the components of the AEC intervention generated additional complexity. The AEC context also provided an environment prone to cognitive load, which altered how clinicians performed (4.1.3). Section 5.2 will discuss AEC decision-making as a complex social interaction affected by negotiation, team-based decision-making, and complexity (Figure 14).

[46] Page 31-36

Figure 14 AEC Decision-Making at work in uncertainty; Problem solving in context



5.2.1 Negotiated Distributed AEC decision-making

This ethnography has demonstrated how negotiation was distributed throughout the AEC consultation, affecting and modifying the clinical decision-making at every stage from triage to prognosis (4.2). The negotiated distributed nature of AEC decision-making is demonstrated clearly using a network map of the multiple actors involved in Ruby's index patient case (Figure 15). The network map also illustrates the complexity of interactions involved in each AEC assessment (8.4.4).

Figure 15 Negotiated Distributed Social Interactions in AEC; A network diagram of Ruby's Index Case

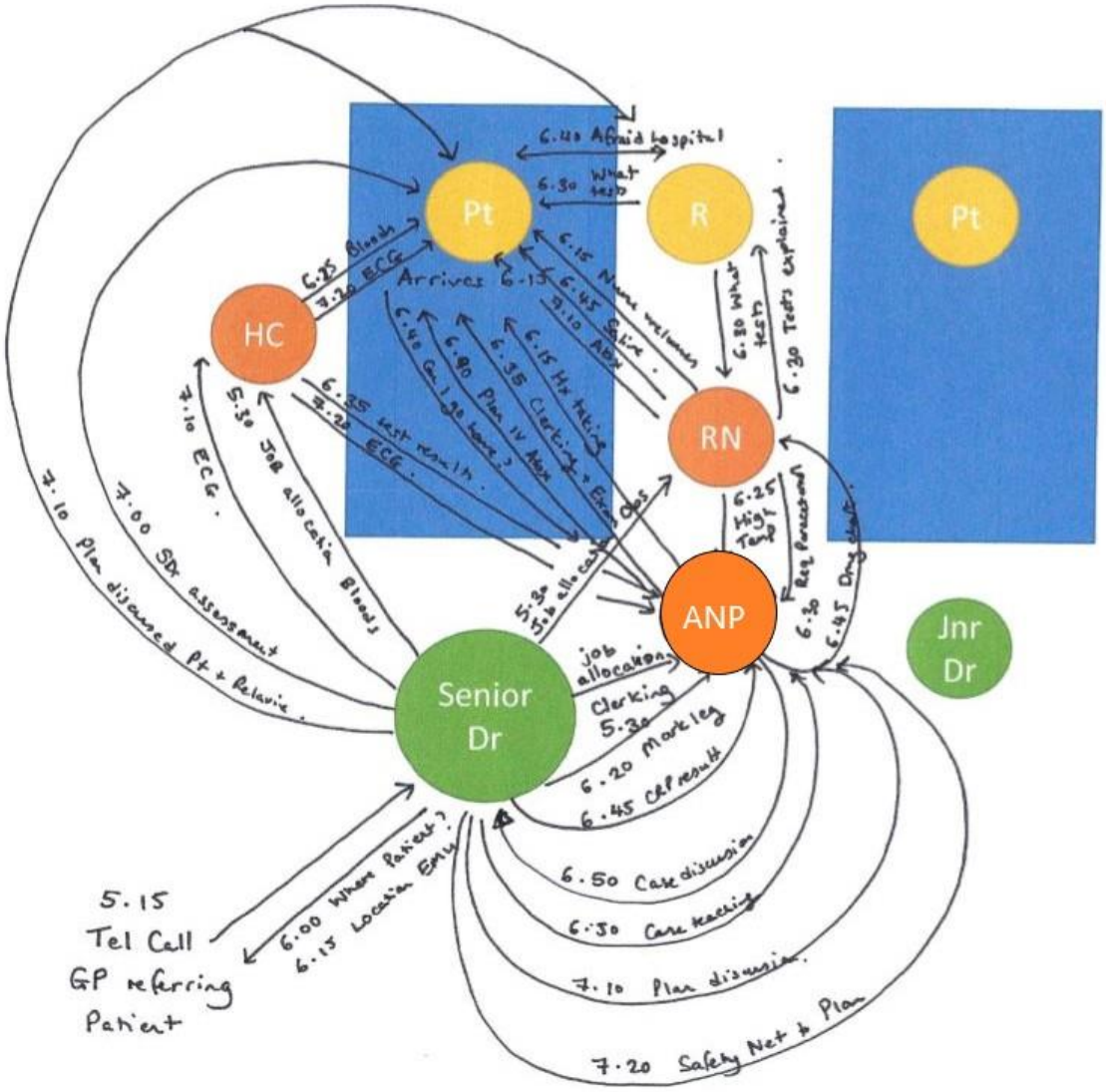


Diagram Key 1: ANP – Advanced Nurse Practitioner, HC – Healthcare Assistant, RN – Registered Nurse, Pt – Patient, Jnr Dr – Junior Doctor, R – Relative. 5.15 – time of day (pm). Arrows refer to the interactions between the social actors and contain a brief summary of the actions being carried out

Previous research has highlighted the importance of negotiation. Strauss (1978) identified four key aspects of negotiation in decision-making; the negotiators, timing and visibility of negotiation and balances of power. This section uses this framework to explain the process of AEC negotiated decision-making, starting with the negotiators. Montgomery (2013) describes medical work as the social interpretation of health and disease between two negotiators, the patient and doctor. Most research on these socially negotiated interactions has concentrated

on the patient-doctor dyads to inform the educational literature on the medical consultation (Pendleton, 1984, Neighbour and Reade, 1987, Silverman et al., 1998). Often studies have assumed the limited input of friends and family on medical decision-making (Frosch and Kaplan, 1999). However, other authors have found that significant others do have a role in decision-making (Booker et al., 2017). Often their influence can range from the supportive bystander role, to more collaborative decision-making, persuasion and direct instruction giving (Ohlén et al., 2006). However, the role of multiple clinical voices is less commonly discussed. Atkinson (1995)[47] is an exception, with work concentrating on the "*socially organized medical work*" that was distributed between multiple social actors. He characterized the "*medical talk*" that occurred between healthcare professionals including doctors, nurses, laboratory staff, and between different medical specialties. In this thesis I offer new insights into the significance of multiple actors in the negotiated decision-making taking place in AEC. This work highlights the influence of the senior clinician, the patient and their family, the AEC MDT and other healthcare professionals when negotiating the AEC care plan (4.2.3a).

This dispersal of decisions across several people and time has been described as "distributed" decision-making (Rapley, 2008) and was defined as decisions which were "*routinely distributed 'over' people, they emerge, transform and solidify in and through multiple interactions with multiple others, significant or otherwise, over a period of time*". Rapley based his model of distributed decision-making on four studies of consultations in primary and secondary care noting that medical consultations were often informed by relatives and acquaintances (Rapley, 2008). Elwyn et al. (2012) has described this need for deliberation with others as a central part of Shared Decision-Making (SDM).

SDM has been described as a process by which clinicians aid patient choice by providing information and encouraging deliberation (Elwyn et al., 2012). This was first described as an alternative to the paternalistic decision-making models of consultation, with patients and

[47] Page 52

doctors both participating in decision-making (Charles et al., 1997). Three types of discourse are needed for SDM consultations: choice, option and decision talk (Elwyn et al., 2012). There is a considerable evidence that patients do wish to be involved in decision-making about their health (Coulter, 1997) and there has been an exponential rise in research articles on SDM since 1996 (Blanc et al., 2014). One area needing further review is how SDM is achieved under stress such as the cognitively loaded environments in urgent care (Frosch and Kaplan, 1999). A 2012 systematic review of SDM in the Emergency Department only found five eligible studies and identified a need for studies that investigate the barriers and facilitators to SDM (Flynn et al., 2012). A further expert consensus group in 2016 discussed the uncertainties associated with SDM for older adults in the Emergency Department, concluding that the use of SDM to discuss hospitalization was a high priority for research (Hogan et al., 2016).

This thesis contributes to this debate on SDM in urgent care as decision-making was observed in real-time and in context. As discussed, the main environmental factors affecting decision-making in AEC were the increased demand, severity and acuity of the patient's illness and reduced decision deliberation time (4.1.2). In response to this, AEC clinicians often increased the time with their patients and involved the MDT in response to complexity whilst working under time pressure (4.1.3). Negotiated distributed decision-making was seen throughout the AEC assessment, with the patient and their GP influencing triage, relatives often provided additional information for diagnostic decisions, during the management stage patients' and families' wishes were incorporated to modify the AEC care plan and the MDT was crucial during prognostic decision-making to decide on suitability for treatment at home (4.2.d & 4.2.3a).

This thesis differs from the existing literature on SDM by appreciating that the AEC clinicians considered how, and which decisions could be shared in a negotiated, distributed manner with the patient and their next-of-kin. Often the decision regarding ambulatory treatment at home was discussed in terms of the capacity of the patient and/or their relatives with information from the MDT (4.2.3a). In some cases, patients gave clear reasons for home treatment and the

family and AEC MDT were able to support this. However, for others patients, hospital treatment was advised as the patient had factors that the clinician felt would lead to an adverse outcome with AEC treatment (4.2.2d). Disease severity also influenced treatment decisions such as whether intravenous or oral treatments were needed (4.2.2d). However, even these medical decisions were occasionally modified to patient's individual needs as seen in Ruth's case (4.2.3a). From this empirical data, it appears that the AEC clinicians chose which decisions could be negotiated with patients, where they required information from other sources such as the MDT and which decisions remained their medical responsibility.

A 2015 Academic Emergency Medicine conference discussed of the balance of power in clinical decision-making in urgent care (Hess et al., 2015, Kraus and Marco, 2016). Kraus and Marco summarised the challenges to providing SDM in emergency care as "*physicians often have no established relationship and decisions about diagnosis, treatment, and disposition are time dependent*" (Kraus and Marco, 2016). Perceived barriers from surveys of ED clinicians included suggestions that patients preferred physicians to decide, that patients may ask for more aggressive care than the physician felt appropriate and that patients might feel the decisions were too complex (Kanzaria et al., 2015). However, ED clinicians did feel in 50% of their cases an SDM approach would be appropriate (Kanzaria et al., 2015). Case based discussions highlighted other important ethical considerations including trade-offs in goal directed treatment, maintaining continuity of care, patient information and education and the need for surrogate decision-makers in some cases (Kanzaria et al., 2015). Ethicists have suggested it is possible to have SDM as the aim of ED but recognizes situations where this may be difficult (Kraus and Marco, 2016). For example, surrogate decision-makers or alternative approaches may be needed where patients have long-term conditions such as dementia or shorter reversible causes of impaired capacity such as delirium or pain (Kraus and Marco, 2016). Charles et al. (1997) felt that SDM was needed for long term conditions with life threatening consequences such as cancer but did feel that other conceptual models of decision-making might be needed in

emergency situations. I suggest here that negotiated distributed decision-making provides a useful conceptual model for team-based decision-making in urgent care.

In conclusion, this ethnography supports the idea that different decisions may require different approaches and level of involvement from clinicians, patients, relatives and team members. This is likely to vary depending on the type of decision being made and the priorities of the actors involved in decision-making. The skill of the AEC clinician is to understand when and which approach to decision-making may be appropriate to support individually tailored care planning. Where higher disease severity is present, clinicians are likely to have a greater understanding of the options and so these treatment decisions may only support very limited negotiation, however decisions on locations of care may require a more holistic approach to negotiation with several participants. The data on AEC decision-making does however demonstrate that patient wishes can be incorporated at every stage of decision-making. This phenomenon requires further research to develop training for clinicians planning to work in AEC and to understand patients' perceptions of their involvement in decision-making in AEC. Further support for AEC communities of practice is likely to assist the development of AEC clinical practice in context. Further research is needed into whether negotiated distributed decision-making occurs in other urgent care areas with high levels of clinical uncertainty.

5.2.2 Team decision-making in AEC

The importance of teamwork in AEC is discussed in relation to the literature on team effectiveness, dealing with complexity and stress management. Previous research on effective teams in healthcare show that three conditions are required; a small number of clear objectives, clear roles and responsibilities and opportunities for team-based reflections "*team reflexivity*" (Baird et al., 2020, West, 2012). This ethnography observed that principles of AEC working were shared across the AEC team (4.2.3a) and, the roles of the senior clinician were clearly defined (4.1.1c). However, these principles and roles were often tacit and only understood by members of the AEC team. The AEC teams were also observed to spend time reflecting on their

performance during in team meetings. Further research is needed on how to encourage effective team reflexivity in urgent care.

The value of the team when assessing complex older patients with multi-morbidity has been previously investigated (Pethybridge, 2004, Ellis, 2011). A systematic review of team working with older people in the community suggested that factors influencing successful team working with complexity were mutually negotiated goals with the clients, close working relationships and shared knowledge across the team (Johansson et al., 2010). These factors were observed when senior clinicians prioritized worked with the MDT and valued their teams' input (4.2.3a and 5.2.1). This ethnography extends our understanding of AEC decision-making by demonstrating how the team impacted directly on clinical decision-making by providing additional information, adding to the holistic assessment of patient need, to create an individually tailored out-of-hospital acute care plan (4.2.3a). Further investigations are needed into the optimum team composition required for AEC work.

Research on teamwork in urgent care has also highlighted the beneficial effect of the team on mediating stress when working under resource pressures (Flowerdew et al., 2012). This ethnography extends our understanding of how teamwork supported the senior clinicians. In AEC the senior doctors valued the teams input to validate their decisions and to provide emotional support for working in uncertainty (4.1.2e). The data in 4.1.3d demonstrated how senior clinicians adapted team roles to mitigate against environmental stressors. Senior clinicians also used shared responsibility and mutual support to aid cohesive teamwork. More work is needed to understand whether team work training may reduce stress for clinicians working in urgent care roles (Flowerdew et al., 2012).

5.2.3 Complexity in AEC decision-making

Chapter 1 suggested that AEC decision-making should be considered as a complex intervention due to the number of components and interactions. In this section we discuss the elements of

complexity demonstrated in AEC decision-making using the MRC framework: components, behaviours, groups, outcomes and flexibility (Craig, 2008) (

Figure 16).

Figure 16 Dimensions of Complexity in AEC Decision-Making (Craig, 2008)[48]

Dimension of Complexity	Example in AEC Decision-Making
Number of and interactions between components within the intervention	• 4 constant decision-making stages • Multiple decision-making tasks • Negotiation with multiple sources
Number and difficulty of behaviours required by those delivering or receiving the intervention	• Multiple participants modify the AEC care plan • Altered clinical behaviour due to urgent care context
Number of groups or organisational levels targeted by the intervention	• Team-based AEC decision-making requires a holistic assessment of needs by the MDT • Multiple interactions with other healthcare providers and systems
Number and variability of outcomes	• Individual tailoring increased number of possible outcomes • AEC decisions modified by the patient's wishes, new clinical information and health system pressures
Degree of flexibility or tailoring of the intervention permitted	• AEC decision-making is flexible individually tailored intervention co-created between patients, the senior clinician and the AEC team

[48] Adapted from Box 2, MRC Complex Interventions Guidance, page 7

Chapter 4.2 established four main constant components of decision making: triage, diagnostic, management and prognostic decisions. These components also contained smaller decisions tasks within them such as assessments of disease severity and suitability for AEC. The AEC consultation process also required clinical information from multiple sources including the patient, their family, investigations, the AEC team and other healthcare professionals (Chapter 4.2.3a).

The patient and their families were also key in altering the "*AEC plan*". These negotiators were able to modify the AEC complex intervention through discussion with the HCPs involved in their care (4.2.3a). In addition, clinicians altered their behaviours in response to the urgent care context (4.1.3c).

Several professional groups were involved in team-based AEC decision-making. The whole MDT was used to assess the medical, functional and social needs of each individual patient (4.2, 5.2.2). In addition, multiple negotiated interactions with other healthcare providers and systems to provide the AEC intervention were seen (4.2.3a)

As demonstrated in chapter 4.2.3b, each clinical plan was individually tailored. This adds to the complexity by increasing the number of possible outcomes for each AEC care plan. These AEC clinical decisions were also modified by the patient's wishes, new clinical information and health system pressures. Finally, individual tailoring allowed the provision of a flexible AEC care plan co-created between patients, the senior clinician and the AEC team. Further research is needed to understand how to best evaluate AEC complex interventions recognizing the flexibility and complexity required to produce individually tailored outcomes.

Chapter 6: Critical Appraisal & Reflection

In this chapter I discuss the methodological strengths and limitations of this ethnographic study using the trustworthiness criteria established in Chapter 3. The chapter then considers researcher positionality critically examining the impact on the research, the researcher and the participants. The chapter closes with a section on the unanticipated challenges including the COVID-19 pandemic.

6.1 Methodological contributions

Chapter 3 outlined the methodological approach used in this study to understand the clinical decision-making of AEC clinicians. As discussed, the research question required credible methodological techniques which were flexible enough to appreciate clinical decision-making in context and in real time. The ethnographic methods combined with cognitive task analysis allowed analysis at depth and breadth, gaining "*emic*" and "*etic*" perspectives on the phenomenon. The constructionist approach allowed the co-production of meaning through interaction with the participants.

These methodological choices were crucial in answering the research questions in this dissertation; how the work of AEC clinicians was delivered in the context of AEC. I discuss how key themes were constructed using the novel methodological approach outline in this thesis, in terms of study design, data collection and data analysis.

One of the novel aspects of study design was the combination of ethnography with critical decision methods. The ethnographic method of constant comparison method was central to understanding the components of AEC decision-making. The design used sequential analyses of observational data to compare the key stages in decision-making for each participant and between participants (within and across case analysis). This was combined with the critical decision method to produce timelines of decision-making, which revealed the multiple linked decisions within the four larger stages of triage, diagnostic, management and prognostic

decision-making. This thesis provides evidence for complexity in decision-making when providing individualised healthcare and the methodological approach could be used to understand other complex decision-making areas under time and resource pressure.

Data collection in this thesis established that the work of AEC decision-making was complex negotiated distributed team-based decision-making. This was elicited by observation of the participants and the multiple interactions needed to prepare and individually tailor care plans for their patients. These observations were verified by interviews to check the understanding and importance of negotiation with patients, relatives and their MDT. The mapping of these interactions worked was facilitated by process tracing, sociograms and the use of the critical decision method. These methods could be used to research other clinical areas where team-based decision making is used.

Investigation of decision-making in the urgent care context was facilitated by framework analysis. This method had the flexibility of combining both "*a priori"* codes from the literature review and data derived codes, to develop a deeper understanding of the contextual factors at work. The relationships between the environmental factors were further developed using process tracing. This type of thematic analysis also provided a clear audit trail for theme development. Healthcare services research could benefit from this analytic approach to understand the relationships and mechanisms at work in complex interventions.

These three examples illustrate some of the strengths of the original methodological approaches used in this thesis. These techniques are likely to be useful in health services research where complex interventions, relationships and decision-making are under investigation. The next section critically appraises the strengths, limitations and trustworthiness of this ethnography.

6.2 Strengths and Limitations

6.2.1 Strengths of this ethnography

Previous authors have called for qualitative studies and in particular ethnographic studies to investigate how clinicians work in context (Danczak and Lea, 2018, Atkinson, 1984). In addition studies investigating the variation and factors that affected clinical decision-making in naturalistic settings have previously been identified as a gap in the literature (Beresford, 1991). One of the strengths of this study was that expert clinicians were investigated in naturalistic settings performing the work of clinical decision-making to understand the influencing factors. This allowed multiple perspectives and captured the variation in clinical practice, which is not often discussed.

This thesis was also able to highlight the causes and effects of cognitive load from the clinician's perspective (2.5.1). This is even more relevant with the pressures that health services around the world are facing working in this current pandemic. The literature review highlighted the gap in the literature on understanding how cognitive load affects clinicians and their decision-making and recommended further mixed methods studies to investigate the relationships between cognitive load, clinical uncertainty and clinical outcomes.

A further strength was the co-production of this knowledge with the participants. This was designed into the study from research design to analysis, congruent with the constructionist perspective. Interviews provided an opportunity to check understanding of the observed phenomenon and for participants to provide accounts of their meaning. Participant meetings helped to share initial findings and understand the impact of the research on the clinicians (6.3.7).

6.2.2 Trustworthiness of this ethnography

Chapter 3 discussed trustworthiness with regards to the epistemological approach, study conduct and data analysis. Lincoln and Guba (1985) established 5 main criteria to assess

trustworthiness; credibility, transferability, dependability, confirmability and reflexivity (Table 25). Here I discuss the strategies I used to establish trustworthiness in this thesis.

Table 25 Trustworthiness of Study Conduct, adapted from (Lincoln and Guba, 1985)[49]

	Quality Test	Strategy
Credibility	Conduct of fieldwork	1. Prolonged engagement of 14 months 2. Persistent observation 3. *Triangulation (sources, methods, investigators)* ***not used*** 4. Instead contextual validation of sources and methods
	Peer debriefing	Use of supervision meetings Feedback meetings with participants and sites
	Negative case analysis	Systematic search for variation supported by framework analysis techniques 1. Index Case summaries 2. Participant summaries 3. Thematic summaries 4. Data display tables
	Referential adequacy	Anonymised raw data including fieldnotes and interview transcripts available on request, participant summaries included within the appendices
	Member checks	Patient participation group prior to study Informal feedback during observation & interview Informant feedback meetings with participants and sites
Transferability	Thick description	Thick descriptions of cases, sites and decisions from fieldnotes and transcribed interviews Participant summaries
Dependability	Dependability audit	*Halpern Audit; raw data, data reduction and analysis, data synthesis, process notes, research proposal and instrument development* ***not used*** Audit of code and theme development Systematic within and cross case analysis using analytic framework Supervision meetings and member checking
Confirmability	Confirmability audit	
Reflexivity	Evidence of reflexive activity	Use of reflexive diary Supervision meetings

[49] Page 328

6.2.2a Credibility in fieldwork conduct

Credibility was demonstrated using several techniques; prolonged engagement, persistent observation, contextual validation, negative case analysis, referential adequacy and member checks. Immersion in the field is a central principle in ethnographic research (Patton, 2002) and the fieldwork portion of the study lasted 14 months. In addition, I have worked in association with ambulatory care since 2015. This prolonged engagement facilitated trust with the participants and sites and an opportunity to capture seasonal variation (Chapter 4.2.1a). Observation periods provided opportunities to compare clinical behaviours seen in the field, with participant accounts of their decision-making.

6.2.2b Contextual validity to assess representativeness

One aspect of credibility is representativeness; Lincoln and Guba (1985) recommended triangulation to assess this. Triangulation refers to the use of multiple sources, methods, investigators and theories to validate the data obtained (Denzin, 1970). I felt this strategy was aligned with a positivist approach to research searching for an objective reality and so not suitable for a constructionist study. Instead of triangulation, I instead considered contextual validation to assess representativeness (Diesing, 1972). This technique describes two forms of validation; assessment of themes from different sources and comparison of the data sources. For this, I compared data sourced from observation and interviews. I also used constant comparison of the participants, using within-case analysis, across case-analysis and framework analysis to systematically review the data. This use of multiple data sources aided contextual validity by looking at converging lines of enquiry (Yin, 2009). Some authors (Bikker et al., 2017) have advocated multiple investigators can be used to improve credibility in ethnographic research, however this approach was not feasible in the design due to time and cost. However, having one researcher aided consistency in data collection and improve rapport with participants. Researchers are known to exert an effect on data collection (Patton, 2002). However, the constructionist approach allows for the co-creation of social reality based on the interactions between researcher and participants. I regularly reflected on my positionality (6.3)

and supervision meetings were used to challenge assumptions resulting from my background (Robson, 2011).

6.2.2c Negative Case analysis

To assess the variation in AEC clinical practice I systematically searched for this in the index case summaries, participant summaries, thematic summaries and data display tables. The variation that results from participants backgrounds was discussed in 4.1.1b. By reviewing the data across the participants and backgrounds I was able to construct that AEC clinicians required a diversity of approach to work in the urgent care environment. In addition, during diagnostic decision-making (4.2.2b), variation in treatment plan was seen based on disease severity and individual patient factors. This adds to the literature by recognising that personalised care relies on clinicians able to individually tailor care plans.

6.2.2d Referential adequacy

Referential adequacy was supported by making the data sources transparent. Throughout the project I maintained timely and meticulous data management for all data sources including the raw data (electronic recordings of the interviews and handwritten fieldnotes) and anonymised data (transcripts, participant summaries, typed fieldnotes). Examples of participant summaries, anonymised interviews and fieldnotes are available on request, electronic recordings are not obtainable as they contain data which may identify the participant.

6.2.2e Member checking

Feedback from the informants was used to demonstrate construct validity of the themes and researcher understanding of the phenomenon and context (Yin, 2009). These meetings included a patient participation group (PPG) in November 2015, and four meetings in the AEC sites between March 2019 and March 2020. These meetings influenced the study through their effects on research design, checking participant meaning and researcher reflexivity. The PPG highlighted the influence of the multidisciplinary team on clinical decision-making; identifying team involvement as an "*a priori"* theme.

6.2.2f Transferability

Transferability in qualitative research differs from external validity required in quantitative research. In the latter, detailed description would allow precise predictions to be made about the expected outcomes in other settings. However constructionist ethnographic accounts can "*only set our working hypotheses together with a thick description of the time and context in which they were felt to hold*" (Lincoln and Guba, 1985). Therefore, in this study of decision-making I have provided thick descriptions of cases, sites and decisions in the context of the ambulatory setting. In the discussion, I considered which principles may be applicable for other AEC or urgent care settings.

6.2.2g Confirmability and Dependability

Confirmability and dependability are discussed together as the audit strategies used to manage trustworthiness often overlapped. As the systematic treatment of the data using framework analysis was described earlier, here I demonstrate how the data products developed during the analytic process to show confirmability and dependability. The aim of assessing confirmability was to evaluate the extent that the data and inferences are grounded in the data (Lincoln, 1992). Appraisal of confirmability relied on whether the a) findings were grounded in data b) inferences logical c) the utility of the themes d) the use of negative cases to challenge the interpretation (Lincoln and Guba, 1985). Dependability assessments considered the appropriateness of the study conduct and data analysis to support the research assertions and included inquirer positionality, sampling strategy and contextual validity.

Lincoln and Guba (1985) recommend the use of the Halpern Audit to assess confirmability and dependability, reviewing the data analysis from raw data to analysis products. This process usually involves an outside auditor and systematic assessment of the theme development, unfortunately was not within the scope of this project. However, the audit trial used in this thesis is provided here. This was developed with involvement from the supervision team and demonstrates the development of the findings via the a priori concepts in the literature, the

analytic codes, the analysis frameworks used, data charting and mapping and final conceptual framework (Table 26). A further table linking the research aims and objective with the methods through to the findings is shown below (Table 27and Table 28).

Table 26 Audit to demonstrate development of the findings

Objectives	Literature	A priori themes	Topic guide	Codes	New themes	Analytic framework	Findings
Clinical Decision-Making in AEC	Types of clinical uncertainty: internal (cognitive, emotional and personal), external (technical, scientific and practical) and interpretive (conceptual, ethical and relational) **(8)**	Uncertainty in diagnosis, management and prognostic decisions	*Can you describe the key decisions that you felt that you made for the care of that patient? Can you tell me about the key stages in the decision-making processes for this case?*	Index Case Key decision tasks Team Decision Making Patient involvement Heuristics Fast/Slow Decisions Using 'gut' Changes to plan Challenges in decision making	Interruptions Team based decisions: Responsibility for team Team wellbeing & emotions Predicting course of illness	Cognitive Task Analysis of Index Cases (Critical Decision Method)	Clinical Decision Making is complex, negotiated, and distributed social interaction between the doctor, patient, family and team **(4.2.4 & 5.2))**
Ambulatory environment	Environmental factors contribute to cognitive load **(2)**	Environment described in fieldnotes	*How do you manage when you are unsure?*	Environment Suitability for ambulatory care Complexity and acuity Guidelines Uncertainty	Boundaries of AEC: Wider hospital interaction Primary care interaction Interruptions Quality of Care The 'Day Before' Technology	Within and Across Case Analysis of the sites Process Tracing	Clinicians demonstrate variation in uncertainty thresholds and alter their behaviour under cognitive pressures **(4.1)**
The characteristics of AEC Clinicians	Clinical behaviours may be altered under cognitive load (**2)**	Previous Experience GP, Consultant or Coordinator	*What are the differences in working in AEC compared to your usual role?*	Senior clinical Management Triage Supervisor Teaching Coordinator Management Difference with usual role	Roles worked Anxiety (pt, relatives, drs, MDT) Tired/Hungry/Frustrated Development of AEC care	Within and Across Case Analysis of the participants Analytic induction	Clinical Decision Making in AEC is modified by: 1. Diversity of background 2. Cognitive flexibility 3. Contextual awareness **(4&5)**

6.2.2h Reflexivity

Researcher reflexivity was maintained by three main methods; the use of a reflective diary, member checking and supervision meetings. A reflective diary was useful for data analysis and reflection. I often noted cognitively useful memos about the data or themes. It also was used to map out ideas and relationships in the data. For reflection, the diary provided a place to record thoughts and emotions triggered by the data. Notebooks were regularly reviewed and indexed to aid recall of the research process and the development of key themes. Regular supervision meetings allowed the team to reflect on the data, findings and interpretation. The team had clinical and methodological expertise which allowed debate on the significance of the findings and interpretation which maintained trustworthiness.

6.2.3 Limitations of this ethnography

Despite a careful attention to trustworthiness, there are limitations to this ethnographic study. Firstly, the study design precluded the involvement of the patient and MDT and their direct voices are infrequently heard in this thesis. However, I did observe their interactions with the senior AEC clinician and from this gained the understanding that decision-making was a negotiated social interaction. This thesis does show that patients and the MDT had a key role individual tailoring of their care. Further research should investigate ambulatory care from the perspectives of patients, relatives, MDT members and key stakeholders in the healthcare system. Booker (2019) provides an useful methodological example of an ethnographic study that investigated the patient and clinician roles in ambulance callouts.

As discussed in the section on transferability, this study was situated in a time and place. The specificity of time and place was useful to understand the thinking processes of the clinicians in the three AEC sites chosen, these boundaries were useful to gain the depth of data. This provides some challenges for transferability; however, I think the themes uncovered of cognitive flexibility, individual tailoring of healthcare and negotiation of care plans have useful applications in other settings where clinical uncertainty and complexity are seen. In the

discussion I have made suggestions of general principles that could be applicable to other urgent care settings (5.1.1e) and the implications for practice and policy are discussed later (7). This case study was designed to understand a critical example of how clinicians work with uncertainty and as such provides insights into how clinicians work under pressure and in conditions of cognitive load.

As discussed in 6.2.2, an external Halpern audit was not used in this ethnography due to the lack of scope and funding for this. However, I conducted an internal audit to demonstrate how the findings were developed from the data (Table 26). In addition, I display in Table 27 and Table 28 how the research findings link to the original research question, building from initial themes in the data collection through the analytic process. This provides a robust account of how I constructed a new understanding of the work of AEC.

Table 27 Linking Research Question 1 to the Findings

Research Question 1	Objectives	Expected Outcome	Data Collection	Analysis Method	Findings
To understand how clinicians working in ambulatory care settings make clinical decisions	What types of clinical decision-making processes are observed in practice?	To describe the clinical decision processes used in ambulatory care	Participant-observation from patient-clinician interaction	Cognitive Task Analysis of the Index Case (3.5.5)	Clinical Decision-Making in AEC is a Complex, Negotiated Social Interaction (4.2 and 5.2)
		To explain when and how different techniques may be used in practice	Direct observation of ambulatory context & description of environment	Across Case Analysis of Site Fieldnotes (3.5.2) Framework analysis of uncertainty (3.5.1 & 8)	Decision-making in AEC is affected by clinical uncertainty, cognitive load and patient priorities (4.1 & 4.2)
	What information is used by clinicians to make decisions & how is this information critically evaluated?	To define a typical data set of clinical information used by clinicians working in ambulatory care	Participant-observation of types of information collected by clinician	Within and Across Case Analysis of Site Fieldnotes and Interview data (3.5.2)	AEC clinicians use information about patient preferences, health system capacity and their clinical assessment (4.2)
		To describe how clinicians critically evaluate the information sources and use this information to base their decisions	Focused interview with clinician to reflect on cases seen	Within and Across Case Analysis of Site Fieldnotes and Interview data (3.5.2)	AEC clinicians think reflectively about their practice and have developed a local community of AEC practice (4.1)
	What communication do we see between clinician, patient, carer, and clinical team and how does this affect clinical decision making?	To describe how communication between patients, carers, clinicians and clinical teams and any effect observed in the clinical decision making	Observational data recording communication and information exchange between the parties involved in decision making	Within and Across Case Analysis of Site Fieldnotes and Interview data (Chapter 3.5.1) Process tracing and sociograms (Chapter 3.5.3)	The AEC consultation involves the patient, their families, the AEC doctor, the AEC team and other healthcare professionals in team based decision-making (4.2 and 5.1)

Table 28 Linking Research Question 2 to the Findings

Research Questions 2	Objectives	Expected Outcomes	Data Collection	Analysis Methods	Findings
To understand how the ambulatory care setting affects how clinicians make clinical decisions	How does the ambulatory environment affect decision making processes?	To define a detailed description of the ambulatory care environment	**Observational data** on the ambulatory setting. Descriptions of the environmental factors including the physical environment, resource availability, benefits/limitations of non-bed based care and external pressures	Across Case Analysis of Site Fieldnotes (3.5.2) Framework analysis of uncertainty (Chapter 3.5.1 & 8)	Description of the environmental factors in the AEC environment (4.1)
		To record any perceived differences in clinical care in the ambulatory environment and describe impact on clinical care (observed by researcher or expressed by clinicians)	**Interview data** from clinicians describing similarities and differences of ambulatory care with usual care (primary or secondary healthcare) and whether any perceived difference in clinical practice	Within and Across Case Analysis of Site Fieldnotes and Interview data (Chapter 3.5.2)	Environmental pressures in AEC contribute to cognitive load and alter clinical behaviours (4.1)

6.3 Researcher reflexivity & positionality

6.3.1 Researcher Positionality

The researcher has been described as the "*research instrument*" in qualitative research (Patton, 2002)[50]. This is relevant in constructionist context where I was an active participant in developing the knowledge presented in this thesis. Here I outline my positionality and values framework including background and identity, interests and motivation, expectations and assumptions that have in term shaped the constructionist process of analysis. The aim of sharing these details is to demonstrate credibility by showing how and where positionality of the researcher affects the research. Reflexivity and positionality are key principles of ethnographic work (Creswell and Miller, 2000). As this is was constructionist study, the findings were co-constructed based on the

[50] Page 3 and 700

values framework of both the researcher and the participants. This section aims to demonstrate how the positionality at the time of study conception whereas the 6.4 reviews the development of my development as a researcher over the course of the study.

6.3.2 Background & Identity

The personal characteristics of the researcher can affect the conduct of the research; these include age, race, gender and identity (Hammersley and Atkinson, 2019. I am an academic GP in my thirties, female and mixed race. In terms of career trajectory, I am typical of the recent generation of doctors who qualified after the MMC review of medical education. I finished my medical degree in my mid-twenties and spent two years as a foundation year trainee doctor, then three years of General Practice training. Atypically from my peers, I entered academia already having qualified as a GP, rather than during my training.

I often found my experience level to be perceived differently by colleagues. Clinically, I was more experienced than my doctoral peer group, having attained my status as an independent practitioner. In contrast, academically I was relatively inexperienced, particularly as a principle investigator. However, due to my clinical experience I suspect I had more confidence, than I would have had as a younger doctoral candidate, due to the responsibility that I had during my GP work. I was conscious of stepping between these different worlds and initially kept them separate by timetabling research and clinical activities on different days. However over time, like my research participants, these roles have "*blended*" over time [Rufus interview].

Some authors discussed how being female researchers in male-dominated environments they appeared conspicuous or felt discriminated against due to their gender (Hammersley and Atkinson, 2019). However as female GPs are now 50% of the workforce, I did not expect to have these difficulties (Jefferson et al., 2015). My age was often commented on my patients, but with participants I considered a colleague, despite any age difference, as I was a qualified GP. The only place that my gender and age attracted attention was during academic presentations with both positive and negative experiences.

I grew up as mixed race in the 1980-90s in the UK and I was conscious having an outsider status, which I viewed as advantageous. Some of my summer holidays were spent in a small village in Borneo, Malaysia, which contrasted greatly with school terms in a town on the North Yorkshire Coast. I was used to different expectations of culture and behaviour in both places and have always felt that being flexible and adapting to place has been an advantage. Interestingly ethnographic texts have been written about my mother's Bidayuh people (Geddes, 1957) and I have been aware of consciously subverting the genre and being an "*native*" observing the strangeness in Western medical practice. I think that due to these perspectives, I was more sensitized to differences in culture, which was useful when undertaking ethnography.

6.3.3 Interests & Motivation

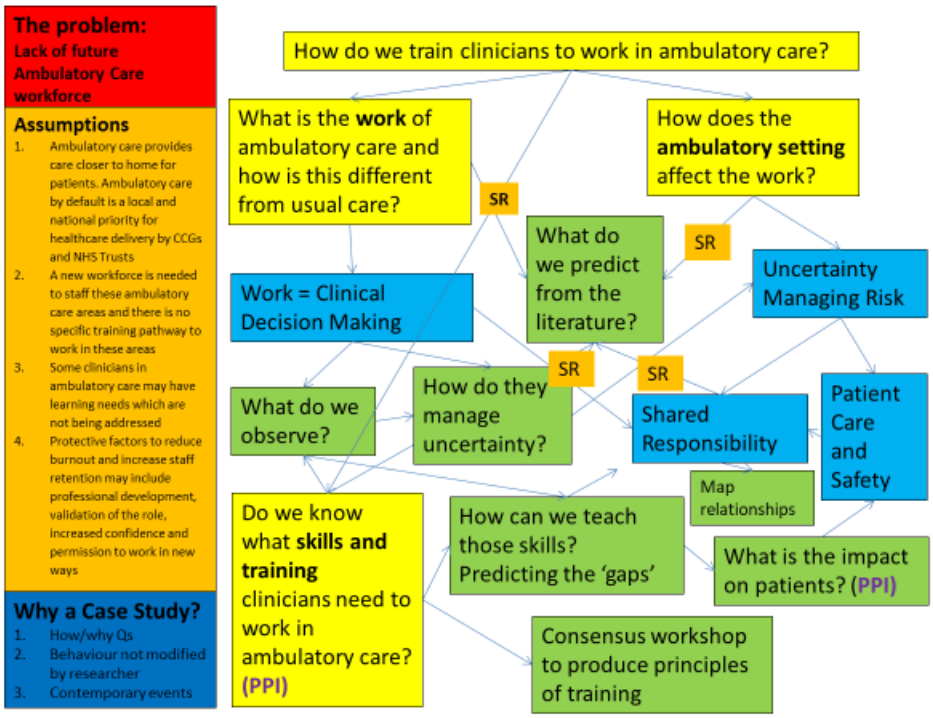
During my GP training I was motivated to develop a special interest in care of the older person. This was stimulated by a placement in ortho-geriatrics, where I could see first-hand how good multi-disciplinary care could reduce the impact of a hip fracture. Equally I noted where community factors had multiplied to render the person vulnerable to this type of injury. I gained a Diploma and then a Masters in Gerontology and sought out further clinical experience in ambulatory care settings. My interest in the problem of recruiting and training doctors in ambulatory care is both personal and professional. I remembered the challenge of gaining experience via an apprenticeship model and wondered whether trainees might benefit from more explicit guidance on their working practices. I felt that the benefits of a qualitative ethnographic study were that I could observe real-life clinical practice in-situ in enough depth to understand how this differed from usual care.

6.3.4 Expectations & Assumptions

During my master's degree, I had concentrated on quantitative methods in healthcare research, but after completed a course in qualitative interviewing I felt that these methods were more aligned to my research question. I then gained a further methodological expertise in Qualitative Methods during a post graduate course in Oxford. I hoped that my communication skills from

General Practice would aid this and that my holistic view of patient care in the community would allow me to see and understand the ethnographic perspective. I successfully applied for NIHR CLAHRC (Oxford) funding for 40% FTE for 31 months to deliver this study. In reality, it has taken 5 years to complete with an additional 9 months of funding from the University of Southampton.

Figure 17 Initial Conceptual Map March 2016



At the start of the study I framed the problem in the clinical setting; needing a future workforce for ambulatory care (Figure 17). Assumptions from this were that;

1. Ambulatory care provided care closer to home for patients. Ambulatory care by default was a local and national priority for healthcare delivery by CCGs and NHS Trusts
2. A new workforce was needed to staff these ambulatory care areas and there was no specific training pathway to work in these areas
3. Some clinicians in ambulatory care may have had learning needs that were not being addressed

4. Protective factors to reduce burnout and increase staff retention may include professional development, validation of the role, increased confidence and permission to work in new ways

I then divided the questions into their constituent parts considering the work of AEC, the setting and what factors might affect the work. Initial themes included uncertainty, shared responsibility, decision-making work and patient safety. I discussed earlier how those themes then developed over the course of the study.

6.3.5 The Impact of the researcher on the research: Managing potential inquirer bias

Reflecting on my identity, values and assumptions, I felt this impacted the research in two main ways; the values framework and the interaction between participant and researcher. One of the central aspects of my values framework is that everyday clinical work is often overlooked with efforts often concentrating on rare, abnormal or difficult cases.

> *"We must acknowledge that clinicians doing complex everyday work get things right far more than they get them wrong. We focus on the 10% of adverse events while mostly overlooking the 90% of care that has no harm."* (Braithwaite, 2018)

During my academic training, the gateway into research was through a quality improvement fellowship and these principles are now ingrained. Combined with my clinical interest in older adults, I was motivated to understand how we can improve community healthcare pathways and provision for this group. I felt this could be done by examining our clinical practice, and the limitations and uncertainty in practice. This study incorporated those values by exploring AEC decision-making in situ, concentrating on everyday clinical cases.

Authors have talked about "*bracketing off*" their personal experiences when researching (Chew-Graham et al., 2002), however I felt that a better description of this was to work as a culturally and clinically informed ethnographer, able to reflect upon the differences in practice (Ziebland et al., 2013). In addition, as a clinical environment I felt that my experience would be beneficial

in several ways. Firstly, I was already sensitised the environment, which could be challenging to non-clinical ethnographer due to the technical language and clinical procedures. Secondly, my insider status allowed conversations at a depth that might not be possible without some medical knowledge. Other medically trained qualitative researchers felt they obtained richer, personalised accounts of the participant's lifeworld when they recognised a researcher as a fellow colleague (Chew-Graham et al., 2002). Thirdly as I had undergone a similar training to my participants, I felt this this helped my understanding of the medical care, processes and language used in the setting. Some have suggested that healthcare research can only done by healthcare professionals (Lawler, 1991) so they can draw on shared experiences. The danger of this approach is that researchers known to the field may find it more difficult to find the "*etic*" perspective (Green and Thorogood, 2018). I was vigilant for this effect, but felt whilst I had an "*emic*"' perspective, I could also draw on my identity as an outsider used to examining culture to see the strangeness in the AEC clinical environment.

The interaction between researcher and participant is key the constructionist approach to healthcare research. One of the challenges I faced was how to manage this relationship, given my familiarity to the AEC setting and some participants. I considered Gold's typology of researcher; observer, observer as participant, participant as observer and complete participant (Gold, 1958). I initially felt that due to my knowledge of the field, that participant-observer was the most appropriate role description. I discuss how the interaction with participants affected researcher-participant relationship in 6.4.

6.4 Impact of the research on the participants and researcher

Patton (2002)[51] described three ways in which the researcher can impact the findings of a study; potential inquirer bias (6.3.5), the effect of the researcher on the participants "*reactivity*" and

[51] Page 704

the changes seen in the investigator during the study "*reflexivity*". In this section I review the impact of the research on the participants and the researcher.

6.4.1 Reactivity and the impact on the participants

In this section I discuss the ethical and emotional considerations for participant reactivity in this ethnography. In the ethics section (3.7) I discussed the main concerns for ethical research practice and how I planned to mitigate this. Like clinical medicine, clinical research has ethical guidance to direct best practice. Whilst most of these considerations overlap, I did have to consider when my clinical judgement and research practice might cause conflict (3.7). This situation did not arise, but it did provoke some comments from the participants. It was challenging to explain my position of interested observer whilst outlining situations where I might have to act in the patient's interests. However, most understood why a section on the participant information sheet discussed professional integrity. There was one situation during the scoping visits where I used my professional judgement to not join a clinical emergency. I had seen that several members of the clinical team were already involved and as I was not the responsible clinician my presence could have caused confusion. In the methods textbooks I found little to guide the clinician, particularly when conducting qualitative research in an urgent care environment. I did not feel that participant-observer (Gold, 1958) explained my experience as I was not working alongside my colleagues providing medical care, nor was I observing with no direct experience of healthcare. The best description of my situation I found was that of "*negotiated interactive observation*" (Wind, 2008). Wind (2008) explains this means that she is there to witness and interact with participants "*being receptive to the experiences of the people studied and the on-going activities and events*". Importantly she recognised that her observations were only possible by negotiating status with the participants which then influenced the narrative. In this ethnography, I have tried to demonstrate how I constructed a greater understanding of clinical decision-making in AEC, by showing difference between the participants voices using direct quotes, the observation findings from my fieldnotes and my interpretation of the findings.

I was conscious of the emotional considerations when interacting with my participants. These meetings were often thought provoking for the participants. Most felt validated by having their experience recorded. The AEC clinicians said that I had captured the complexity of their workload "*it's what it feels like"* [Reflective diary]. For most, being observed was a memorable event. I noted this first after the scoping visits, as the fieldnotes were able to transport clinicians back to the observed clinical shift. Reuben was also able to recall the sights and sounds of the observed shift, despite being interviewed two months later.

Like Wind (2008), my participants were puzzled, anxious or pleased at my presence. During some observations I was conscious of participants deliberating acting in ways I wished them to see and validate what they thought was good practice. This participant reactivity was also noticed in some observation periods, where actions were consciously conducted away from the researcher, particularly if the situation had provoked strong emotions such as frustration or fear. I used my judgement as to whether these situations required documenting in the fieldnotes and discussed some of the challenging interactions with the supervisory team. However, these situations were rare, and, in most observations, I was allowed similar access to that of a medical student entering the field. The participants were used to having junior members of the team following them and asking questions and I felt a useful analogy for explaining my presence with the team, advising that I was there to learn from them.

I also noted during the participant checking meetings that some of the data provoked emotional reactions. The cognitive load data was particularly powerful for clinicians. Those who had participated in the study often reacted emotionally to seeing the data presented. Some clinicians were happy to self-identify as participants with their peers and grateful that I had shone a spotlight on their difficulties they faced. Some were visibly moved by seeing the diagrams of interactions between clinicians and felt they now understood why the work was challenging. Others faced with the same diagrams took a deep intake of breath, then relaxed during the discussion. In general, AEC clinicians who had not been participants had less visceral responses.

The findings also inspired personal reflection and clinical practice in the clinicians. AEC clinicians considered how to mitigate their load, and clinical managers thought how they could reduce this in an organisational manner. Much of the findings were felt to be reflective of AEC clinical practice but some differences of opinion did occur between different participant groups. The hospital-based participants felt that discharge from hospital was more challenging, and interestingly community members felt that hospital admission was more difficult, perhaps reflecting what was the normal clinical practice for each group.

After the feedback meetings I considered how to best feedback to participants, and concluded that thematic based presentations illustrated by quotes, would convey the principles without identifying single clinicians. Sharing the results with informants also provoked ideas for deeper analysis. In the feedback sessions I used diagrams to facilitate discussion with clinicians about their work practices. I felt they granted permission for clinicians to consider their cognitive load and workplaces. I also realised that I needed a deeper understanding of the decision-making processes to demonstrate how the cognitive load differed in AEC to other settings, which was facilitated by cognitive task analysis of the index cases.

The participants were reflexive about the nature of their work and often considered this very deeply; their personal clinical decisions were important to the AEC clinicians. They particularly valued knowing the outcome of their patient assessments, as AEC is a relatively new area of medicine. At the end of the interview, the participants usually said one of three things;

1. I've never been asked that before
2. How did I do, could I have some feedback?
3. What do you do? [Reflective diary 15/5/18]

The first comment suggested to me that the participants found the act of reflecting with a researcher on their practice a novel experience. They often felt they had learnt something about their own practice in the process of being observed. I reflected that often as doctors gain seniority the opportunities for observed practice or peer review are reduced. The second

comment reminded me that despite my assurances, participants were concerned about my judgement on their practice. The third comment suggested that I had some insider knowledge or expertise that the participant was also keen to learn from.

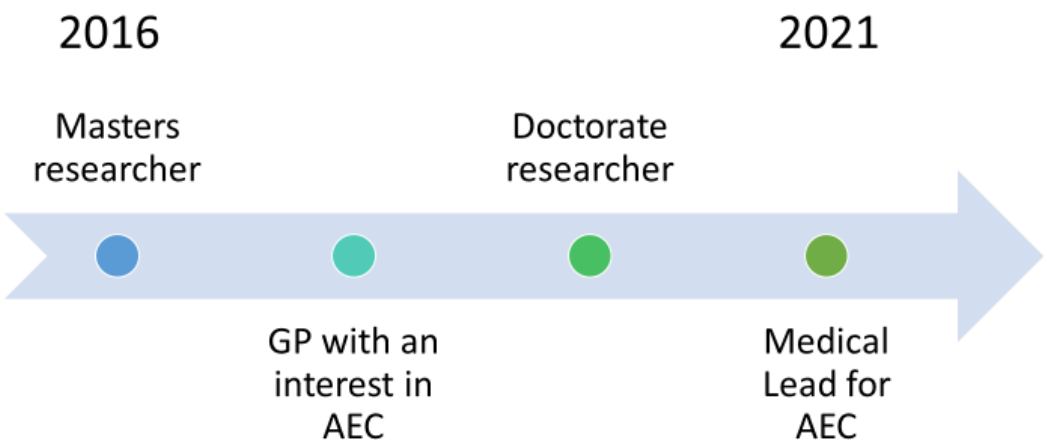
In summary the research impacted on the participant by allowing self-reflection but could provoke strong emotions. As a researcher I used my judgement when managing the ethical and emotional impact on the participants. The participants interest in the research process also facilitated a co-constructed approach to theme development prompting deeper analysis. This process has been described as "*intentional transformation*" where data developed as the researcher's consciousness changed in response to the study (Brody, 1981).

6.4.2 Impact of the research on the researcher

It is well known that participating in research often affects the investigator (Patton, 2002)[52]. I found it useful to keep a reflective diary alongside my fieldnotes to track my thoughts and feelings during the research process. During the production of this ethnography I felt I developed along two parallel journeys, developing expertise and leadership in both AEC and research (Figure 18).

[52] Page 705

Figure 18 Parallel journeys for the researcher



6.4.2a Early career researcher to Doctoral candidate

During the ethnography I have developed from an early career researcher to a doctoral candidate. This process has been gradual over time and hard to track. I found during my methodological training in qualitative research that I had an affinity with the methodology that I noticed other colleagues on the course struggled with, particularly if they had a positivist background in research. However due to my familiarity with seeing different behaviours in different contexts, I found the possibility of capturing variation in experience and understanding the influence of positionality captured my interests. As a clinician, I was always interested in patient stories and found it easier to remember cases once I had found a unique fact about each individual under my care. This again was useful to help construct participant summaries, once I had found a quote which summarized their viewpoint (4.1 Table 19). The main learning from this process has been how to critically approach problem solving by asking questions and obtaining data. This has been a useful transferable skill for both my clinical and management roles.

The research experience has also facilitated a role in my clinical world, as I am now a Clinical Research Lead. This capacity building for research was one of the key aspects of the application to NIHR CLAHRC and the doctoral process provided me with time and space to develop the skills required. Early in the application process I found that the staff and patients in the Community Trust were under-represented in healthcare research locally and considered how I could improve this. Due to the doctorate experience I have been able to write a local strategy which aims to increase access to research for particularly older adults and to increase staff awareness and participation. The doctorate level training was helpful in developing the skills required to lead on Clinical Research in an NHS Foundation Trust. The introduction of this role has allowed participation in COVID research and lead to the establishment of a Community Research Group.

6.4.2b Learning to Lead in AEC

Between 2016 and 2021 I completed my 'First Five' years as a GP (RCGP, 2021). During the doctorate I was predominantly working as a salaried GP for 5 sessions per week with 4 sessions of research time. This was helpful during the fieldwork where I found this provides some analytic distance from the AEC clinical environment. However, once I was in the analysis and write up phase I was increasingly drawn to return to working in Ambulatory Care. In the final year of the doctorate, an opportunity to work as Medical Lead for Ambulatory Care was advertised. I applied and was lucky enough to be offered this post as a job share with a colleague. I took up this post in early 2020 just as the COVID-19 pandemic started (6.5).

This ethnography helped my transition from early career GP with a special interest in AEC to AEC Medical Lead. I would describe this transition as like that of the journey from apprentice to craftsman. In his seminal work on craftsmanship, Sennett (2009)[53] discusses the craftsman's desire to do quality-driven work and the abilities needed to perform this work. The abilities needed to attain expertise are described as localisation, questioning and opening up (Sennett,

[53] Chapters 9 & 10

2009)[54]. This is similar to my thinking processes during this thesis, where I localized the problem; the lack of training to work in AEC. I then questioned how I might understand the work performed in AEC, choosing ethonography, and finally have sought to understand the work in the context of what was already known. This process has allowed me to consider my vocation and ultimately lead to me changing to work in AEC.

This has sometimes been described in the ethnographic literature as "*going native*" particularly when associated with over rapport and changes to the character of the research (Hammersley and Atkinson, 2019)[55]. I think this definition is now problematic due to the discussions about race relations and colonial past currently in the news. The implication in early ethnographies was that the "*others*" being studied were non Western cultures (Prasad, 2005)[56]. However, ethnographers are increasingly recognizing that the "*moral ambiguity and political complicity associated with ethnography has grown ever more obvious and problematic in the shrinking and increasingly inter-connected postcolonial world*" (Van Maanen, 1995). In response to this ethnographers have increasingly reported on their positionality (Prasad, 2005)[57]. For example, when working as a biracial ethnographer working with teenagers in multi-ethic, multilingual classrooms, Malsbury (2014) described her positionality and how she was motivated to understand how these youths came to understand how they developed their community. Usefully one of her participants explained how as they came to understand the language, they started "*learning other cultures*" (Malsbary, 2014). I have found this description are more useful explanation for the personal development I gained from researching AEC, as I felt during the fieldwork that I had an apprenticeship in AEC. However, the academic aspect of the doctorate provided time and space to question, analyse and interpret to learn from this AEC culture.

The other criticism with "*going native*" is that researchers lose the critical distance required for analysis and fail to notice taken for granted practices (Hammersley and Atkinson, 2019, Prasad,

[54] Page 277
[55] Page 91&92
[56] Page 84
[57] Page 99

2005). De Jong *et al* (2013) discuss how constantly contrasting involvement and detachment actually inspired analysis and how role switching during fieldwork offered deeper perspectives on the participant's lives. The use of role switching was useful to me as a researcher as I contrasted my clinical work as a GP, with the academic role and the fieldwork of AEC. I think this cognitive flexibility provided some protection against inquirer bias (6.4.1) and allowed me to maintain a "*habitus of surprise*" (de Jong et al., 2013) when analyzing this ethnography. In addition, I think the research question and my motivation to research this area have maintained the clarity of purpose in conducting this research. Personally I learnt from the participants was that I wished to work in AEC, but this thesis has enabled a greater understanding of what this work involved.

As I have been completing the write-up of this thesis, I have been mentoring GP trainees and training experienced GPs transferring to Ambulatory Care. I have encouraged the trainees to learn how to perform a holistic MDT assessment and to consider how they might work with the Primary Care team to do this. The experienced GPs have gained a greater understanding of the Community pathways, increasing their contextual adroitness. They also valued working with the MDT and the dynamic nature of the decision-making in AEC. The research has impacted on how I recruit, train and retain clinicians to work in AEC. During the recruitment process I consider the diversity of training and how clinicians can demonstrate how they manage to work with uncertainty. During the training, the key attributes and skills have been incorporated into competency documents to allow new starters to track their progress. Finally, my colleagues and I have started a local community of practice to support senior clinicians with their development.

The themes discussed in Chapter 5 have also had personal significance at times. I was always aware of my diversity of background; however, the thesis has highlighted how I have been sensitized to notice the differences between cultures. During the ethnography I have been conscious of using this analytic tool more consciously to contrast the familiar and the strange. I also had some personal challenges during the process of producing this ethnography and the

literature of cognitive load and medical uncertainty were useful to help me adapt to the new circumstances. In a section from my reflective diary from 2019, I considered what I had learnt from the literature.

> "*Different aspects of the literature have correlated with my own personal development over the course of this project. NB, I have often needed discussion with others to help me understand this.*
>
> - *Medical uncertainty recently has chimed with my own need for certainty…The equipoise in the situation and reliance on negotiation/discussion/strategizing to resolve the situation has similarities with how the clinicians manage uncertainty.*
> - *The cognitive load literature was developed at a time when I was returning to work after a period of illness…I felt the effects (of cognitive load) on my own cognitive processing as an inability to write or concentrate on my research which required higher order thinking.*
> - *Decision-making analysis was only able to start once I had made some clear decisions on the choices I had in my personal life"* [Reflective diary 12.8.19]

The period of this ethnography has allowed a great deal of personal development and I feel that the reflexivity required for qualitative research accelerates this process. Thinking about the changes during this 5 year period, I am struck by how I had to flexibly adapt to new situations and unanticipated challenges. This is discussed using a critical example in 6.5.

6.5 The impact of the COVID-19 pandemic

As discussed in 6.4 in 2020 as I was completing the final stages of writing up this ethnography I started work as Medical Lead for Ambulatory Care. This coincided with global pandemic of COVID-19. This had a profound effect on my life, both clinically, academically and personally. It has also affected the wide AEC Community with services changing in response to the pandemic (NHS, 2020). AEC services were often disrupted by reduced capacity due to staff redeployment

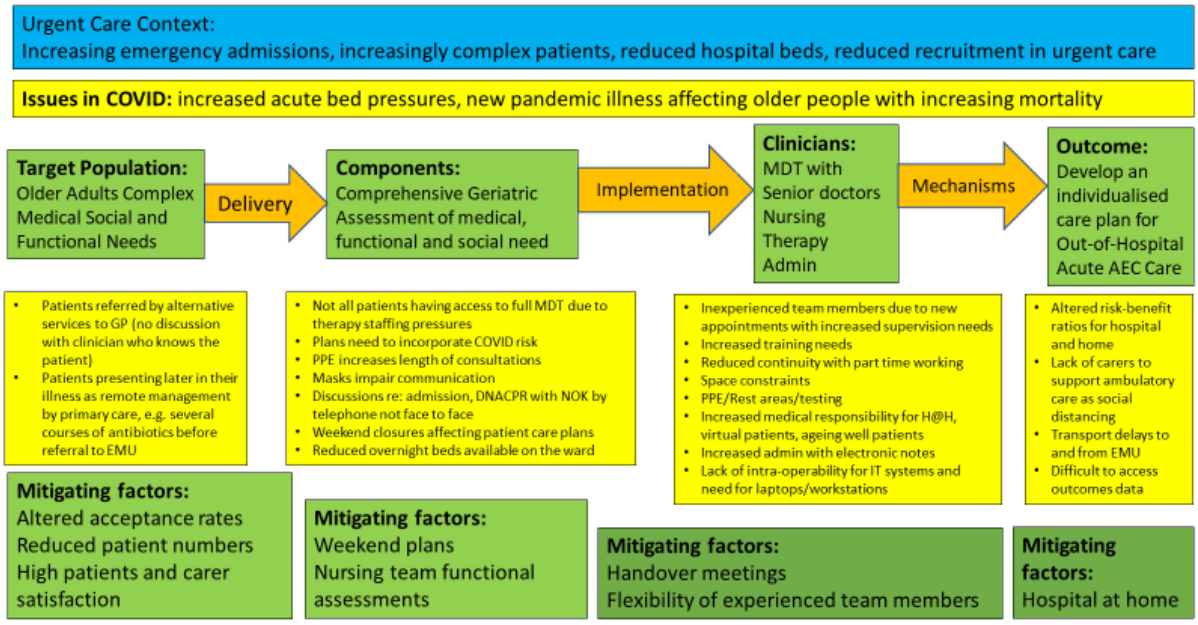
and social distancing measures (NHS, 2020). Patient numbers initially decreased and then recovered as lockdowns were eased (NHS, 2020). In some regions, COVID-19 was the impetus for increased medical cover and alterations in how services were provided (NHS, 2020). Examples of good practice in Emergency Care discussed by the NHS Benchmarking team included altering workforce roles, improved communication and flexibility in teamworking (NHS, 2020).

I used the AEC Complex Intervention framework developed in this thesis to understand what had changed in AEC locally during the pandemic (Figure 19). The context for AEC changed as there were increased pressures on acute hospital beds and a new illness which had a high mortality for older people. Although the components of the complex intervention were unchanged, their delivery was greatly affected. Triage was altered as patients were not being seen by clinicians who knew them and often presented later in their illness, making assessment of disease severity much harder. This was mitigated by altered acceptance rates, overall reduced patient numbers and high satisfaction levels from patients and carers. The Comprehensive Geriatric assessment was more challenging to perform due to staffing shortages across the MDT, the need for PPE and alterations in resource availability. The clinicians were affected by staff redeployment and large numbers of new staff members with relative inexperience in AEC. These factors were mitigated by the flexibility of the MDT and experienced clinicians. The outcome of the AEC CI was changed as fewer family carers were available due to social distancing and the presence of the pandemic altering the risk-benefit ratio of being in hospital, however the hospital at home teams were able to assist treating patients at home.

The framework (Figure 19) allowed me to map out and understand the impact of the pandemic, which was useful to demonstrate to colleagues, managers and service commissioners the impact of COVID-19 on AEC. It has also highlighted to me why alternatives to acute hospital services are needed for older patients. Academically, one impact of COVID-19 on the research was to lengthen the duration of the write-up period but I also think the period of reflection helped me

understand the wide implications of my thesis. In the final chapter I discuss the implications of this ethnography for clinical practice, policy and further research (7).

Figure 19 Changes in the AEC Complex Intervention during the COVID 19 pandemic



Chapter 7: Translation to Practice: Implications for clinical education, practice, policy and research

7.1 Complex negotiated distributed team-based decision-making in AEC

In summary, the work of AEC is complex negotiated distributed team-based decision-making to deliver an individually tailored care plan for patients with urgent healthcare needs suitable for out-of-hospital management. Key decision-making components included triage, diagnostic, management and prognostic decisions. Variation in the delivery of these components was achieved through negotiation and individual tailoring. The participating AEC clinicians had diverse training backgrounds and were boundary spanning individuals with cognitive flexibility and contextual adroitness. These clinicians mitigated the cognitive load of working in urgent care settings by altering their tasks, referral thresholds and clinical behaviours. Effective team working was enhanced by team reflexivity. Team based decision-making was required to manage the complexity and uncertainty of working in the AEC environment. This study of AEC clinicians was particularly needed to understand which decisions and tasks are involved in this new area of medicine. It also provides a critical example to understand how complexity, negotiation and teamwork affect clinicians working in environments with high clinical uncertainty and cognitive load thereby answering a gap in the literature. In this chapter I discuss how the findings of this thesis could influence clinical education, practice, healthcare policy and research.

7.2 Implications for Clinical Education, Practice, Policy and Research

7.2.1 Implications for Clinical Education

As discussed in 1.3.2, currently no specific training scheme is available for clinicians wishing to work in ambulatory care. The AEC clinicians had varied background training and diversity of experience was felt to be a strength that allowed clinicians to work at the interface of primary and secondary care (5.1.1a). However, for the future development of AEC as a specialty, a more

explicit training schedule rather than the current apprenticeship model is likely to be required. Medical educationalists have considered what ED training clinicians needed and felt that current teaching methods provided insufficient training to manage emergency situations (McCarthy et al., 2016, Kuhn, 2002, Croskerry and Sinclair, 2001). Studies have recommended education strategies that focus on deliberate practice and timely feedback to manage cognitive load (Kuhn, 2002, McCarthy et al., 2016), as it is known that "*acquisition of expert performance requires engagement in deliberate practice and that continued deliberate practice is necessary for maintenance of many types of professional performance*" (Ericsson, 2004).

Graber et al. (2012) reviewed the literature on education interventions to reduce diagnostic error and concluded that three types of interventions were currently in use: firstly those which improved knowledge and experience such as simulation training, secondly interventions to improve decision-making including reflective practice and thirdly cognition support tools such as electronic decision-support tools (Graber et al., 2012). Unfortunately, due to heterogeneity of the interventions and quality of evaluation, the educational outcomes of training were not well understood (Graber et al., 2012). This thesis has distilled some of the principles of AEC decision making, including the constant and variable components of AEC decision-making and further evaluation would determine the educational utility of training in these principles.

In addition, this thesis has identified cognitive flexibility and contextual adroitness as key attributes of AEC clinicians, allowing them to respond to clinical uncertainty. Training for uncertainty was explored in a 2015 study of the Fire Service with an evaluation of a brief goal orientated training intervention for operational commanders (Cohen-Hatton and Honey, 2015). The simulation training involved evaluating goals (why am I doing this?), anticipated consequences (what do I expect to happen), and risk-benefit analyses (are the benefits worth the risks) once a potential course of action has been identified. Fire commanders who participated in goal-oriented training were more likely to develop explicit plans and show anticipatory situational awareness than those who had not. Similar interventions could be tested

using AEC scenarios based around the suitability for AEC criteria discussed in prognostic decision making (4.2.2d). AEC simulation training could involve consideration of the goals of AEC for this patient, how the patient might manage at home during this illness (including consideration of the alternatives to AEC) and the potential risks and mitigations required for this patient.

This ethnography highlighted that negotiated decision-making was a fundamental part of every AEC consultation (5.2.1). Given that much of the research into communication in medical consultations has concentrated on the patient-doctor relationship (Atkinson, 1995), further research is needed into negotiated team-based decision making and how clinicians incorporate the views of patients, families, carers, the MDT and other associated HCPs to produce individually tailored AEC care plans. Further training on negotiating clinical plans with multiple actors is likely to benefit patients with complex health needs by concentrating on patient priorities (Coulter and Collins, 2011). Additional research is needed into whether negotiated distributed decision-making occurs in other urgent care areas with high levels of clinical uncertainty (5.2.1).

7.2.2 Implications for Clinical Practice

Based on the data from this ethnography (4.1.2) and review of the literature (2.4), I also offer some advice on how clinicians may improve their mental workload and reduce cognitive load using Sweller's (1988) model of cognitive load for learners (2.1). Here I consider how to mitigate the intrinsic, extrinsic and germane causes of cognitive load. At the intrinsic level, clinicians need to be alerted to the limitations to their cognitive capacity. Most clinicians are unaware how working in emergency situations can affect their cognition (Kuhn, 2002, Croskerry and Sinclair, 2001) and this thesis demonstrated how the increased cognitive workload could affect clinical behaviours. Clinicians need to review work shift patterns and consider how to protect thinking time at work.

It is also well known that urgent care environments are often busy, overcrowded and noisy places (Croskerry and Sinclair, 2001). The literature on cognitive load demonstrated how these

environments could alter clinical outcomes by changing clinical behaviours, task completion and increasing the risk of error (2.4). This ethnography also extended our understanding by investigating how the AEC physical environment often increased cognitive load due to physical factors (4.1.2f). Effective management of space and patient flow by the coordinator could mitigate the fear, forgetting and frustration experienced by clinicians working under cognitive load (4.1.3e).

However, instead of viewing these attributes of the urgent care environment as fixed, I suggest that re-designing workplaces and workflows could improve cognitive load. One 2013 example used ethnography and healthcare design principles to consider how they could improve the patient experience in the ED (Ku and Lupton, 2020)[58]. By redesigning signage and communication, the design team reduced aggressive behaviour by 50%, patient frustration at waiting by 75% and complaints about poor communication by 57%. At an organisational level, employers should consider the extrinsic factors that impact on the clinician. Cognitive task analysis (Crandall et al., 2006) and Health Design Thinking (Ku and Lupton, 2020)[59] techniques could be used to improve work patterns, encourage clinician designed workflows and enhance physical spaces for clinicians to think. This improved "*future hospital*" was imagined by Pickering et al. (2012) as "*organizations built around smart environments that facilitate consistent delivery of effective, equitable, and error-free care focused on patient-centered rather than provider-centered outcomes*".

Finally, reviewing the germane causes of cognitive load, the presentation of clinical information can also often affect decision-making (Laker, 2017). In recent years there has been a drive towards digital transformation in recent NHS England plans (NHS, 2019a) and improving electronic medical record systems could improve clinician cognitive load (2.4.3). However, the literature chapter highlighted examples where clinician's cognitive load increased with greater

[58] Case Study Page 176-179
[59] Page 58-119

administrative burdens after the introduction of EMR. Based on the systematic review presented in 2.4 and the ethnographic data, I recommend the following principles when evaluating the impact of EMR in the urgent and emergency care environment:

1. Understand the EMR workflow in urgent care before, during and after the introduction of an EMR system
2. Analyse and describe the clinical tasks that EMR will facilitate or replicate
3. Consider the ease of information retrieval
4. Consider emphasis framing for critical information
5. Consider how to measure the outcomes of EMR; cognitive load, efficiency time, quality or error rate
6. Consider the volume and duration trade-off for optimal information exchange
7. Consider the unintended consequences of EMR including change to documentation rate, patient contact, information load and team working

7.2.3 Implications for Healthcare Policy

In this section I consider the implications of this ethnography for the medical workforce and MDT, concentrating on future development in the UK NHS. The NHS and Health Education England (HEE) have held recent consultations on the "*Future Doctor*" and how the healthcare workforce will need to change in response to the challenges of an ageing population (HEE, 2020, HEE, 2017). HEE (2020) identified eight themes in a recent report, which are mapped against the key themes from this ethnography (Table 29).

Table 29 Implications for Future Doctor Programme

Theme from Future Doctor Programme (HEE, 2020)	Implications for policy from this ethnography
Patient-doctor partnership	AEC clinicians worked in partnership with patients, families and the MDT to make

	individually tailored clinical plans (4.2.3b) using negotiated decision-making (5.2.1)
The Extensivist and Generalist	AEC clinicians felt diversity of background training helped create a community of practice able to provide generalist care (4.1.1b)
Leadership, Followership and Team working	AEC senior clinicians demonstrated cognitive flexibility when leading their MDT including an understanding of alternative approaches, motivation to change and self-efficacy (5.1.1a)
The transformational MDT	AEC senior clinicians worked with their team to improve effectiveness, dealing with complexity and stress management (5.2.2)
Population Health and Sustainable Healthcare	AEC clinicians demonstrated contextual adroitness altering work tasks, referral thresholds, clinical behaviours and team working in response to the environment (5.1.1a)
Adoption of Technology	Advances in digital technologies need to be clinician designed to reduce cognitive load (2.4.3)
Work-Life Balance and Career Flexibility	Team based working with shared responsibility and mutual support helped AEC clinicians validate their decisions and

	provided emotional support for working in uncertainty (5.2.2)
Driving Research and Innovation	Training in research with dedicated time can help clinicians analyse problems within their health services and develop clinical leaders (6.4.2)

The AEC clinicians demonstrated negotiated decision-making with the patient, their kin and the MDT to allow modification and individual tailoring of the AEC plan. The ethnographic data also demonstrated that different types of decisions often required distinct approaches and level of involvement from clinicians, patients, relatives and team members, and acknowledging variation in their priorities. The skill of the AEC clinician is to understand when and which approach to decision-making may be appropriate to support individually tailored care planning (4.2.3a). This negotiated decision-making for individual tailoring is likely to be an essential skill for "*Future Doctors*" making complex decisions with clinical uncertainty.

AEC clinicians felt that diversity of background training helped create the AEC community of practice able to provide generalist care for complex older adults (4.1.1b). Further support for AEC communities of practice is likely to assist the development of AEC clinical practice in context (5.2.1a). Learning environments and communities of practice were not discussed in the "*Future Doctor*" report (HEE, 2020) but is likely to be required to develop and sustain doctors working in new ways. However, the planned school of generalism could incorporate this into their working aims. Further research must concentrate on how to foster diversity in training to produce "*boundary spanning*" individuals (Tushman and Scanlan, 1981) required for both AEC workforces and the "*Future Doctors Programme "* .

This thesis identified that the key attributes of the AEC doctors were cognitive flexibility, contextual awareness and diversity of background (5.1.1a). These characteristics helped AEC clinicians lead their MDTs in urgent care settings with where patient complexity, clinical uncertainty and cognitive stressors were part of the usual working environment. These skills of adapting to environmental challenges including an understanding of alternative approaches, motivation to change and self-efficacy should underpin leadership curricula for "*Future Doctors*". Training should also concentrate on clinicians understanding their local populations and healthcare communities.

AEC senior clinicians worked with their team to improve effectiveness, dealing with complexity and stress management (5.2.2). More work is needed to understand whether team-work training may reduce stress for senior doctors working in urgent care roles (5.2.2). In addition, further research is needed into team roles in urgent care MDTs and in particular the work of advanced clinical practitioners (ACPs) (Evans et al., 2020). The numbers of ACPs are increasing and further research is needed how these roles are supported in Primary and Community Care (Evans et al., 2020, Goldberg et al., 2016). Team based working with shared responsibility and mutual support also helped AEC clinicians validate their decisions and provided emotional support for working in uncertainty (5.2.2). This aspect of team working has the potential to reduce stress, improve wellbeing and increase staff retention (Flowerdew et al., 2012).

There have been rapid developments in technology but the need for more understanding of the uses and potential for digital technologies has been recognized by the NHS (NHS, 2019a). This thesis would recommend that any advances in digital technologies need to be clinician designed to reduce cognitive load (2.4.3).

Finally, as discussed in the personal reflections in 6.4.2 training in research with dedicated time can help clinicians analyse problems within their health services and develop clinical leaders (6.4.2). An emphasis on "*Every Doctor a Scientist and Scholar*" described by HEE (2020) should

help future education programmes to include both time and support for clinicians to undertake academic work.

7.2.4 Implications for Health Services Research

The ethnographic data presented in this thesis suggests two areas of urgent need for Health Services Research in AEC. Further investigations should concentrate on developing research methods to evaluate complex interventions in urgent and AEC care settings including ethnography. Secondly long terms outcomes data is needed to understand the impact of AEC on patient outcomes.

It is increasingly recognized that complex interventions that integrate primary and secondary care are needed to reduce hospital admissions for older adults (Philp et al., 2013). In keeping with other work by Hickman et al. (2015), this ethnography showed that individually tailored treatment by senior clinicians with negotiated decision-making were essential for multi-disciplinary complex interventions to improve health outcomes for older people (5.2.3). Therefore, evaluations of multi-component complex interventions require methods with flexibility to understand the relationships and influences within their context (Donaldson et al., 2021)[60].

This thesis demonstrated that it is possible to understand decision-making work using ethnography and cognitive task analysis to investigate in detail the multiple influences on clinicians when delivering a complex intervention. Other studies of decision-making using ethnography have also established the utility of understanding the experience of healthcare by considering the impact on patients and their networks of care. One such study showed that people in the patient's network may not consider themselves as carers, and terminology such as "*accompanying persons*" may reduce social shame when considering alternatives to hospital admission. Ethnographies of community rehabilitation centres demonstrate that SDM should be

[60] Chapter 27 page 375-392

viewed as "*aligning expectations*" rather than "*patient buy-in*". Further ethnographic research is needed to understand how clinicians, the MDT, patients and accompanying persons negotiate complex healthcare decisions together in urgent care. These studies are needed so that "*ethnographies of health answer a call to document what other resources cannot*" (Hansen et al., 2013).

The recent pandemic has exposed the need for alternatives for hospital admission for older people, however there is limited research into which patients benefit and their long term outcomes (Elias et al., 2021). A 2020 meta-review of community health and social care for older people: impact on hospital care demonstrated that there were only 4 systematic reviews of urgent care at the interface of primary and secondary care (Dawson et al., 2020). Dawson et al. (2020) concluded that there was positive evidence for discharge and transitional care to reduce hospital admissions, and interventions concentrating on supporting self-management, re-ablement and hospital at home services could benefit quality of life. This thesis recommends that further research in AEC concentrates on investigating:

1. Which patient groups benefit from ambulatory care (5.1.1c)
2. What is the impact of an individually tailored AEC care plan for patients (5.1.1d)?
3. What are the short, medium and long term patient outcomes following an AEC CI (5.1.1d)
4. How to improve prognostic decision-making for AEC patients (5.1.1c)

This study of AEC clinicians demonstrates the utility of understanding healthcare practices in context using the lens of the complex intervention. AEC clinicians perform multi-component decision-making stages, using "*cognitive flexibility*" and "*contextual adroitness*" to negotiate individually tailored care plans in the context of urgent care. Understanding these processes in more detail could inform clinical education, practice and policy by providing an example of the "*Future Doctors*" needed to work in the increasingly complex health service. Health services research has a role in evaluating which CIs work in particular contexts to provide a range of

effective interventions that target patient priorities. In conclusion, everyday clinicians make difficult decisions in healthcare; understanding what influences these decisions for the most vulnerable patients must remain a priority for healthcare research.

Appendix

A1 Cognitive Load in Urgent Care: Weight of Evidence Assessment

Cognitive Load in Urgent Care					Quality assessment			
Country	Author	Date	Article type	Methodology	Weight of Evidence A: Quality	Weight of Evidence B: Appropriate	Weight of Evidence C: Relevance	Weight of Evidence: Global
Canada	Crosskerry	2001	Review	Review	M	L	H	M
USA	Kuhn	2002	Literature review	Systematic literature review	M	H	H	H
Ireland	McCarthy	2016	Literature review	Literature review and research protocol	M	M	H	M
USA	Skaugset	2017	Literature review	Literature review	M	M	H	M
UK	Adams	2017	Research	Grounded Theory (interview & focus groups)	H	M	H	H
UK	Balla	2012	Research	Thematic analysis (interviews)	H	M	H	H
USA	Laxmisan	2006	Research	Ethnographic (interview & observation)	H	H	H	H
Australia	McRobert	2013	Research	Protocol analysis	H	H	H	H
USA	Park	2012	Research	Ethnographic (interview & observation)	H	H	M	H
Israel	Politi	2017	Research	Computational ethnography	H	H	M	H
Israel	Shachak	2009	Research	Ethnographic Cognitive Task analysis	H	H	M	H
Australia	Bishop	2015	Research	Participatory action research	H	H	M	H
USA	Agarwal	2013	Conference	Randomised Cross Over	L	L	M	L
USA	Barnett	2017	Conference	Cross sectional analysis retrospective	L	L	M	L
UK	Body	2014	Research	Cohort prospective	H	H	L	M
Netherlands	Gevers	2010	Research	Cross sectional Survey and regression analysis	M	M	M	M
Taiwan	Kuo	2012	Research	Computational walk through (experimental) and cognitive task analysis	L	L	M	L
USA	Laker	2017	Research	Case-control experiment PhD Dissertation	M	M	M	M
USA	Mohan	2014	Research	Evaluation of Serious Game (Case control)	M	M	M	M
Australia	Westbrook	2018	Research	Case Study Observation	H	M	H	H

A2 Cognitive Load in Urgent Care: Summary of Studies

Cognitive Strain in Urgent Care				Site	Summary	Cognitive Load Measure	Key Findings
Country	Author	Date	Methodology	Site	Description of Aims	Task analysis, Secondary task analysis, Experiential, Subjective, Objective, Error	Summary of key findings
Canada	Crosskerry	2001	Review	ED	To outline the sources of error in emergency medicine	Error	High decision density, cognitive load and diagnostic uncertainty lead to an error prone environment.
USA	Kuhn	2002	Systematic literature review	ED	To understand the cognitive processes that contribute to diagnostic error and suggest teaching strategies	Task analysis, Experiential, Error	Overview of the sources of diagnostic error and uncertainty in emergency medicine. Experiential learning to aid management of uncertainty
Ireland	McCarthy	2016	Literature review + research protocol	ED	To design training for emergency decision making	Error	Teaching Decision Making requires an understanding of the cognitive science, deliberate practice and proficiency based progression

USA	Skaugset	2017	Literature review	ED	ED multi-tasking	Task analysis	Overview of the sources of multi-tasking and task switching in emergency medicine. Recommendations include reducing external interuptions, teaching task switching skills and standardise departmental work flow where possible
UK	Adams	2017	Grounded Theory (interview & focus groups)	ED	To understand ED decision making by junior doctors; interview and focus groups	Subjective, Experiential	Three distinct phases in clinical reasoning; case framing, evolving reasoning and ongoing uncertainty. Intuitive and Analytical processing in parallel as predicted by dual cognition theory
UK	Balla	2012	Thematic analysis (interviews)	OOH GP	To understand OOH GP decision making; interview study	Subjective, Experiential	Clinical decision making in OOH GP dominated by rule out strategies for severe illness. Three main rules used to determine diagnostic closure; global wellness, patient needs and reliability of contigency planning

USA	Laxmisan	2006	Ethnographic (int & obs)	ED	To understand ED physicians decision making, interuptions and handover; Ethnographic study	Task analysis (time), Experiential, Objective and Subjective	Communication proces in the ED are complex and cognitively taxing for clinicians; multiple handovers and interruptions
Australia	McRobert	2013	Protocol analysis	ED	To compare of Experts and Novice Decision Making in ED; Simulated Scenarios with Observation	Task analysis (accuracy), Objective	Diagnostic accuracy improved with experience level. Skilled physicians less affected by missing contextual information
USA	Park	2012	Ethnographic (int & ob)	ED	To examine the effect of EMR on doctor's work practices in ED; Ethnographic study	Task analysis (time), Experiential, Objective and Subjective	Direct effects on work; altering worload, changing workfow, increased documentation time. Indirect effects; reduce patient contact, reduced interactions with ED team
Israel	Politi	2017	Computational ethnography	ED	To explore EMR use profiles in the ED; computational ethnography	Task analysis (intensity, time), Objective	4 Use profiles of EMR emerged, quick and basic, quick and deep, slow and basic and slow and deep. Identifies a trade-off between volume and duration of use

Israel	Shachak	2009	Ethnographic Cognitive Task analysis	GP	To understand the effect of EMR on doctor's work practices in General Practice; Ethnographic study	Task analysis (intensity), Experiential, Objective and Subjective, Error rate	EMR improved information recal, improved legibility, reduced physician perception of cognitive load, increased errors of automasticity, reduced patient contact
Australia	Bishop	2015	Participatory action research	ED	To compare Clinician Designed EMR to usual EMR; Participatory Action Research	Task analysis (intensity, time), Objective	Clinician designed EMR improved time efficiency and reduced cognitive load as measured by clicks compared to usual EMR
USA	Agarwal	2013	Randomised Cross Over	ED	To understand the difference in efficiency (time to completion) and cognitive load (NASA task load) of computerised prescriptions of symptom based vs drug classification vs free text searches; Randomised Cross-Over	Task analysis (time), Objective	Presentation of information by symptom was associated with reduced time and lower task load
USA	Barnett	2017	Cross sectional analysis retrospective	GP	To explore decision fatigue in primary care and the day of the week; retrospective observational cohort study	Secondary task analysis, objective	Reduction in time intensive tasks (smoking cessation) at the end of the week. Increased opiate prescribing for back pain or sedative prescribing at the end of the week

UK	Body	2014	Cohort prospective	ED	To evaluate of ED physician clinical gestalt, ECG and troponin testing of patients with Acute Myocardial Infarction; Prospective Cohort study	Secondary task analysis, objective	Clinical gestalt with high sensitivity troponin and ECG improves diagnostic accuracy
Netherlands	Gevers	2010	Cross sectional Survey + regression analysis	ED	To understand the associations betwee Job Demand and Job Strain; Cross sectional survey	Psychological, Subjective	High acute job demands impede teamwork behaviours. High acute job demands also result in job strain, particularly when combined with chronic emotional strain
Taiwan	Kuo	2012	Computational walk through (experimental) and cognitive task analysis	ED	To test 2 user interfaces for ED Patient monitors; before-after computational walkthrough	Task analysis (time), objective	Simple user interfaces reduced the operation time and error for all groups of clinicians
USA	Laker	2017	Case-control experiment PhD Dissertation	ED	To understand the effect of emphasis framing on ED physicians decision making; Case Control study	Task analysis (accuracy, time), objective	Emphasis framingsignificantly reduced the time to clinical decision in comparison to the control group
USA	Mohan	2014	Evaluation of Serious Game (Case control)	ED	To evaluate of a simulated trauma triage in ED using game technology; serious game evaluation	Task analysis (time, intensity), objective	When cognitive load was high, clinicians were more likely to transfer critical trauma patients. Cognitively loaded clinicians needed longer to assess cases than the controls

Australia	Westbrook	2018	Case Study Observation	ED	To investigate the association between interuptions, multi-tasking and working memory; Case Study Observation	Task analysis (intensity), Objective, Error	Interuptions were significantly associated with increased clinical errors

A3 Participant Data Summary Table

	Rhoda	Rosa	Ruby	Ruth	Ralph	Reggie	Reuben	Renata	Rowley	Rita	Rufus	Roger
Usual Role	GP	Coord	GP	GP	Cons	GP	Cons	Cons	Cons	Cons	Cons	Coord
Index Case Decision-Making												
Index Case	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Key decision tasks	DC	Abx LOC	Dx Rx	Abx	LOC Severity	Dx Rx	Dx LOC	Rx	Rx LOC	Dx Rx LOC	Dx LOC	LOC
Team Decision Making	Nurse OT MDT	MDT	MDT	GP MDT	GP Junior Dr MDT	Nurse MDT	MDT Hospital	MDT	GP MDT	Nurse Physio MDT	Hospital	MDT
Patient involvement	Patient Family	Patient Family	Patient	Patient	Patient	Patient	Patient Family	Patient	Patient Family	Patient	Patient Family	Patient Family
Heuristics Fast/Slow Decisions Using 'gut'	Gut	Fast Gut				Tests more when busy	Easy and hard decisions	Gut Anxiety	Easy	Initial triage "eyeballing"		Using MDT
Changes to plan	New info	Advice from hospital		Patient wishes		Patient wishes	Patient wishes	Family wishes	Patient wishes		Patient wishes	New info
Challenges in decision making	Vulnerability	Gaining experience in AEC	Supervision	Supervision	Supervision Cognitive load	Supervision	Supervision Interruptions	Lack of info Cognitive load	Interruptions Communication	Busy environment	Interpreting specialist advice	Communication
Roles worked												
Senior clinical	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Management		✓					✓	✓		✓		
Triage	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
Supervisor			✓		✓		✓	✓	✓	✓	✓	
Teaching			✓				✓			✓		
Coordinator		✓						✓				✓
Management		✓			✓		✓	✓		✓	✓	

Difference with usual role	Patient Complexity	Community versus hospital	Holistic care, emotion Independent working	Team emotions, time pressure, severity illness	Hierarchy	Gatekeeping Continuity	Community versus hospital	Multiple roles	Patient Complexity	Patient Acuity	Communication Independent working	Pathways of care
Ambulatory environment												
Environment	Busy, Open Plan	Pts prefer small/speed		Time day, resources including staff, busy	Busy, pace of work	resources, busy, team, hospital demands	location of care, move-move, busy, time of day	Busy, 1st day back, winter pressures	handover (day to day dr, nurse to dr), time of day	Calm day	Plenty of doctors, quieter	Avoiding 'pinch points', transport, time of day
Suitability AEC care?	Falls, safety net, severity	Ability Mx home, severity, safety net	Falls, ability mx home	Admission avoidance, condition based, severity, safety net	Safety net, severity, undifferentiated problems	severity, ability Mx home, *"not about numbers"*	*"part experience, part physiology, part patient conversation"* Predicting illness course	Older pts avoid HAH, young pts straightforward Rx. Not for people needing specialists or test not available community	Suitable if can walk to the toilet, cognition/ADLS	Who can we make the most impact for?	AEC as "glue" for hospital, no rigid definition	Experience, discussion with Senior Dr
Complexity & acuity	Vulnerability	Comorbidities, social issues	Medical and social vulnerability	Acute setting not appropriate for frail older, need MDT	Discusses uncertainty with patient, clinical anxiety		Admits complex or acute	Complexity work of geriatricians	Complexity work of geriatricians, time limiting factor	Acuity easier hospital, older frail harder to achieve	Handover and who's in charge at which time ?hospital/GP	
Guidelines	Developing own	Adapts existing	Creativity	Developing own, learned experience	Adapt and patient centred	Useful for inexperienced, depends how applied	Guidelines conservative and restrictive, use with clinical judgement and patient wishes	Geriatricians often work outside guidelines, individualised plans, few CDM	Conservative RCP AEC guidelines, patient safety & risk judgements	Helpful for novices and reduce variation, room for	Guidelines didactic, scores justify but don't direct decisions	Observes diff clinician "styles"

								clear cut		flexibility		
When unsure	Long vs short term plans	Ask for advice	Prioritising	Colleagues, documentation, experience			Depends why unsure, if patient unwell vs patient well/unclear diagnosis		Learning from colleagues, reflexive comparison	Learning from colleagues, specialists, d/w MDT		Discuss with senior doctor
New themes												
Interruptions	✓			✓	✓	✓		✓	✓	✓	✓	✓
Boundaries	✓						✓		✓	✓	✓	
Technology	✓			✓		✓		✓	✓			✓
Wider hospital interaction		✓					✓	✓	✓	✓	✓	✓
Quality of Care		✓	✓								✓	✓
Team wellbeing & emotions				✓	✓	✓					✓	
The 'Day Before'				✓						✓		
Responsibility for team					✓	✓	✓				✓	✓
Predicting course of illness							✓		✓		✓	
Anxiety (pt, relatives, drs, MDT)				✓			✓	✓	✓	✓		
Development of amb care							✓			✓	✓	
Tired/Hungry/Frustrated								✓		✓		
Primary care interaction									✓	✓	✓	

A4 Participant demographics

Pseudonym	Sex	Ambulatory experience	Site 1 Observation	Job title	Other sites 1	Other sites 2	Management
Rhoda	Female	0-2 years	Woodleigh	GP	OOH GP	ED	N

Rosa	Female	2-5 years	Woodleigh	ANP/AP	Woodleigh	Wynchwood	Y
Ruby	Female	0-2 years	Woodleigh	GP	OOH GP	ED	Y
Ruth	Female	2-5 years	Warmsley	GP	OOH GP		Y
Ralph	Male	2-5 years	Warmsley	Cons	Medicine	Wynchwood	Y
Reggie	Male	Over 5 years	Warmsley	GP	OOH GP	Wynchwood	N
Reuben	Male	Over 5 years	Warmsley	Cons	Medicine	ED	Y
Rita	Female	2-5 years	Warmsley	Cons	Medicine		N
Renata	Female	2-5 years	Wynchwood	Cons	Medicine		Y
Rowley	Male	2-5 years	Wynchwood	SpR	Medicine		N
Rufus	Male	2-5 years	Warmsley	GP	Woodleigh	ED	N
Roger	Male	2-5 years	Wynchwood	ANP/AP	Woodleigh	ED/Amb	N

A5 Information Sheet and Consent Form for Participants

INFORMATION SHEET for PARTICIPANTS

IRAS Reference Number: 212750

Clinical Decision Making in Ambulatory Emergency Care

I would like to invite you to participate in this study which forms part of my Doctor of Medicine (DM) from the University of Oxford. This study is sponsored by Oxford Health NHS Foundation Trust and funded by the National Institute of Healthcare Research Collaboration for Leadership in Applied Health Research and Care Oxford (NIHR CLAHRC Oxford). This research may also be used to inform the recruitment and training processes for doctors working in Ambulatory Care at the two NHS Foundation Trusts.

Please only participate if you want to; choosing not to take part will not disadvantage you in anyway. Before you decide whether you want to take part, it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Please ask if there is anything that is not clear or if you would like more information.

What is the purpose of the study?

This study aims to understand how clinical decisions are made by staff working in Ambulatory Emergency Care (AEC). These day units treat older patients with complex medical and social needs without keeping them in a hospital bed overnight, which is known as 'Ambulatory Care'. Doctors and nurses need to be able to judge who would be suitable for this type of medical care. We aim to learn what factors influence how staff make decisions in the AEC and how the day unit environment might affect this process. By understanding the factors that influence decision making, we aim improve the training that doctors and nurses need to work in AEC.

Why have I been invited to take part?

You are being invited to take part because you are either a senior doctor or nurse who has clinical decision making responsibility for ambulatory emergency care

Do I have to take part?

Participation is voluntary and you do not have to take part.

What will happen to me if I take part?

This study seeks to observe doctors and nurses whilst they are working during a normal shift at their ambulatory care centre. A suitable time will be arranged to observe you during your work. If possible the study aims to observe each participant for 2 x 4 hour sessions at work and conduct a 30 minute interview after your clinical shift to reflect on cases seen. A digital recording of this interview will be made and the transcripts will form part of the research data. You will receive a certificate of participation for your CPD portfolio to confirm that you have taken part in a research study.

Will my taking part be kept confidential?

Data collected in this study will be anonymised as soon as possible after data collection. The participants will be identified only by a participants ID number and only the chief investigator will have access to the log containing the ID numbers for corresponding participants. All documents and audio recordings will be stored securely on an encrypted Oxford Health NHS Foundation Trust computer and only accessible by research study team. Participants are able to withdraw from the study at any point. If participants decide to withdraw, we will include data collected from them up until that point in subsequent analysis.

Confidentiality may be breached if the researcher observes behaviour which could result in the risk of harm to participants or patients. Concerns would be discussed with the participant initially and they will be encouraged to report to their line manager or clinical lead. The episode will be recorded by the researcher and discussed with the research supervision team. In the extreme event that a participant refuses consent to discuss the concern, but the researcher feels the risk of harm is great, following discussion with the supervising team, confidentiality may be breached and concerns discussed with the relevant authorities.

What are the possible risks of taking part?

The observation process aims to minimally impact on your clinical shift. If it is apparent that the ward or workload is too busy the researcher will reschedule. The researcher may ask questions during the observation but will aim to minimally disrupt you whilst you are working. A 30 minute interview at the end of the observation period will be conducted in an office away from the clinical ward environment.

What will happen to the results of the study?

The results will primarily be written into a Doctoral Dissertation for the University of Oxford. The results will be made available the NIHR Oxford CLAHRC and will be published on their website. A report on the results will be provided to the sponsoring NHS Foundation Trusts.

The findings from this research may be used to establish the training needs of the ambulatory workforce and agree best practice for supporting staff development for AEC. This may improve patient safety by developing educational support and training for staff in ambulatory care. Our findings will be shared through the scientific literature and through conferences and meetings for those involved in ambulatory care.

Who should I contact for further information?

If you have any questions or require more information about this study, please contact:

Dr Sara McKelvie sara.mckelvie@oxfordhealth.nhs.uk

GP & Doctoral student

Dr Dan Lasserson danl@well.ox.ac.uk

Senior Interface Physician in Acute and Complex Medicine and Associate Professor, NIHR Biomedical Research Centre, Department of Geratology, Oxford University Hospitals NHS Foundation Trust

Thank you for reading this information sheet & considering participating in this study

CONSENT FORM for PARTICIPANTS

IRAS Reference Number: 212750

Clinical Decision Making in Ambulatory Emergency Care

Please complete this form after you have read the Information Sheet

Thank you for considering taking part in this research. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

I confirm that I understand that by initialling each box I am consenting to this element of the study. I understand that it will be assumed that a blank box means that I DO NOT consent to that part of the study. I understand that by not giving consent for any one element I may be deemed ineligible for the study.

Please initial

1. I confirm that I have read and understood the information sheet dated 1st August 2016, Version 1 for the above study. I have had the opportunity to consider the information and asked questions which have been answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. Furthermore, I understand that I will be able to withdraw my data at any time. I understand that the researchers will include data collected up until that point in subsequent analysis.

3. I consent to audio recording of the interview with the researcher and that the transcriptions will be used as research data

4. I understand that confidentiality and anonymity will be maintained and it will not be possible to identify me in any publications

_____	_____	_____
Name of Participant	**Date**	**Signature**
_____	_____	_____
Name of Researcher	**Date**	**Signature**

A6 Study Protocol

Recruitment

- **Site Consent:** Two NHS Foundation Trusts
- **Site Visits to Areas providing Ambulatory Emergency Care:** Woodleigh, Wynchwood and Warmsley
- **Participant Recruitment:** 1) Gatekeeper to Email Potential Participants 2) Site Visits 3) Monthly Clinician Meetings

Participant Selection

- **Participant Meets Study Criteria:** Clinician with senior clinical decision making responsibility for patient care
- **Informed consent:** Information Sheet and written Consent form provided and discussed with potential Participant
- **Publicise Study at Sites:** Posters displayed in Ambulatory Emergency Care Areas

Study Process

- **Observation:** Field notes with detailed descriptions of the clinical decision making processes observed and environmental factors involved
  Field Notes typed up after each observation period into Microsoft Word document. Thematic coding using Nvivo
- **Interview:** Short interview (30 minutes) to reflect on cases observed using the Think Aloud protocol
  Audio recordings made during the interview and transcribed into Microsoft Word Documents. Thematic coding using Nvivo

Analysis & Results

- **Analysis Techniques:** Pattern Matching and Explanation Building Techniques
- **Discussion:** Regular discussion with Supervisors Dr Lasserson, Dr Reeve & Dr Glogowska, 3 monthly joint meetings and monthly supervision meetings, telephone and email support
- **Write-Up:** Results to be written as a doctoral thesis for submission to the University of Oxford & NIHR CLAHRC, Summary Reports available for participating NHS Foundation Trusts
- **Dissemination of Results:** Consensus Conference to discuss finding with Stakeholders and inform best practice for supporting staff working in ambulatory emergency care. The findings will be shared through the scientific literature and through conferences and meetings for those involved in ambulatory care.

A7 Topic Guide

Topic Guide for Interviews with Participants

The provisional topic guide for questions is provided for the researcher to orientate to the research objectives to understand how clinicians make clinical decisions and whether the ambulatory environment affects this process

1. Introduction

Introductions with the Clinician, Ward Staff
Background details: Gender, Principal work site, Experience level, and Background training

2. Informed Consent

Informed consent form signed at initial observation
Offer opportunity to discuss key questions and concerns
Discuss ethical concerns including confidentiality and anonymity
Verbal check of consent for the interview to take place and audio recording
Explain how the data will be used

3. Case Discussion

Please tell me about one of the cases that we saw together

Interview can also prompt to discuss interesting case from the observation period

4. Clinical Decision Making

Stages in decision making

Could you describe to me the **key decisions** that you felt that you made for the care of that patient?

Could you tell me about the **stages in the decision making process** for this case

Information needed for decision making

What information did you think was important to making those decisions?

How did you use this to help you with your decision making? Why was this information critical to your decision?

Shared decision making and communication

Which people (patient, staff, carers, relatives) were involved in decision making with this patient? What did you find out? Was this useful/helpful/relevant? How did it affect your practice?

How involved do you think the patient/carer was with the decisions about their health today?

System 1/System 2/Heuristics/Decision modifiers

Some decisions are made quickly and others take longer to arrive at. Could you describe a **fast decision** that you made today? And a decision that took **longer** to work out?

Often doctors talk about using their **gut instincts** when making clinical decisions, do you have any examples of this from the cases we have seen today?

Did you have to change any aspects of your decision making today? Why was this? What made you change your mind?

Did you find any aspects of the decision making in this case **challenging**? What made it difficult?

5. **Effect of Ambulatory Care Setting on Decision Making**

Differences with other clinical roles

What **other clinical roles** do you have? Do you work in any another clinical areas? E.g. GP, OOH GP, Secondary Care, A&E

Do you think there **are any differences in working** in the ambulatory care setting here compared to your other clinical roles?

Decision Making and Risk Management

How do you decide who is suitable for ambulatory care here?

Do you think that patients/carers/relatives worry about being cared for in an ambulatory way /outside of the hospital? How do you answer their concerns?

The patients seen here are often **acutely unwell with complex backgrounds**, how do you think this affects the decision making process?

What place do clinical guidelines have when working here in ambulatory care?

What do you do when you are unsure?

Is there anything else that you think affected your decision making today?

6. **Ending the Interview**

Any other questions or comments that the participant would like to discuss
Thank the participant for taking part
Turn off the audio-recording

7. After the Interview

Explain the next steps in the study including the timeline for results
Check whether the participant wishes to be contacted with the results

A8 Data Collection Tool

Date	Data Collection Sheet for Participant No							
Site		Context						
Time	Patient	Doctor	Interactions	Environment	Information	Decisions observed	Decision Modifiers	Reflections

Key: P = Person E = Event A = Activity B = Behaviour

A9 Fieldwork Protocol

Clinical Decision Making: Fieldwork Protocol



A10 Thematic Coding Manual for NVivo

AEC clinicians

- Burnout
- Cognitive Load
- HALT
- Managing multiple roles
- Performance
- Responsibilty for the team
- Unsure
- Roles
    - Coordinator
    - Management role
    - Nursing
    - Senior Clinician
    - Supervisor
    - Teaching
    - Triage

AEC Environment

- Boundaries of AEC

- Complexity & Acuity
- Context
- Environment
- Guidelines
- Interuptions
- Location
- Suitability for Ambulatory
- Technology
- The day before...

Ambulatory Care

- Development of AEC
- Difference AEC with 'usual' medical care
- Difference of AEC with other roles
- Patient Safety in AEC
- Quality of care in AEC

Clinical Decision-Making

- Anxiety
- Easy or hard decisions
- Family, relative & carer involvement
- Heuristics & Gut
- Hypothetical-deductive reasoning
- Mindlines
- Patient involvement
- Reflection
- Satisfycing
- Shared Decision Making

Continuity

- Informational continuity
- Interpersonal continuity (Relational)
- Longitudinal continuity
- Management continuity

Index Cases

- Challenge of decision making
- Change to plan
- Diagnostic decisions
- Discharge decisions
- Key decisions
- Key information
- Location of Care
- Patient Cases
- Prognotic decisions
- The Plan
- Treatment decisions

- Vulnerability

Team in AEC

- Communication
- Induction to AEC
- Interactions
    - Coordinator and Senior Doctor
    - Junior and Senior doctor
    - Nurse and senior doctor
    - Primary Care
    - Therapist and Senior Dr
    - Wider hospital
- Meetings
    - Team based decisions
    - Team members
    - Team wellbeing

Uncertainty

- Cognitive uncertainty
- Conceptual uncertainty
- Emotional uncertainty
- Ethical uncertainty
- Personal uncertainty
- Technical uncertainty

A11 Standard Operating Procedure: Concerns Protocol

Clinical Decision Making in Ambulatory Care: CONCERNS PROTOCOL

Purpose of document: This document outlines the actions to be taken should any concerns arise during the conduct of the study 'Clinical Decision Making in Ambulatory Care'

Scope of reference: This document applies to concerns arising related to:

i. Individual participants – including researcher identified concerns about the participants safety or health; participant dissatisfaction or concerns with the research process

ii. Research partners/research sites – including concerns expressed by research partners; researcher concerns

iii. Researchers – including any concerns for the wellbeing and safety of individual researchers

iv. Research process – concerns and successes revealed during the research process which could refine the approaches for this study, or future research

Identifying concerns: concerns related to any of these issues will be reported to the research team using a Concerns Form (see appendix). The time frames for discussing concerns with senior researchers on the team (DL or JR) are within 24 hours for serious concerns (Red) or 1 week for routine concerns (Amber).

Resulting action plan to address concerns:

Specific actions will be identified by the research team in response to each individual event. An action plan will be clearly documented, including who is responsible for implementing it and by when. Outcomes will be identified at quarterly team meetings.

Possible actions for each of the identified circumstances include:

i. Research participants: any concerns about the participants' safety or health will first be discussed with the individual. They will be encouraged to seek help from their usual sources if appropriate. Where appropriate, consent will be sought from the participant for the research team to discuss their concerns with the participant's line manager. In the extreme event that a participant refuses consent, but the research team feel the risk of harm is great, following discussion with DL/JR, confidentiality may be breached so that the relevant line manager or clinical lead can be informed. The PIL will inform potential participants of this possibility.

   Where participants express concern or dissatisfaction with the research process or conduct of the research, they will be invited initially to discuss this with the researcher or another member of the team. We will invite people to express their concerns in writing so that issues can be clarified and addressed. Concerns will be discussed at the quarterly research team meeting, and responded to by the PI or Clinical Supervisor (DL or JR) as appropriate. Where possible we will seek to address concerns and enable the person to remain in the study. However, participants will also be reminded of their right to leave the study at any stage without adverse impact.

ii. Research partners/sites: any concerns with the conduct/process of the research raised by research partners will be addressed following the process described for research participants.

   Should researchers identify any concerns about the research sites (e.g. access) these will be discussed at research team meetings and an action plan agreed. These will likely include a repeat visit from a senior member of the research team to explore and reinforce messages about the rights of individuals to take part and refuse involvement in research, and issues of confidentiality.

iii. Researchers: Any problems with regards to safety during fieldwork will be reported to the research team (DL/JR) and actioned appropriately according to the situation.

Should individual researchers identify concerns about their own health, these should be initially discussed with senior members of the research team (DL/JR). If other members of the team have concerns about a colleague, they will first discuss this with the individual concerned. Options for supporting the individual will be identified, including: support from within the research team and signposting to their primary healthcare physician

iv. Research process: PI for the project, SM will maintain a research journal to document the development of the project in keeping with the requirements in establishing the trustworthiness of the project. Any specific concerns identified as part of this process, or by individual team members, will be documented on the CONCERNS FORM and discussed at monthly team meetings to decide appropriate actions. These may include making modifications to the current protocol (where significant, these will be reported to REC), or noting issues for future learning.

Processes for monitoring: Concerns forms arising during the research process will be reviewed at quarterly research team meetings, and audited on an annual basis. All team members will be encouraged to use the form to report concerns so that a clear audit trail can be collected for purposes of reporting to ethics, but also in writing up lessons learnt from conducting qualitative research. Any concerns form coded as AMBER must be reviewed within a week, RED within 24 hours – with at least one of the senior researchers on the team (DL or JR).

APPENDIX

Clinical Decision Making in Ambulatory Care: CONCERNS FORM

Date completed:

Completed by:

Identifier code for participant (if relevant):

SEVERITY OF CONCERN:

Green (non urgent) / Amber (within 1 week) / Red (within 24 hours)

NATURE OF CONCERN:

Date discussed/reviewed:

Discussed by:

ACTIONS arising (list action(s), person(s) responsible, proposed completion date):

REVIEW OF ACTIONS: (including date of review, outcomes)

A12 AEC Roles

Role	Definition
Senior clinical	Clinicians worked as the "expert" clinician, directly assessing patients, reviewing colleagues' assessments, finalising the individually tailored AEC clinical plan
Management	Clinicians who had managerial responsibilities in addition to their clinical roles
Triage	Clinicians assessed which patients were suitable for AEC in negotiation with the referring HCP, usually by telephone
Supervisor	Clinicians supervised junior members of staff, often overseeing several members of the clinical team
Teaching	Clinicians provided clinical tuition for other MDT members to improve individual learning and team performance
Coordinator	Clinicians organised and managed the MDT to optimise team performance and improve patient flow in AEC

A13 Patient Index Cases

Participant	Patient details	Reasons for AEC referral	Assessed by	AEC assessment duration (mins)
WOODLEIGH				
Rhoda	Older Female	Dehydration, complex health and social care needs	Rhoda	300
Rosa	Younger Female	Mastitis and signs of sepsis	Rosa	120
Ruby	Older Female	Cellulitis and no response to oral antibiotics	Ruby	70
WYNCHWOOD				
Renata	Older Female	Non-specific illness and reduced functional ability	Renata	90
Rowley	Older Female	Shortness of breath and wishes to avoid hospital	Rowley	150
Roger	Older Female	Cancer and increasing care needs	Senior Doctor	100
WARMSLEY				
Reggie	Older Female	Shortness of breath	Junior Doctor	25
Ruth	Older Female	Shortness of breath and orthopnoea	Emergency Department and Junior Doctor	20
Ralph	Younger Male	Haematemesis and Malaena	Junior Doctor	20
Rita	Older Female	Weakness, diarrhoea and reduced functional ability	Junior Doctor	20
Rufus	Older Male	Heart Failure and pleural effusion	Junior Doctor	10
Reuben	Younger Female	Chest pain on background of Type 2 Diabetes	Junior Doctor	20

Appendix Chapter 8: Understanding and Managing Clinical Uncertainty in Decision-Making in the AEC Complex Intervention

This chapter focuses on how clinicians manage the clinical uncertainty of decision-making in AEC, by examining the types of uncertainty and how this is managed. The chapter begins with an overview of the literature on clinical uncertainty in decision-making in urgent care (6.1), then discusses the analytic framework used (6.2). The chapter ends by demonstrating the cognitive strategies used by AEC clinicians to manage clinical uncertainty in the AEC setting (6.3).

8.1 Clinical uncertainty in decision making; A critical review of the literature

Other authors have provided excellent systematic reviews of the literature on clinical uncertainty (Han et al., 2011, Alam et al., 2017, Helou et al., 2020). This section instead provides an critical overview of the literature on clinical uncertainty, highlighting key authors and concepts (Grant and Booth, 2009). These concepts were used to develop the analytic framework used to appraise the effects of clinical uncertainty in AEC decision-making (6.2).

Although seen as a ubiquitous element the practice of medicine, defining clinical uncertainty remains an area of considerable debate and discussion. Often clinical uncertainty is used to describe the inherently interpersonal, context specific and judgement dependent nature of clinical practice (Beresford, 1991). Definitions of medical uncertainty tend to describe uncertainty in terms of the evolving nature of medical knowledge, the imperfect world of clinical practice and the unpredictable consequences of medical intervention.

> "*Medicine in fraught with uncertainty, and medical practice involves dealing with it on a day-to-day basis. Due to the uncertainty inherent in the environment, optimal decisions are not guaranteed to give the desired outcome. Furthermore, uncertainty can lead to variability in medical decisions, with the same (type of) patients being treated differently by different physicians.*" (Kostopoulou, 2009)

Pioneering work by Renee Fox defined clinical uncertainty in medical knowledge acquisition. Her work noted that novice doctors gained experience by learning to recognise whether the clinical uncertainty in their patient cases was related to their personal knowledge or the current understanding of disease (Fox, 1957). Her further work highlighted that medical uncertainty was found in many contexts including the use of clinical investigations, the development of new therapies but may be expressed differently in other cultural contexts (Fox, 1980). Her definition of clinical uncertainty was wide-ranging, covering societal uncertainty about risk and danger, the emotional impact of uncertainty for patients and their physicians and uncertainty in decision making (Fox, 1980).

Critique of this approach was provided by Atkinson who felt that uncertainty has developed into tacit sociological concept with little exposure to critical challenge (Atkinson, 1984). From his observations, he concluded that students were often pragmatically gathering medical knowledge in a reductionist fashion, often placing undue certainty on facts (Atkinson, 1984). And, as most medical teaching was done within hospital settings, there was an overemphasis on diagnostic certainty, rather than exposure to the degree of uncertainty in clinical presentation seen in primary care settings. He recommended that both certainty and uncertainty should be considered as interdependent concepts which co-exist in medical decision frameworks (Atkinson, 1984). He advised that ethnographic approaches were required to investigate when and in what context practitioners change their approach to cope with varying degree of clinical uncertainty in practice (Atkinson, 1984). Yet, few studies exploring clinical uncertainty in context exist (Helou et al., 2020, Alam et al., 2017, Han et al., 2011).

Despite the interest in clinical uncertainty, few studies have investigated the cause and effect of clinical uncertainty on decision-making. Compounding the problem, the literature on clinical uncertainty has often been often scattered across disciplines (sociology, bioethics, health services research, cognitive psychology) and taxonomies of uncertainty are usually theoretical and lack integration across specialities or empirical evidence (Han et al., 2011, Helou et al.,

2020). Recent reviews of clinical uncertainty provide a comprehensive overview of the literature including taxonomies of clinical uncertainty (Han et al., 2011), diagnostic uncertainty in primary care (Alam et al., 2017) and uncertainty in decision-making (Helou et al., 2020). However, few empirical studies of clinical uncertainty were found. A systematic search for diagnostic uncertainty in primary care revealed six quantitative studies and four qualitative studies concentrating on the traits, skills and strategies required (Alam et al., 2017). Helou's review uncovered only four qualitative and one quantitative study that examined uncertainty in decision making (Helou et al., 2020). Most of these studies used surveys and interviews to assess uncertainty. Few examined clinical uncertainty in context with observations with none described as using ethnographic methods (Alam et al., 2017, Helou et al., 2020).

In this thesis, I concentrated on clinical uncertainty in medical decision-making, examining the cognitive processes required for knowledge interpretation in the context of the AEC environment. Beresford suggests that clinical uncertainty affects decision making "*by determining which [factors] are taken into account, and by affecting their relationship to the ethical commitments of physicians*" (Beresford, 1991). This concept of decision-making in uncertainty was conceptually useful to understand the variation in the factors and relationships that affect AEC decision making. To make sense of the clinical uncertainty observed within AEC, I found it useful to consider which medical decisions were affected by uncertainty and the different types of clinical uncertainty, and I outline the evidence used to develop a sensitizing framework below.

8.1.1 Clinical uncertainty in decision tasks

Clinicians are faced with making important decisions in their daily practice. Previous authors have identified the decision tasks faced by doctors when dealing with clinical uncertainty. One model of clinical uncertainty based on focus group work with trainee GPs proposed that doctors consider whether the uncertainty is situated in the diagnosis or management (Danczak and Lea, 2014). Others added a third category of uncertainty in prognostic decision-making (Kostopoulou,

2009). Diagnostic uncertainty is described as uncertainty in interpretation of the clinical information to decide between differential diagnoses (Kostopoulou, 2009). Management uncertainty arises from the assessing the probability of benefit, harm and cost effectiveness of treatment (Kostopoulou, 2009). Prognostic uncertainty results from the unpredictability of future events in relation to specific patients (Kostopoulou, 2009).

This thesis extends these models of clinical uncertainty by introducing a fourth decision task; Triage decision-making (4.2.2a). In Chapter 4.2 the empirical investigation identified that there were four fixed components of decision-making in AEC (chapter 4.2); triage, diagnostic, management and prognostic decisions. The decision tasks within each component are summarised in Table 30. The next section examines what is known about the types of uncertainty in decision-making.

Table 30 Decision Making Tasks in Clinical Uncertainty

Constant components in AEC Decision Making	AEC Decision Making Task
Triage Decisions	Suitability for AEC
Diagnostic Decisions	Confirming the diagnosis Disease severity assessment
Management Decisions	Managing the clinical problem/s
Prognostic Decisions	Assessing the response to AEC Management Suitability for AEC

8.1.2 Types of clinical uncertainty

This section provides a critical overview of the types of clinical uncertainty previously described in the literature. The classification of clinical uncertainty was a key theme of a recent scoping

review and thematic analysis (Helou et al., 2020). This was defined as categorizing the uncertainty in a decision by type and magnitude to gain a better understanding of how to address it (Helou et al., 2020). Several authors have developed taxonomies of clinical uncertainty, here I concentrate on those I felt were conceptually relevant to understand the source of uncertainty within decision making tasks. These concepts provided the candidate components for the sensitizing framework of clinical uncertainty in decision-making presented in 6.2. This section concentrates on three taxonomies by Beresford (Beresford, 1991), Alam et al (Alam et al., 2017) and Han et al (Han et al., 2011) which provided useful conceptual perspectives into clinical uncertainty in decision making for physicians.

Beresford based his categorisation on the medical literature and his own qualitative interviews with physicians on resource management decisions (Beresford, 1991). He identified three factors that influenced clinical decision making in uncertainty; technical, personal and conceptual factors. Technical uncertainty arose from inadequate data to predict clinical outcomes. This technical uncertainty could be due to unavailability of medical records or a lack of investigative tests. Personal uncertainty was defined as difficulties arising from the patient-doctor relationship. He cited two examples of how this might occur. First, a lack of prior relationship, meaning that the patients' wishes are unknown, which could be critical at the end of life. Second, where previous knowledge of the patient may reduce clinical detachment. I feel these examples are two ends of a continuum of relational continuity between patient and healthcare provider, and as such will refer to this type of uncertainty as relational. The final factor, conceptual uncertainty, was again defined with two examples. The first is incommensurability where clinicians compare the utility between two situations which are not easily comparable. For example, in an overcrowded emergency department, deciding which patient requires the last available hospital bed. The second aspect he discussed was the problem of applying general rules to individuals when decision making. This aspect of uncertainty is of interest to this study as AEC has not yet established clinical guidelines to aid practice and clinicians are often interpreting protocols for their practice. In this study I aim to capture

examples of the interpretive practice that clinicians use when working in uncertainty and show how clinicians recognise and manage technical and relational uncertainty in AEC decision making.

Alam et al revisited factors influencing clinical uncertainty, investigating the literature on diagnostic uncertainty in primary care (Alam et al., 2017). Three different aspects are identified; cognitive, emotional and ethical. Cognitive uncertainty occurs when clinicians misinterpret clinical information or contextual cues. Emotional aspects relate to the stress or anxiety provoked by uncertainty or the effect of mood and affect on decision making. The final factor of ethical uncertainty includes the moral aspects of sharing uncertainty in decision making with patients. In addition to examining these aspects of uncertainty, the review also considers the skills and attributes needed to manage in situations of diagnostic uncertainty (4.1). Despite the review's emphasis on diagnostic uncertainty, rather than management uncertainty, I felt that these factors added key concepts to develop the sensitizing framework for uncertainty in AEC decision making.

The final authors discussed in this section, Han et al provided a comprehensive conceptual review of insights gained from healthcare, decision science, engineering, risk analysis and the law (Han et al., 2011). This review also highlighted medical uncertainty from the patients' view however, I have deliberately not included these as this is outside the scope of this limited critical review. The team proposed a three-dimensional taxonomy of clinical uncertainty based on theoretical insights from multiple fields (Han et al., 2011). Their classification proposed that uncertainty can be viewed from the source, issue and locus. Sources of uncertainty included; probability, the difficulties of predicting future outcomes; ambiguity as imprecision, missing information or evidence; and complexity resulting from multiple causal factors and interpretations.

The team describe the "*substantive issues*" to describe types of clinical uncertainty. The characterize three types scientific, practical and personal. Scientific issues included uncertainty

in diagnosis, prognosis, causal explanations, and treatment, due to the current understanding of medicine. As such, I consider Han's explanation of the scientific causes (Han et al., 2011) as most allied to Fox's description of uncertainty in current medical knowledge (Fox, 1957) and will use this definition henceforth. Practical issues are explained as variations in processes of providing healthcare. Finally, they define personal issues as patient-centred factors including the patient's experience of illness. I will refer to these as patient factors to avoid confusion with clinician factors. As this study is investigating clinician's cognitive processes I instead use personal to refer to the intrinsic experiential aspect of uncertainty for clinicians, particularly relating this the difficulty of distinguishing between individual doubt and scientific uncertainty as referred to by Fox (Fox, 1957).

This review had a third aspect to their taxonomy, namely the difference in patient and physician as the locus of uncertainty (Han et al., 2011). As healthcare teams and patient networks (family, carers and wider kin) are often involved in medical decisions (Danczak and Lea, 2014), I feel this aspect is best classified with relational aspects of uncertainty as described by Beresford (Beresford, 1991). This relational aspect of decision-making is also discussed comprehensively in Chapter 4.2.

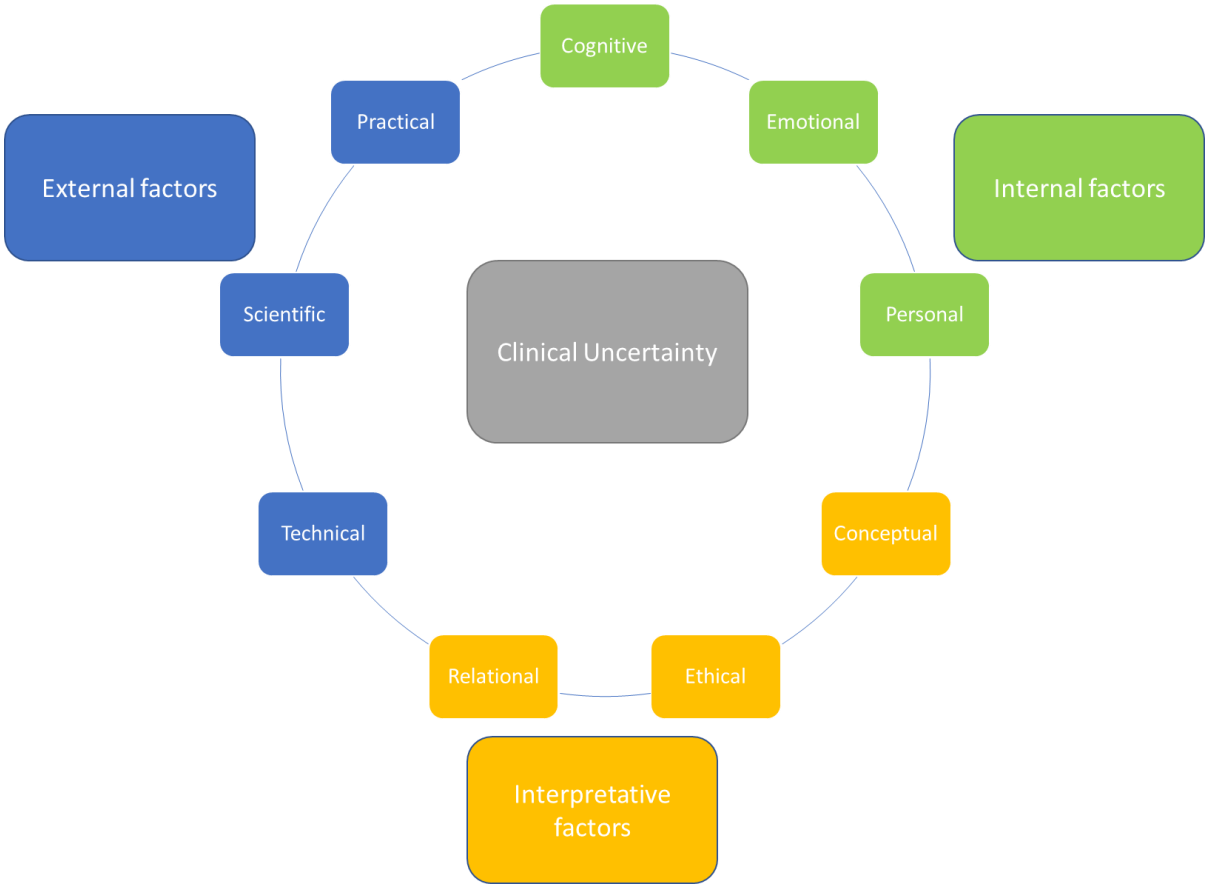
In this section I have explored nine different conceptual aspects of uncertainty in decision making for inclusion in sensitizing framework on clinical uncertainty in decision making; cognitive, emotional, personal, conceptual, ethical, relational, technical, scientific and practical. As I consider clinical uncertainty as a cognitive process intrinsic to clinician, I further subdivided these types into internal, external and interpretative factors similar to Sweller's classification of sources of cognitive load (Sweller, 1988) (2.1). Internal factors are types of uncertainty that directly relate to inner cognitive processes; cognitive, emotional and personal uncertainty. External factors occur outside of the physician and include technical, scientific and practical issues that affect decision making. Interpretative factors are the types of uncertainty that result from physician constructing meaning from clinical information, patient cues and wider societal

norms, these include conceptual, ethical and relational uncertainty (Table 31). Section 8.3 will show how these different types of clinical uncertainty interact and affect decision making.

Table 31 Types of Clinical Uncertainty in Decision-Making

Type of Clinical Uncertainty		Definition
Internal	Cognitive	The cognitive processes affecting decision making
	Emotional	The affective factors influencing decision-making
	Personal	The clinicians' experience of clinical uncertainty
External	Technical	Inadequate data to support decision-making
	Scientific	The current state of medical knowledge
	Practical	Variations in healthcare processes and practice
Interpretative	Conceptual	Difficulties applying abstract rules to specific scenarios
	Ethical	The effect of moral influences on uncertainty
	Relational	Interactions between individuals (patient, doctor) or groups (healthcare teams and patients' networks)

Figure 20 Types of Clinical Uncertainty in Decision Making



8.1.3 The impact of clinical uncertainty on decision-making

The impact of clinical uncertainty on decision-making is not well understood. Most research has concentrated on the recognition of uncertainty and communication skills required to discuss uncertainty with patients (Alam et al., 2017). Authors in the field have called for further research, particularly empirical studies to understand how clinicians manage uncertainty in context and which factors influence this (Helou et al., 2020, Han et al., 2011). It has been suggested that by understanding the type of clinical uncertainty at work, clinicians would be able to select management strategies to reduce the uncertainty (Han et al., 2011). This thesis investigated how clinicians manage the uncertainty they see in daily practice in the context of the AEC environment. In this section I evaluate what is known about the impact of clinical uncertainty on medical decision-making.

8.1.3a The effect of uncertainty on clinical practice

The studies on the impact of clinical uncertainty identified several ways in which clinical practice was affected; recognition of uncertainty, reduced risk tolerance, altered clinical behaviours. A study of family doctors investigated their attitude towards ambiguous symptoms (Seaburn et al., 2005). The authors noted two distinct responses to uncertainty; some clinicians ignored uncertainty and used a more doctor centred approach, but others would acknowledge symptoms and patient concerns (Seaburn et al., 2005). The lack of recognition of clinical uncertainty may reflect its absence in formal medical curricula (Helou et al., 2020). This difference between functional and dysfunctional responses to clinical uncertainty is discussed later.

Risk tolerance was often altered by the influence of uncertainty on clinical decisions. An interview study of physicians described three ways that uncertainty reduced their risk tolerance (Beresford, 1991). Firstly, they often described that when they had a reduced tolerance for diagnostic risk and consequently ordered more tests. Secondly, they often felt compelled to escalate healthcare for example arranging more hospital admissions when under time pressure. Finally, some clinicians discussed that intolerance to uncertainty was driving technology use and reducing investment with lower technological requirements such as psychiatry, geriatrics and chronic care.

Decision-making behaviours have also reported to alter in the presence of uncertainty. A survey study with GPs on their response to uncertainty showed that heuristics were commonly used when clinical uncertainty was present (Schneider et al., 2014). Test of time or use of contextual information (family or occupational history) were particularly used to direct the consultation. These studies illustrate the paucity of research into medical uncertainty and the effect on clinicians and patient outcomes. This reiterates the need for further research to analyse the impact of and physicians' response to uncertainty.

8.1.3b Tolerance to uncertainty

Studies investigating the effects of clinical uncertainty on physicians generally concentrated on tolerance to uncertainty. This is most frequently measured using the Physician Reactions to Uncertainty Scale (Cooke et al., 2013), but other scales such as the dealing with Uncertainty Questionnaire (DUQ) and Ambiguity Aversion in Medicine scale (AA) (Alam et al., 2017). Traits associated with improved tolerance to uncertainty included experience level (Nevalainen et al., 2014) and resilience (Cooke et al., 2013). In addition, protective personality traits associated with higher tolerance to uncertainty scores included extraversion, conscientiousness and openness, whereas higher neuroticism scores predicted more anxiety due to uncertainty (Schneider et al., 2014). Doctors who practiced using a bio-psycho-social model of disease rather than a biomedical model were associated with a lower PRUS score, suggesting reduced stress from uncertainty (Evans and Trotter, 2009). From this we can see that research has concentrated on the stress reactions associated with physician uncertainty, but few studies have reported on the impact on clinical practice or clinical decision making.

8.1.3c Managing Clinical Uncertainty

Ways of managing clinical uncertainty have been characterised previously into reducing uncertainty, acknowledging uncertainty, supressing uncertainty and decision support (Table 2) (Kostopoulou, 2009). Reducing uncertainty often involves using the test of time or treatment to aid decision making (Kostopoulou, 2009). Further information may be gathered and additional sources of evidence evaluated for example collateral information from a relative. Acknowledging uncertainty with patients was described by most authors as an important clinical response to uncertainty (Danczak and Lea, 2018, Seaburn et al., 2005, Beresford, 1991). Known strategies to manage uncertainty here included preparing contingency plans with patients and shared decision making with the patient (Kostopoulou, 2009). Suppression of uncertainty is described as a dysfunctional response to clinical uncertainty and often occurs when uncertainty is not recognised or an action is required where clinical information is lacking (Kostopoulou, 2009). Decision support included the resources available to clinicians to improved decision-

making and these included clinical guideline and decision support tools (Kostopoulou, 2009). These factors informed the analytic framework for analysing management of uncertainty in AEC presented in section 8.2.

Table 32 Clinician responses to uncertainty in decision-making

Clinician responses to uncertainty in decision-making (Kostopoulou, 2009)	
Response to Uncertainty	**Specific Strategy**
Reducing Uncertainty	**Information gathering**; investigations or second opinion **Time**; deferring the decision until more information available **Management**; Initiate treatment on basis of hypothesized diagnosis and monitoring, **Evidence**; Use contextual and circumstantial evidence (strategy for experienced clinicians)
Acknowledging Uncertainty	**Contingency planning**; safety netting, follow up, further tests, referral to specialist, shared decision making with the patient
Supressing Uncertainty	**Survival Strategy**; usually a maladaptive response if reducing uncertainty or contingency planning are not possible but an action is required
Decision Support	**Decision Support Aids**; clinical algorithm, practice guidelines, decision support aids

8.1.3d Functional and dysfunctional responses to clinical uncertainty

Strategies for managing uncertainty have been described as functional and dysfunctional responses (Danczak et al., 2016)[61]. As discussed earlier, clinicians often have a choice whether

[61] Whilst dividing responses in this binary way may aid categorisation, it is worth keeping in mind that a functional strategy used in the wrong context may well be dysfunctional and vice versa.

they respond to clinical uncertainty. Supressing uncertainty has been described as a maladaptive response to manage uncertainty and heads the list of dysfunctional approaches to managing uncertainty. Further dysfunctional approaches may include; premature reassurance, increased tests, assuming a previous diagnosis, labelling the problem as 'functional', inappropriate escalation of care, blame, shirk responsibility or burnout (Danczak, 2017). The origins of these responses may reflect the lack of attention paid to medically unexplained symptoms in doctors' training. During medical school, teaching often concentrates on providing students with recognisable cases demonstrating characteristic disease patterns. One criticism of this is that this leads to an implied bias that patient problems have discrete solutions, which is often not the case in primary care or patients with multi-morbidity (Atkinson, 1984). As we have seen earlier, this may lead to clinicians avoiding or ignoring uncertainty (Seaburn et al., 2005, Danczak, 2017). In contrast to these maladaptive responses, research has suggested more functional approaches that acknowledge uncertainty (Hewson et al., 1996, Griffiths et al., 2005) (Table 31).

Two qualitative studies explored the best practice strategies that clinicians use when managing diagnostic uncertainty (Hewson et al., 1996, Griffiths et al., 2005). These can be summarised as exploring certainty, explaining the clinical problem, acknowledge the uncertainty and managing the uncertainty (Table 31). Exploring certainty included recognising what aspects of the clinical problem they feel they have enough evidence for, and which alternative diagnoses were felt to be unlikely. When explaining the clinical problem, clinicians should give a concise account of the clinical problem in context, with an open discussion about the risks and benefits. Clinicians need to acknowledge the various areas of uncertainty in this case to facilitate a negotiated plan of action. Managing uncertainty would require a discussion of the provisional nature of the diagnosis, the plan of action, with appropriate contingency planning. In this study of AEC

clinicians, I will explore whether the strategies for managing uncertainty are used and how the context influences the chosen approach.

Table 33 Managing Clinical Uncertainty in Consultation

	Discussing Hormone Replacement Therapy (Griffiths et al., 2005)	**Medical Management of Uncertainty (Hewson et al., 1996)**
Exploring Certainty	Focus on the certainty for now and in this test	Eliminating alternative diagnoses
Explaining the Clinical Problem	Providing a coherent account of the medical evidence for the risks and benefits	Defining the context of the diagnosis and explaining the symptoms Describing prognosis Negotiating problems
Acknowledging Uncertainty	Acknowledging the inherent uncertainty of medical evidence	Keeping diagnostic options open Cautious not to miss potential diagnoses
Managing Uncertainty	Negotiating a provisional decision	Negotiating the plan of action Appropriate time limited safety netting Appropriate contingency planning

8.1.4 Summary of the literature on clinical decision-making in uncertainty

This chapter considered the definition, sources and types of clinical uncertainty and the impact on clinicians and their behaviours to underpin a conceptual framework to aid analysis of this AEC decision-making study. In summary, I define clinical uncertainty in decision making as a cognitive process inherent to clinicians that may vary depending on the context, type or degree of uncertainty involved. It can occur at any point in the clinical trajectory; whether that be in diagnosis, investigation, treatment, or predicted prognosis of the medical case. In each case, there is likely to be a spectrum from clinical uncertainty, through clinical equipoise to clinical certainty. This clinical uncertainty can be described in terms of internal, external and

interpretative factors. Internal factors include cognitive, emotional and personal aspects of the clinician's metacognition. External factors are the technical, scientific and practical aspects outside of the clinician that affect clinical decision making. Interpretative factors influence physicians' clinical practice; conceptual, ethical and relational uncertainty. Relational uncertainty also captures the interactional nature of medical practice and the influence of the patient, patient's network and healthcare team.

The effect of uncertainty on clinical decision-making included recognition of uncertainty, reduced risk tolerance, altered clinical behaviours. Clinicians were shown to have variable tolerances to uncertainty and increased tolerance was associated with reduced stress. Clinicians manage clinical uncertainty by reducing uncertainty, acknowledging uncertainty, supressing uncertainty and using decision support aids. Responses to uncertainty have been divided into functional and dysfunctional responses.

The key concepts defined in this critical review of the literature on clinical uncertainty in decision making was used to inform the development of the analytic framework described in 8.2. This provided a structure for analysis of the complex and uncertain decision-making work of AEC clinicians and I will consider whether there are common patterns or interactions between the factors described.

8.2 A methodological framework for analysis for understanding clinical uncertainty

One of the aims of this study was to understand the pattern of clinical uncertainty across the AEC consultation and how this was managed. A focused ethnographic approach was chosen as allows an in-depth exploration of the factors which affect decision-making by examining the cognitive tasks in situ. Cross case analysis was used to understand the how clinical uncertainty affected each stage in the index cases' consultations (3.5.2). This was facilitated by framework analysis using the model of Clinical Uncertainty discussed here (Table 34).

Table 34 Framework Analysis of Uncertainty in AEC Decision-Making

Stages in the AEC Consultation:	Patient Triage	Diagnostic decisions	Treatment & Management decisions	Decision modifiers	Prognostic & discharge decisions
Decision Task	• Whether to accept the patient for AEC?	• What is the diagnosis? • How severe is the clinical problem?	• How to manage the clinical problem?	• What are the patients' or family's wishes? • Is there any new information?	• How did the patient respond to treatment? • What is the best location of care for this patient? • Is AEC feasible? • What contingency plan is needed?
Clinical Uncertainty: Sources, Patterns and Interactions		**Technical** **Ethical** **Emotional/Personal**	**Cognitive** **Relational** **Ethical**		**Conceptual** **Practical**
Strategies to Manage Uncertainty	**Reduce uncertainty by Information gathering**		**Decision Support**	**Acknowledge & Explain Uncertainty** **Contingency Planning**	**Team Decisions**

The framework assessment of uncertainty during the stages of the AEC consultation revealed differences in the magnitude of uncertainty (Table 35). Several of the cases had at least one consultation stage with a high degree of uncertainty (7/12), but two cases had low uncertainty levels throughout. By the end of the AEC consultation, uncertainty reduced; most cases ending with low uncertainty levels but one-third tolerated moderate uncertainty on discharge. At the closure stage most of the factors causing clinicians uncertainty had been addressed. The AEC clinicians were able to tolerate the presence of some uncertainty on discharge, but the degree and cause varied between clinicians.

Table 35 Magnitude of uncertainty in AEC Clinical Decision-Making

Participant	Triage Decisions	Diagnostic Decisions	Management Decisions	Decision Modifiers	Prognostic Decisions
Uncertainty score	Low = 1 source of uncertainty Moderate = 2 sources of uncertainty or 2 sources of the same uncertainty type				

	High = 3 sources of uncertainty or multiple sources of the same uncertainty type				
WOODLEIGH					
Rhoda	Low	Mod	Low	Mod	Mod
Rosa	Low	Low	Low	Low	Low
Ruby	Low	Low	Low	Low	Low
WYNCHWOOD					
Renata	High	Mod	Low	Low	Mod
Rowley	Low	Mod	Mod	High	Mod
Roger	Mod	Low	Low	Low	Low
WARMSLEY					
Reggie	Low	High	Low	Mod	Mod
Ruth	Mod	Low	Mod	Mod	Low
Ralph	High	Mod	Mod	Low	Low
Rita	Mod	Low	High	Low	Low
Rufus	Mod	Low	Mod	High	Low
Reuben	High	Low	Low	Low	Low

8.3 What are the sources of Clinical Uncertainty in AEC decision making?

In this section I discuss the sources of clinical uncertainty seen in AEC decision-making using the analytical frameworks discussed in 8.2. These are described using the constant components discussed in 4.2.2. This section systematically appraises the sources of clinical uncertainty seen at each stage of the AEC decision-making (Table 36).

Table 36 Sources of Clinical Uncertainty in the AEC Decision-Making

Constant components in AEC Decision Making	AEC Decision Making Task	Type of Clinical Uncertainty
Triage Decisions	Suitability for AEC	Technical
Diagnostic Decisions	Confirming the diagnosis Disease severity assessment	Technical Cognitive Personal Emotional
Management Decisions	Managing the clinical problem/s	Technical Relational Conceptual Practical Cognitive
Prognostic Decisions	Assessing the response to AEC Management Suitability for AEC	Technical Conceptual Practical Relational
Decision Modification	Altering the AEC Clinical Plan	Technical Cognitive Relational Ethical Practical

8.3.1 Clinical Uncertainty in AEC Triage Decisions

The main decision-making task in AEC triage was to decide the suitability for ambulatory care during a telephone call between clinicians (4.2.2a). Framework analysis revealed that the main type of uncertainty present at this stage in decision making was technical uncertainty. This type of uncertainty was due to inadequate data to support decision-making. This uncertainty was managed by clinicians by reducing the uncertainty see by asking for further clinical information or by asking for further tests.

Often participants needed further information on the patient's background (Renata) or care needs (Rita and Roger) to decide on the suitability for ambulatory care. Some cases were challenging due to missing information.

> *We discuss how difficult it is when it is unclear who referred the patient and there is a lack of information on the patients "usual self", a limited history and lack of family members.* [Renata Fieldnotes]

Tests were used to reduce technical uncertainty by providing diagnostic information or requested to assess disease severity. Rowley and Reuben needed tests to reduce diagnostic uncertainty. Rowley's case had several possible diagnoses for shortness of breath, and he used test results to decide between them. Rosa and Rhoda requested tests to aid their judgement of illness severity. Rosa asks her healthcare assistant to take blood tests for her patient to help her decide the on the severity of the infection.

> *"11.55am Rosa says 'I need the bloods first to confirm the infection – CRP'*[62]
>
> *12.10pm The nurse + advanced nurse practitioner discuss POC (point of care) bloods – lactate*[63] *ok and CRP 157"* [Rosa fieldnotes]

[62] C-reactive protein, an inflammatory maker used to monitor severity of infections
[63] Lactate, an inflammatory marker

The prominence of technical uncertainty at this stage is likely due to the lack of clinical information at the initial stages of the AEC intervention. During the triage stage the patient is remote from the AEC clinician, and the case is being discussed between the healthcare professionals without patient involvement. After triage, the clinicians all requested further information to reduce technical uncertainty, guided by the referral information.

8.3.2 Clinical Uncertainty in AEC Diagnostic Decisions

During diagnostic decision-making, four main types of uncertainty were demonstrated. The most frequently described were technical and cognitive uncertainty due to limited or new information during the diagnostic process. Personal and emotional uncertainty were also demonstrated by the clinicians supervising more junior team members.

8.3.2a Technical uncertainty in diagnostic decision-making

The main issues leading to technical uncertainty were limited access to clinical information due to cognitive impairment or the absence of certain investigations in the community. Renata noted how information gathering was often challenging when cognitive impairment was present due to dementia or delirium. During an assessment of an older man with dementia and shortness of breath it was hard to obtain a clinical history. She reduced the uncertainty in this case by involving the family to obtain a collateral history from his wife.

Rowley described how some tests were unavailable in the community which increased the diagnostic uncertainty. For his index case, he needed a white cell count[64] to help decide on the severity of illness but this test is sent to Warmsley for processing overnight. Instead he reduced uncertainty by obtaining a point of care blood test for CRP which would help him decide on severity by assessing inflammation.

[64] A white cell count, is part of the Full Blood Count and describes the number of white cells present in the blood to fight infection

8.3.2b Cognitive uncertainty in diagnostic decision-making

For Rhoda the main source of uncertainty during diagnosis was cognitive. She described feeling "*overwhelmed*" by the number of symptoms that her patient had. She found it hard to decide which clinical problems required action now and which could wait. During her patient assessment the patient disclosed a new symptom and Rhoda decided to review her medical notes to see whether this symptom had been investigated before. Her concern was that new persistent diarrhoea might be a sign of cancer. She managed this by obtaining further information from the medical notes to reduce uncertainty. The GP records showed that this symptom had been investigated before by the patient's GP.

> *"I think knowing that she'd had some investigations into her bowels would make me more relaxed because then I thought we don't have to kind of worry so much about the risk of malignancy. Having her x-ray reported reduced the, because I wondered if she had an aneurysm, although she didn't have any symptoms of it but still it was like, '[sigh of relief]. So that was good to, to relax about that."* [Rhoda interview]

8.3.2c Emotional & Personal uncertainty in diagnostic decision-making

For some, cognitive uncertainty was associated with personal and emotional uncertainty. Rhoda expressed her emotional uncertainty by saying she felt overcome by the medical problem list and worry that the patient appeared "*vulnerable*". Feelings of anxiety were also expressed commonly by junior doctors. Some juniors were clear with the senior doctor about the cause of their uncertainty e.g. the junior doctor working with Ruth was unsure about her abdominal examination and asked for a second opinion. Ruth used a combination of information gathering, clinical examination and bedside tests to do this to allay the junior doctor's concerns. Renata also displayed a combination of personal and emotional uncertainty, feeling frustrated by a lack of information.

8.3.3 Clinical Uncertainty in AEC Patient Management Decisions

The rest of this section will now demonstrate how clinical uncertainty manifested during patient management. Uncertainty stemmed from technical, relational, conceptual, practical and particularly cognitive uncertainty.

8.3.3a Technical uncertainty in Patient Management Decisions

Rhoda, Roger and Rita described a need for additional information to manage their patients to reduce technical uncertainty. Rhoda explained how new symptoms needed further investigation during the patient management stage, but worried about the boundaries of ambulatory care.

> *"at what point do we draw the line as to what we do?"* [Rhoda interview]

In Roger and Rita's cases, the clinicians acknowledged they need help in deciding the medical plan. The doctor who reviewed Roger's case needs some specialist advice from the haematologist regarding apixaban, a blood thinner. He asks for a second opinion by telephone to reduce the technical uncertainty.

Rita realised during her assessment that she required further information about the patient's ability to manage at home. Whilst examining the patient she asks about her home life. Rita discovered there was no lift and only stairs and requests a therapy assessment. Rita arranged a home visit for the patien that evening to reassure the patient, but I felt there was some element of reducing the clinician's personal uncertainty in addition.

> *"I've just reviewed her on the consultant round and we've, the decision-making round her is that we should still try and get her home, but to give her added confidence and do an assessment as she's got the stairs, thirty-two steps to get to her flat, we've asked our therapy colleagues to come and assess her and they're about to do a stairs assessment on her as we speak."* [Rita interview]

8.3.3b Cognitive uncertainty in patient management

Cognitive uncertainty was often as a result of complexity in the index case. This was often demonstrated at the patient management stage. The best examples of patients with complex problems were provided by Rhoda, Ralph and Reuben. These patients were complex due to a combination of acute undifferentiated illness, multiple long-term conditions, functional impairments or social difficulties. The clinicians demonstrated their thinking strategies when combatting cognitive uncertainty. Each use a combination of different cognitive strategies as a response to cognitive uncertainty.

Table 37 Types of Clinical Reasoning adapted from (Cooper et al., 2017)

Type of Reasoning	Explanation
Deductive	Evidence search to rule out disease as cause for illness (General to specific)
Inductive	Observed findings are interpreted to discover cause (Specific to general)
Abduction	Choosing the most likely explanation for symptoms, signs and observations
Deterministic	Usual routines based on familiar clinical problems
Probabilistic	Estimated probability used to generate likelihood
Hypothetical-deductive reasoning	Clinician generates hypothesis and tests with evidence
Mindlines	Internal illness scripts based on clinical experience
Type 1 thinking	Fast, pattern recognition, intuitive thinking (Heuristics)
Type 2 thinking	Slow, controlled and effortful thinking

Rhoda struggled with case complexity and the busy environment in she is working. The number of clinical problems forces her to use a type 2 thinking strategy, which was cognitively exhausting. Her patient's plan evolved over 50 minutes, as Rhoda considered each of the clinical problems in turn. She first needed to speak to the radiology team regarding an abnormal x-ray finding which she thought might be a sign of an aneurysm, using deductive reasoning. She was unsure of the cause of the abnormality and asks for further advice from a radiologist who

disagreed there was any cause for concern. Whilst reviewing the chest x-ray, Rhoda then discovered an abnormal bone scan showing osteoporosis and was concerned that the patient was not having any treatment for this. She uses inductive reasoning as the bone scan shows osteoporotic disease, which would be likely in this patient group. She then uses deterministic reasoning and hypothesis modification to decide on a pain management plan for the patient. She thought that the pain was likely due to the shingles infection. She knew that neuralgic pain agents such as amitriptyline work for this type of pain. But whilst checking the patient's medications she realises the patient is already taking a similar agent. She modifies her plan to increase the neuropathic painkiller that the patient is already taking.

> *"12.35pm Rhoda looks up the patient's medications in the British National Formularly. Her thought process is that amitripylline[65] might help the patient's post herpetic[66] headache. But the patient's notes say that she is on clomipramide, a similar drug to amitriptyline already. Rhoda decides to increase the dose of clomipramide (hoping this will reduce the patient's pain).*
>
> *The plan is to discuss osteoporosis treatment, further blood tests to check for markers of bowel disease. Rhoda also wants to write a 'patient friendly' discharge letter which explains the medication changes and contingency plan*" [Rhoda fieldnotes]

Rhoda then considered the best way to convey this information to her patient, worrying about the complexity involved. She decided to concentrate on medication changes and handed back other tasks to the GP via the discharge letter.

> *I was thinking, 'Oh my goodness how am I going to get this across to you?' So I tried to sort of say, "Right we'll sort of follow it up so don't worry but you need to…", the main thing I suppose that she had to kind of concentrate on was the medication changes ones*

[65] A tricyclic antidepressant which also reduces nerve pain
[66] Pain following a shingles infection

that she shouldn't take and I made sure, I said, "Right which ones is that you have to stop?" She said, "These ones." [Rhoda interview]

Ralph described his own thinking as Bayesian[67]. However, during the observation, I observed several thinking strategies. He used Type 1 thinking to recognise a typical pattern of disease during his telephone call with the referrering doctor to derive his pre-test probability, then used evidence from the symptoms and a decision aid to arrive at his post-test probability. An example of hypothetical-deductive reasoning, Type 1 thinking and probabilistic reasoning.

"I suppose to a certain extent you could argue that this was Bayesian in terms of how it was approached. So, I already had a prior (plan) in my mind and then I was, without applying actual numbers, seeking to modulate that according to new evidence" [Ralph interview]

Reuben was very clear at describing his diagnostic cognitive processes for differentiating between different causes of chest pain and uses these to direct his management plan. He uses a mixture of probabilistic reasoning, type 1 pattern recognition, and mindlines to diagnose the cause of the chest pain. Reuben had a well-defined cognitive mindline for assessing severity and relating this to his clinical management plan. Reuben knew that only a small percentage of patients presenting to medicine with chest pain have acute coronary chest pain[68] that requires cardiac catheterisation[69], only 1 or 2 patients per day. He used this to calculate his pre-test probability. Then he considered the outcome of the tests (chest radiograph, blood tests, cardiac enzyme blood tests and an ECG), being reassured by normal results. He then considered 3 options to manage these patients; firstly, to watch and wait and ask the patient or GP to

[67] Thomas Bayes 1702-61 devised a mathematical theorem to assess the probability of an outcome based on the pre-test probability and the likelihood of all the possible outcomes COOPER, N., FRAIN, J. & PROQUEST (FIRM) 2017. ABC of clinical reasoning. *ABC Series.* Chichester, England: Wiley Blackwell : BMJ Books,.

[68] Chest pain from a blocked coronary artery which can lead to a heart attack

[69] A clinical invention where blockages in coronary arteries are removed

investigate if further symptoms, secondly arrange a further test with hospital review or finally arrange an outpatient appointment.

> *"So, things that go through my head with, with these sort of patients, are age and the pre-test probability of having coronary artery disease. Whether they've got known coronary artery disease and then it becomes easier once you've got X-rays, blood tests, negative cardiac enzymes and normal looking ECG. I think if I remember her rightly, again she had an atypical presentation of chest pain. There was non-exertional, and all of her tests were normal, so although she has known coronary artery disease, she didn't have anything that was sinister or severe at this point in time and those patients are best managed on one of either two pathways. One is to, well three, one is, one is to continue doing nothing, reassure and just take a 'watch and wait' approach and only go to the next level of intervention or investigation if they have ongoing symptoms, and you leave that to the patient and the GP. Second, would be whether the patient would benefit, there's enough in the history to put in a second level of investigation such as a myoview or a stress echo [cardiac investigations] which we should order, and we should see the patient back in the hospital with the results of. And the third one would be whether you went straight to investigation anyway, but as an outpatient."* [Reuben interview]

From Reuben's experience in supervising junior colleagues, he has noticed the difference between expert and novice thinking processes. Reuben thinks as doctors gain experience, their ability to notice the unconventional case improves. He tries to teach his students to deepen their thinking and challenge their interpretative skills.

> *"the students pull out the information that they pull out, ultimately, and its usually information that's taken at a first or second step level rather than, 'Well, actually what does this mean for the person? Can, does this, do these five bits of information fit together in a jigsaw or are there gaps there?' and I suppose that's where good registers,*

consultants then come into to say, "Well, actually there are gaps there. Let's explore them a bit more."

…So, it's trying to, trying to get the students to see it in this slightly different way rather than just fact finding. It's to fact find but get them to think about what each fact means and do the facts fit together, and then you've got to learn how to ignore certain facts that don't fit together. [laughs] Because they're not so important, hopefully." [Reuben interview]

8.3.3c Relational uncertainty in patient management

The negotiated nature of management plans demonstrated earlier (4.2) was also a source of clinical uncertainty. Rowley demonstrated how to incorporate the patient's wishes into the management plan. He was made aware at the triage stage that his patient did not wish to stay in hospital overnight and incorporates this into his clinical management plan. He discussed this provisional plan with the patient and her daughter.

3.30pm Rowley explains to patient and her daughter the plan for:

1. *Nebuliser to help lungs*
2. *CXR*

Patient asks – 'Can I get home?'

Rowley – 'Yes we should get you home'

Patient asks – 'Can my daughter get home now?'

Daughter says – 'Don't worry about me!'[Rowley fieldnotes]

The patient had two nebulisers[70] to try and improve her breathing and oxygen saturations. Unfortunately, it took some time for the patient to respond to treatment and she was getting

[70] Inhaled medication to aid breathing by relaxing the airways

distressed. As Rowley was aware of the patient's wishes not to attend hospital, he tried a second set of nebulisers to try and improve the clinical problem. Her oxygen levels improved and so she was allowed home overnight but to return the following day for re-assessment. Rowley was careful to involve her daughter as he thought that successful ambulatory care relied on relative's involvement. He explained the balance between meeting the patient's wishes and making a safe plan for ambulatory care.

> *"I think her daughter could see how much she didn't want to go up to the acute hospital and, and so, you know, it's finding a balance between not wanting to and not taking too big a risk over sending people home."* [Rowley interview]

One other source of relational uncertainty was caused by senior clinician's supervising other colleagues. Ruby provides a key example when supervising the ANP in her case. She apologised for "*taking over*" [Ruby fieldnotes] in the patient assessment. But Ruby explains this was because she felt that she had ultimate responsibility for the patient and so was dependent on her colleague providing her key information on the patient for her decision-making.

> *"it also depends on how confident somebody is in telling you the information. And we have to, you know, you have, you have to trust and I do trust, as I say I trust everyone here. But I guess it's trusting your own instinct with the information that you've got. So for example that's why I pry a little bit more and say, "What about this, what about that?" But again, I feel that it might sound like I'm not trusting the person with how I'm asking it."* [Ruby interview]

She sais that she trusted her team, but to reduce her personal uncertainty she tends to delve deeper, which some colleagues might find undermining. Team interactions in patient management are discussed later (8.4.4).

8.3.3d Conceptual uncertainty in Patient Management Decisions

Renata faced conceptual uncertainty as she was facing a clinical problem with no easy answer. She explained the difficulties of managing heart failure with renal impairment in a frail older patient.

> *"It's still a tricky one because you worry that if you try to take a bit of the fluid off, which I think was the right thing to do, that actually, you're just going to make her more dehydrated."* [Renata interview]

The patient could not really contribute to the decision making, other than expressing a wish to return home.

> *"She wasn't really clear why she was here and what was going on and I didn't think she really was able to understand or grasp the pros and cons of the thing, other than saying that she wanted to go home. She couldn't tell me what particularly her symptoms were, and I don't think she was really helpful in being able to work out what's going on."* [Renata fieldnotes]

Renata had to consider how to facilitate this and whether ambulatory care would be suitable. She did this by consulting the patient's son who helped her understand that this had been a gradual decline. The son felt his mother was coming to accept that she was not going to recover, and advanced care decisions had already been discussed. This helped her plan and tailor the treatment plan as Renata arranged community care with symptom control as the aim, rather than a more aggressive treatment plan.

She also explained if families have not talked about advanced care planning then she might have considered a different management plan. Renata was aware that she could send this patient to Warmsley for a hospital admission, and for some families this might help them think that every possible care had been taken. However, in this case she was happy that the patient's son felt community care was the best outcome for his mother.

"if you don't have the families on board when you're sort of making decisions, because I mean you could arguably have sent her across to the big hospital, in order to monitor her very closely. But that wasn't what she wanted and also it wouldn't have really changed the outcome. But it would have been easier then to turn round to family and say, "Well we've done everything we possibly can." But I know actually they're not going to really do much more than we can do, so it's more about our perception." [Renata fieldnotes]

8.3.3e Practical uncertainty in Patient Management Decisions

Practical uncertainty in patient management was exhibited where non-standard management plans were made by the clinicians. When plans were individualised to incorporate patient's wishes (Rowley) or adapt clinical advice for AEC (Rufus), this introduced practical uncertainty. Rowley re-negotiates his clinical plan with the nurse twice. The first time he is needed to write a prescription to facilitate his plan for the patient to go home. The second time, he is told about the patient's distressed state and wish to go home and agrees the patient can return home, but suggests the patient returns earlier the next day. The drivers for his management plan are the patient's wishes, his objective assessment of her illness using the saturations as a marker, and input from the nurse who negotiates on the patient's behalf.

5.15 pm Rowley is interrupted seeing Patient C assessment by the nurse with a request for patient A

Nurse asks – 'Can I have a TTO (To Take Out: a patient prescription) for patient A'

SDr says – 'I would like Patient A's oxygen saturation of 83% to improve before discharge

Nurse asks – 'Is there a plan for review?'

SDr – 'Yes tomorrow'

5.45pm Nurse says 'Sorry to interrupt you but patient A is wishing to go home' She reports that the oxygen saturation has improved but the patient is agitated after

salbutamol. They agree for an early review the next morning. The nurse hands this over to the patient who agrees the review time. [Rowley fieldnotes]

Rufus provided an example of where specialist advice is modified for the AEC setting. His index case has had a diagnosis of heart failure made the previous day by one of Rufus' consultant colleagues. They arranged a cardiology assessment and the cardiologist has recommended that the patient have an echocardiogram and stays in hospital. However, Rufus felt the patient was well enough to manage at home and return for the test later. The purpose of Rufus' review was to discuss the cardiology advice with the patient and decide how to practically arrange the echocardiogram. Rufus explained the need to interpret advice from his colleagues for the AEC setting (6.3d & e).

"The cardiology actually thought he needed admission, but I think that's because they weren't terribly familiar with the whole ambulatory sort of ethos, as a lot of the specialities aren't necessarily. So, we sort of, we judicially interpret their advice and apply it, I guess. [laughs]". [Rufus interview]

8.3.4 Clinical Uncertainty in AEC Prognostic Decision-Making

8.3.4a Technical uncertainty in Prognostic Decision-Making

In cases where technical uncertainty was still present, this was usually related to requiring further test information. However, the clinicians felt happy that these investigations could safely be arranged later (Rufus, Ruth). For other cases such as Rowley's he would have preferred her oxygen levels to have improved, but due to her wishes to be at home, he tolerated discharge with this uncertainty only partially addressed.

8.3.4b Conceptual uncertainty in Prognostic Decision-Making

Providing AEC care required participants to work in a different way to their hospital or GP colleagues. But the holistic and creative nature of AEC work was appreciated by the participants (4.2.3b)

"it's much more fluid in a way of, of how you're seeing patients and particularly if the Unit's quite busy, you'll see one, make a plan, go to see the next patient. Possibly even start treatment on one patient just purely on the basis of what their bloods and obs are, and at least you know from a medical point of view, you're dealing with the acute presentation. But then you go back for the sort of psychosocial, emotional side of things just to find out how life's, you know, this presentation's affected them or how life's treating them generally." [Ruby interview]

The conceptual challenge of providing ambulatory care was described as challenging the default position of the hospital admission as the gold standard of care. One participant explained how he had instead moved to an ambulatory care by default position.

"So, we went down the route of the mantra of ambulatory care by default. So, everyone referred to us is suitable for ambulatory care. It's up to us to prove they need admission not that they are suitable for discharge. So, it's, 'Why are you admitting? What's the benefit and what are you going to gain?' So, 'What are we going to do to this patient overnight? Is it just a roof and a bed or is there something actually that we're going to achieve?' Having outreach services delivers investigations, like, point of care testing at home. If you want a blood test, well we can send somebody over to you to get the blood test done, rather than you to us. Antibiotics similarly, so I think it all got wrapped into one with national framework/local framework of ambulatory care by default" [Reuben interview]

Although AEC was established in most of the sites for some time, changing the culture of hospital-based medicine was an ongoing source of tension between departments.

"I've been told that some of the previous consultants may not necessarily have ambulated. But to make teams rethink about ambulatory options, options within the community because I think there's a mindset that whatever happens, only happens in hospital bed. That's not true, so, you know, that doesn't happen. It doesn't always

happen like that. There are some things that do require a hospital bed and there's some things don't, and it's about changing that mindset." [Rita interview]

Some participants described that it was hard to recruit to AEC because as the cognitive work was difficult and participants had a broad range of clinical responsibility.

"so the reason clinicians don't like working here because of that, is because of the responsibility for so many streams…needed to go from handling a phone call, looking at the floor state as it were, of what's happening to patients on a generalist level and then going and drilling deep and making sure you're not missing something specific for a patient" [Ralph interview]

Patients also needed an explanation of what ambulatory care meant. Some patients arrived with "*huge suitcase because they think they're coming in for a fortnight*" [Rosa interview]. But other patients were pleasantly surprised by the experience. Rosa described a letter from a patient who had changed his mind about AEC.

"he's talking about how he didn't really like progress. He doesn't like change. He didn't really like the fact that Woodleigh was here. But then he had to come here and how he loved it and how he went home to his wife's cooking and his own…So, people who have been here think it's great but I think generally out there it's a new idea. People think if you're poorly you should be in hospital." [Rosa interview]

8.3.4c Practical uncertainty in patient management

Practical uncertainty occurred during the closure stage of the AEC assessment. Clinicians worked hard to accommodate patients' wishes such as in Ruth's case. Some patients needed management plans that increased their confidence at home. For example, Rita thought it would be prudent to involve the physiotherapist to assist with her patient's discharge. Rita thought that by demonstrating to the patient she was able to manage the stairs would help her feel more

confident at home. In addition, she suggests that a hospital at home nursing team see the patient on discharge to aid the transition back home.

> "*the decision-making round her is that we should still try and get her home, but to give her added confidence and do an assessment as she's got the stairs, thirty-two steps to get to her flat, we've asked our therapy colleagues to come and assess her and they're about to do a stairs assessment on her as we speak … The kind of support or thinking around getting her home is using, just for her confidence more than anything else, so we're just currently thinking about a Welcome Home package through the home re-enablement team*" [Rita interview]

Unfortunately for Rhoda's patient, pressures in the other parts of the health system prevented her increasing the patient's care package at short notice.

> *"But when I spoke to her today about what we could do to help, because she said she was struggling with day to day activities, she thought somebody coming in each day would be helpful to help her and so I asked the OT about what the possibilities of arranging that would be at short notice, she said, "Probably none."* [Rhoda interview]

Rita felt the patient had the ability to decide her preferred location of care. She discussed an intermediate care bed with the patient, who chose to stay at home with input from the hospital at home team. But the hospital at home team could also alert the AEC clinicians if the patient was struggling.

> "*I did give her the choice between an ICB (intermediate care bed) bed and that's what, she preferred hospital at home because she wanted to be in her own environment which is fine and probably better for her*" [Rhoda interview]

8.3.4d Relational uncertainty in Prognostic Decision Making

Discussion with the patient could sometimes increase clinical uncertainty as in Reggie's case (4.2.2d new information regarding her Diabetes). More often, it was a way of reducing and

managing the risk. In Reuben's case, his explanation of the certain and uncertain aspects of her illness, opened the discussion and allowed the patient to offer new information that could explain her symptoms. This reassured all parties and facilitated a discharge from AEC, even though no definitive cause for her pain was found.

> *"Explains to patient – we checked the tests and all normal so far. Explains the bloods and ECG normal and reassuring. Not typical for your angina. Offers explanation may be after effects of the LRTI or could be "gullet problems". I'm reassured and I hope that you are.*
>
> *The daughter agrees that has had swallowing problems. The patient volunteers that has had acid reflux and had an endoscopy"* [Reuben fieldnotes]

8.3.5 Clinical Uncertainty and Decision Modification in AEC

This thesis was able to observe how decisions were modified in real time. This was often due to the presence of clinical uncertainty. Five types of clinical uncertainty were noted to cause disease modification during the AEC complex intervention; Technical, Cognitive, Relational, Ethical and Practical.

8.3.5a Technical uncertainty and Decision Modifications

Technical uncertainty caused by a lack of information often caused modifications to the clinical plan in AEC. Rosa's index case illustrated how a comprehensive assessment could find additional unaddressed clinical problems. Further interpretation of the chest radiograph was needed by the radiology department and a new long-term problem of osteoporosis was found. In Rowley's case technical uncertainty arose as the patient left before she had responded to treatment. However, he felt confident to ambulate this lady due to his clinical experience gained in general internal medicine.

> *"So I suppose the only thing slightly that worried me was that her Sats were still quite low when we discharged her…but she did look fairly comfortable once she was dressed in her own clothes and that's probably my biggest driver these days is how people look*

when you get them up and move them around a little bit as to how confident I am they are going to be alright at home overnight." [Rowley interview]

8.3.5b Cognitive uncertainty and decision modification

Cognitive uncertainty also changed clinical decision-making. In Ruby and Ralph's cases this was due to diagnostic uncertainty; in both cases the senior doctor was concerned whether the initial assessment by the less experienced clinician considered the full range of alternative diagnoses. This was discussed in diagnosis (8.3.2) and management (8.3.3)

8.3.5c Relational uncertainty and decision modification

Relational uncertainty was the main source of clinical uncertainty that modified clinical decisions, due to the negotiated interaction between the patient and clinician over the clinical plan. In most cases this was driven by the patient; some were tired of the hospital (Rowley, Rufus), others had external pressures (Ruth) and new information was sometimes exposed during the consultation (Reggie). For others, interactions with another healthcare professional were the source of relational uncertainty, I discuss Rufus's index case as an illustration of patient-driven relational uncertainty and Rosa's to demonstrate clinician-driven relational uncertainty.

Rufus' patient was diagnosed with heart failure and had been assessed by the cardiology consultant earlier that day. The cardiologist recommended that the patient have an echocardiogram and was admitted overnight to hospital. The purpose of Rufus' review was to discuss the cardiology advice with the patient and decide how to arrange the echocardiogram.

"The cardiology actually thought he needed admission, but I think that's because they weren't terribly familiar with the whole ambulatory sort of ethos, as a lot of the specialities aren't necessarily. So, we sort of, we judicially interpret their advice and apply it, I guess. [laughs]". [Rufus interview]

Rufus discussed the options for an echocardiogram with the patient and his wife. The patient explained that he was fed up of being in hospital and it had already been a long day in hospital. The patient wanted to be at home, rather in hospital. Rufus and the patient negotiated that he would return the next day for an echocardiogram, mainly because this was needed for the hospital's targets.

> *"Discussed preferences – cardiology would prefer patient to come back for an echocardiogram and to see the heart failure nurses tomorrow or they could return home and be seen next week. Discusses target for hospital needs to be seen within 24 hours*
>
> *Patient prefers home (sick of hospital) but if better for the doctor's target they will come back in the next day"* [Rufus interview]

In contrast, in Rosa's index case, another clinician's advice was the source of relational uncertainty. Her patient had not responded to treatment as usual and so she called the renal and urology teams for advice. Rosa discussed this advice with a senior doctor that she knew well because she felt dismissed by the specialist. Rosa and the senior doctor then interpreted this advice in the light of their ambulatory experience. They modified the specialist's plan, adding in a further patient review to repeat renal function tests the next day.

> *"Rosa and Senior Dr discuss the creatinine of patient B – discussed renal and urology advice from the previous day. They recap the key points of advice*
>
> *Renal team: Senior Dr says 'they didn't want to know'*
>
> *Urology: ANP states that the advice she was given said that it will take 'at least 4 days' for the creatinine to improve'*
>
> *But this advice is not congruent with their experience – use of shrugged shoulders and shaking heads*
>
> *They discuss that patient B is passing clear urine in good volumes, which is seen as a reassuring factor*

A joint plan is made to discuss this patient with a consultant (rather than a registrar) the following day if no improvement" [Rosa Fieldnotes]

This example demonstrates how negotiated interactions with other clinicians can affect relational uncertainty at the plan progression stage. It also shows how multiple types of uncertainty can interact. Technical uncertainty resulted because the patient had not recovered as Rosa expected. Then relational uncertainty and conceptual uncertainty combined when Rosa tried to interpret the specialist advice she had been given, adapting this for the ambulatory setting. The situation stimulated personal uncertainty, which Rosa managed by talking to a trusted advisor and a small modification of the management plan alleviated her concerns.

These cases demonstrate how patient and clinician driven relational uncertainty modified AEC decision-making, with clinicians changing their plans due to the clinical uncertainty present. In addition the examples show how multiple types of uncertainty can be present and interact.

8.3.5d Ethical uncertainty and decision modification

In addition to relational uncertainty, ethical tensions can also cause clinical uncertainty, due to differences between specialist advice and AEC practice. Ethical dilemmas can result when best practice mandates practice, but this differs from the patient's agenda. This is seen in Rufus' case where the specialist advises a next day echocardiogram as this is a national target. Rufus manages this situation by discussing the options with the patient and being explicit about the suggested timescale for the echocardiogram.

8.3.5e Practical uncertainty and decision modification

Practical uncertainty in plan progression was often seen when patients had complex social needs as well as medical problems. This was seen in Roger and Rita's case, where multidisciplinary team assessments aided the clinician to judge how feasible it would be for the patient to be at home during their illness (8.4.4). Often therapy teams would suggest tools and aids to activities of daily living or hospital at home teams would assist discharge decisions.

8.3.6 Awareness of uncertainty in the AEC Complex Intervention

Clinicians described their awareness of the clinical uncertainty of work of ambulatory care. They described alterations to their clinical practice and risk tolerance. Rufus felt that when working in GP felt he had to lower his threshold for hospital admissions as the patient population in the community was different to AEC. He described situations where he had managed unwell patients outside the hospital and considered whether he should have referred these cases.

> *"In GP, I think I used to refer arguably less into hospital, or maybe that's not true, differently into hospital, probably slightly differently based on an understanding of the threshold of what can be managed. Sometimes that will go the other way as well, where you have to be careful that you don't miss apply these things as well. I remember cases where I left stuff at home that I should have sent in, on reflection"* [Rufus interview]

Ruth also thought her threshold for concern had changed. Test levels that would worry her in General Practice she now interpreted differently.

> *"But we all know that sometimes the numbers can be quite frightening and actually working here, I've got less worried about, you know, CRPs of 90 but I do worry about CRPs of 300. So, it's, it's sort of shifted my worry level a little bit to the higher end."* [Ruth interview]

8.3.7 Summary of Clinical Uncertainty types in AEC Decision-Making

This thesis empirically identified that eight types of clinical uncertainty were present during AEC Decision-Making. Technical uncertainty was seen at every stage of the consultation, due to the limited clinical information available in urgent care. This was often present in the early stages of decision-making affecting triage and diagnostic decisions. In contrast, Practical uncertainty affected the later stages of the consultation, where plans were modified to the patient. Negotiated decision making was often seen to modify the AEC clinical plan; this could be patient or clinician driven. Cognitive uncertainty could arise from information overload or complexity in the patient case. This type of uncertainty was often seen to modify patient management

decisions. Emotional and personal uncertainty were seen to cause some degree of clinician anxiety or frustration, often due to too little or too much clinical information. Conceptual and ethical uncertainty often affected the management and prognostic decisions and were seen to modify AEC clinical plans. Conceptual uncertainty often resulted from AEC community of clinical practice where clinical problems usually treated in hospital were treated in an alternative way. AEC clinicians needed to review advice and guidelines from hospital or primary care and interpret them for the AEC setting. Finally, no examples of scientific uncertainty were observed in this data set, this could be due to the clinicians working with diseases with a well-established evidence base, rather than with rare illnesses.

8.4 Managing Clinical Uncertainty in AEC Decision-Making

In this section I discuss how the AEC Clinicians manages uncertainty in their decision-making. I use the taxonomy described by Kostopolou (Kostopoulou, 2009)(8.1.3c Table 30); reduce uncertainty, acknowledge uncertainty and decision support. However, two additional measures were demonstrated by AEC clinicians to manage clinical uncertainty; team decision-making and continuity of care (Table 38). In this section I describe how each of these strategies was used in the context of uncertainty in AEC decision-making to provide a toolkit for clinicians.

Table 38 Managing Uncertainty in AEC Decision Making[71]

Managing uncertainty in AEC decision-making	
Response to Uncertainty	**Specific Strategy**
Reducing Uncertainty	**Information gathering**; discussion with patient or family, investigations, second opinion **Time**; deferring the decision until more information available **Management**; Initiate treatment on basis of hypothesized diagnosis and monitoring,

[71] Adapted from KOSTOPOULOU, O. 2009. Uncertainty in Medical Decisions *In:* KATTAN, M. W. & COWEN, M. E. (eds.) *Encyclopedia of medical decision making.* Los Angeles ; London: Sage.

	Evidence; Use contextual and circumstantial evidence (strategy for experienced clinicians)
Acknowledging Uncertainty	**Contingency planning**; safety netting, follow up, further tests, referral to specialist, shared decision making with the patient
Decision Support	**Decision Support Aids**; clinical algorithm, practice guidelines, decision support aids
***Team Decision-Making**	**Team Decision-Making;**
***Continuity of Care**	**Continuity of Care;**

*New strategies developed in this thesis

8.4.1 Reducing Uncertainty in AEC

In AEC, clinicians were noted to reduce uncertainty using four main strategies; information gathering from the patient or their family, arranging further investigations, obtaining a second opinion and using contextual evidence. In contrast with primary care, trials of time or treatment were infrequently used. This section provides further examples of how these strategies were used in the AEC context by clinicians

8.4.1a Information gathering to reduce uncertainty

8.4.1a.1 Obtaining further information from the patient and/or their family

The AEC clinicians often sought further information during their consultations. This could be from the patient and frequently also involved the family. Further information was commonly sought during triage and diagnostic decision-making stages of the consultation, where technical uncertainty was present. During triage, Rowley obtained further information about the patient's wishes which he used to tailor his AEC clinical plan (4.2.2a). Whereas Renata, during diagnostic decision-making, needed to gain further information from the patient's son to understand the clinical problem (4.2.2b).

During the later stages of the AEC CI, clinicians concentrated on gathering information that would directly impact on the clinical management plan. Ruby asked questions to consider alternative diagnoses and Rhoda reviewed the medical notes to reduce technical uncertainty. For other clinicians' technical uncertainty could occur late in the consultation, leading to a systematic search for further information. For example, Reggie discovered new information, which prompted him to ask the patient about her diabetes (4.2.2b and 4.2.3a).

8.4.1a.2 Investigations to reduce uncertainty

The second strategy to reduce uncertainty was to arrange further investigations. Test results were used to reduce technical uncertainty, individually tailor clinical management plans, assess risk during the AEC consultation and manage their cognitive workload. Some clinicians requested tests to reduce technical uncertainty from a lack of clinical information. For example, further blood tests aided Rhoda in monitoring the severity of renal impairment.

> *"10.20 am Female patient dehydrated, shingles, hyperkalaemia, reviewed lab bloods high urea, Rhoda suggests checking for signs of a Gastrointestinal bleed. Rhoda says this patient needs point of care bloods, intravenous fluids and bloods* ***(Patient A)"*** [Rhoda fieldnotes]

Arranging tests was often done to individually tailor the AEC clinical management plan. Rowley was worried by the patient's daughter describing psychotic symptoms with steroid treatment in a previous illness. He decided to check the patient's white cell count and if this was low, she would not require any steroid treatment. He combined the test information, with corroborating information from the patient's hospital record to produce an individually tailored plan (4.2.3b).

> ***3.40pm*** *Rowley discusses the patient's previous psychotic symptoms with me*

He thinks the steroids caused a brief psychosis and is going to decide whether steroids are needed. To do this he checks the eosinophil[72] levels, which are low. He then refines the plan to avoid steroids if possible

***3.45pm** Rowley review's the discharge letter from Warmsley – low CRP then – as worse likely to need antibiotics ->he decides to await CXR before deciding*

[Rowley fieldnotes]

Ralph and Reuben instead used test results to perform a risk assessment during prognostic decision-making (4.2.2d). For example, Ralph was reassured by the patient's clinical history and clinical appearance, but the junior doctor was worried about a serious cause for the patient's symptoms such as pneumonia or a gastrointestinal haemorrhage. By using test results with a scoring system, Ralph and the junior doctor were reassured there was likely no serious cause for the patient's symptoms.

Finally, some clinicians described using tests to manage the cognitive workload of AEC (2.2). During the observed shift Reggie mentioned how when busy he orders more investigations *"when I'm busy I do more tests"* [Reggie fieldnotes]. Although he tried to be judicious about ordering tests, when under pressure at work, he wished for further information to support his decision making. Expanding on this in the interview, he explained that when the unit is busy, he preferred that information was ready for each patient in time for his senior review. In this case, his rationale for ordering a D-dimer test early is that the test would take time to access.

"A lot of D-dimer's are done which are entirely unnecessary, but it takes a while to get that test done and sometimes it's another two hours you haven't got. So actually to, to get through people a little bit quicker, it's nice to ask them straight off rather than asking for the very basic and then expanding it." [Reggie interview]

[72] A subtype of white blood cells

8.4.1a.3 Obtaining a second opinion

Across the sites, clinicians often asked for further advice from their colleagues. In Warmsley, this process was embedded in the AEC complex intervention with junior doctors performing an initial assessment that was verified by the senior doctor's clinical opinion. Sometimes the junior needed reassurance (Ruth) and sometimes advice (Ralph and Reuben). Analogous processes were seen in the community but with advanced nurse practitioners (Ruby and Rowley). Joint assessments by two clinicians often lead to refinement and alterations in the clinical plan, as the senior doctor uses their considerable clinical experience to guide the AEC management plan.

Rowley considered how he managed cognitive uncertainty and explained he often arranged a further patient assessment or asked for a second opinion from an AEC colleague or specialist at the hospital. He described how this could modify his decisions and how this might affect patient care.

> *Interviewer:* *And what might you do if you were unsure?*
>
> *Rowley:* *So it's a good question. [pause] Bringing [the patient] back for review is always helpful to see if you're doing the right thing…and sometimes you do just have to bite the bullet and send people up to the acute hospital and say, "I'm not quite sure here. I'm not happy sending them home. Can you see them?" And the other thing that's nice is that if you're, what you, because there's generally a new, a different clinician here every day, then occasionally, you do four or five day stints like I just have, you can, you bring someone back on a day when someone else is here and so then you get a second opinion. So that I think works quite nicely. It can be conversely not work very well when you've confident you've got the right thing and set up the right management path and someone comes in and changes it. [laughs]* [Rowley interview]

8.4.1b Trials of treatment and time to reduce uncertainty

AEC clinicians discussed monitoring the response to treatment during the prognostic stage of the AEC assessment (4.2.2d). Trials of time were occasionally used to assess response. Reggie observed the patient trajectory over the day to reduce diagnostic uncertainty.

> *"if they're unwell or you think they're border, slightly borderline, you observe them throughout the day and sometimes that causes consternation because there's an urgent decision that has to be made right now. But actually, if you observe somebody for a while and you see that they're stable or even better throughout the day then that allays that, that worry of uncertainty."* [Reggie interview]

Trials of treatment were more frequently observed. Rita uses a trial of treatment as her strategy to manage her index case. After a brief assessment in A&E, Rita asked her junior doctor to assess and start treatment. When Rita returns to review the patient later, the junior doctor explains that all the tests were normal and this lady had been treated with intravenous fluids. The therapy team had assessed her level of function and felt she could manage at home. The patient had also eaten a sandwich and an ice-cream, which reassured everyone. The trial of treatment in this case, reduced the clinical uncertainty by reducing technical, relational and practical uncertainty. Technical uncertainty was reduced by the normal blood tests suggesting a low severity illness. Relational uncertainty was reduced as the patient felt more confident to manage at home. Finally, practical uncertainty was reduced by the multi-disciplinary assessment.

8.4.1c Contextual evidence: Negotiation with patients and families

In AEC, clinicians frequently negotiated the management plan with patients and their families (4.2.3a). They were observed to obtain contextual information, which was used to individually tailor the clinical plan (4.2.3b). They asked how the patient and their formal and informal networks of care how they felt managing their illness at home. Some patients wanted to go

home despite the team's concerns. Rosa described how she would assess the risk and negotiate a management plan in this scenario.

> *"So it just depends on how ill they are, what their circumstances are like, is there anyone that can stay with them and what do they want to do as well. Some people are more, some people are happy to take risks. We've had patients where we've said to them, if you go home you might die,' and their response was, "Well, these things happen.""* [Rosa interview]

Rowley and Renata felt it was very important to involve the family of older patients they were considering for ambulatory care. They both recognised the strain that this type of care can place on relatives and carers.

> *"I think for all of our patients it's important, older patients particularly have concerned families and it's useful to allay their concerns and try and get them on board with the treatment plan particularly I think when you're not admitting people to hospital because you go off and have an expectation that their relatives going to be admitted and it, it's nice to know if there's a lot of resistance to that early on and you can explore their concerns early on rather than letting it hang over them."* [Rowley interview]

Renata described how different families responded to the idea of AEC, and this was often coloured by their previous experiences of hospital treatment.

> *"Often it's usually, but not always, it's often relatives that worry about patients being ambulated, but often patients are as well. I think a lot of them see the hospitals as a place of safety and home as a place of risk. Whereas, I think health care professionals having seen what happens in hospitals, more from the risk of infection from other people, and from the deconditioning that happens in frailty, from the worsening of cognitive impairment and when it's ridiculously busy like it has been over the last few months, or half a year or however long it's been, you know, the risk of actually coming*

into hospital changes a little bit and you can see that as a health care professional. Whereas as patient's relatives often can't see that. They can often see it when someone's been in hospital. So, if a patient or relatives had a long admission beforehand, they're often much less willing to consider that and want to be ambulated because they've worked out the downsides of going into hospital." [Renata interview]

AEC clinicians reduced uncertainty by gathering further information from the patient and their family, further investigations and advice from colleagues. Contextual information was often combined with a risk assessment to negotiate the AEC management plan with patients and their families. Both clinical information and contextual information were required to facilitate the negotiation of an individualised care plan in AEC. Trials of treatment were used to assess the response to AEC treatment. Trials of time were infrequently observed due to the urgent nature of the AEC assessment.

8.4.2 Sharing clinical uncertainty with patients in AEC

Communicating the clinical uncertainty in AEC and the clinical plan was a key strategy for the AEC clinicians to manage the expectations and concerns of the patients and their relatives. I observed two main ways that this was performed in AEC. First clinicians negotiated AEC decision-making (4.2.3a) by sharing the clinical uncertainty with the patient (explain, explore and acknowledge). Second, they provided contingency plans that were individually tailored (4.2.3b) to their patients.

8.4.2a Sharing uncertainty with patients; explain, explore, acknowledge

AEC clinicians discussed clinical uncertainty with patients in the later stages of the AEC consultation, often whilst negotiating the management plan or considering the prognosis. This shared dialogue between patient and clinician was used to manage relational uncertainty (8.3.3c). The AEC physicians were observed to share the clinical uncertainty by explaining the uncertainty, exploring the risk and acknowledging the patients' views. Reuben explained what

this process entailed in practice; an explanation of provisional diagnosis, an exploration of the clinician's concerns and acknowledging how this might impact on the clinical management plan.

> *"you talk through your concerns, your thoughts and what you think the diagnosis is maybe or is not, and then a strategy for going forwards, in terms of further investigations, and then allow the patient home."* [Reuben interview]

He also described this process as a cognitive checkpoint. By acknowledging the patients' view and his concerns he could then modify his plan from ambulatory care. For example, if on exploring the clinical uncertainty he felt the risks were too great with AEC, he would arrange hospital care.

> *If they're unwell or they have symptomatology that could fall into the, 'this could go wrong,' category, then, and, and you're not sure, then I think you have to admit and do things as an inpatient because it may be more time critical than you can achieve at home."* [Reuben interview]

Reggie explains how important shared conversations are to his clinical practice. He thinks this is particularly useful when there is diagnostic uncertainty (4.2.3a, 8.3.2).

> *"especially when we don't know what the diagnosis is, a hundred per cent, we should be having that shared conversation"* [Reggie interview]

This was observed in practice where he shared uncertainty with his patient by acknowledging her concerns. An older lady he had seen was worried about taking morphine for pain relief. She was a carer for her husband and thought it might make her too tired to care for him. Reggie acknowledged her concerns about using painkillers and provided an explanation which allowed them to negotiate an individually tailored AEC plan. Reggie and the patient agreed to try a different painkiller with fewer side effects.

> *"Patient – I have to be careful taking painkillers, I look after my husband*
>
> *Reggie – Morphine is a 'cleaner drug' and can reduce constipation*

Patient – I'm already on Laxido (a laxative)

Reggie – With liquid morphine, you can control it, you seem sensible

Patient – In my mad house I have to be

The patient agrees to try and oral morphine and will ask the son to collect this from the pharmacy" [Reggie Fieldnotes]

Reggie explained how used the patients' concerns to inform his advice and management plan. He described how he acknowledged her fears, explored the risk-benefits of the different drugs and explained how he thought the new painkiller might help her.

"So I'll often come to the, get to the meat of the consultation, what I want to do and then hopefully you've gone down that far and sometimes leave a bit at the end and if they, depends on their trust and sometimes you don't have that trust as a patient or you haven't had that decent consultation. But sometimes if they've listened to you and they've thought that things have made sense, then you lead onto what, what's going on and with her I thought, 'Well actually, why, why does she want codeine rather than morphine?' because she thinks it's weaker and sometimes you can flip the argument on the head and sometimes I found myself I do more and more is say something and then I shut up. And if you then shut up and get them to talk it through themselves then it's interesting how they can make that case and if you can then out a little bit on the end, then they can sort of agree to it, if that makes sense." [Reggie interview]

The strategies of exploring, explaining and acknowledging uncertainty were also observed during discussions with relatives. Renata had very little initial information about her patient (8.3.2a) and called the son for more contextual information. This helped her management plan as she was able to understand the background.

"It always comes much clearer when you get a collateral and speaking to the son gave me a lot more information." [Renata interview]

She explained how exploring his thoughts and his reports of his mother's views helped her realise this was a case where a palliative approach to symptom management was most appropriate. If the son had not volunteered information regarding his mother's wishes and his understanding of her illness, the case would have been harder to manage. Renata has frequently needed to explain to families exactly how unwell their relative is, some find this hard to hear.

> *"Had I not been able to have that conversation, it would have made it very difficult, [um] mainly because the family wouldn't have been aware of how precarious the situation was…*
>
> *…But that's why you start talking about the advance care planning side of things and finding how far you should go and start dropping some warnings to the family because she's got a really bad heart which is only going to get worse, and she might have a bit of respite but that's how we're going to go."* [Renata interview]

She considers what might have happened had she not gained that contextual information (5.1.1a) or explained the uncertainty in prognosis to the son. Renata may have decided to transfer the patient to a larger centre for more aggressive treatment.

> *"if you don't have the families on board when you're sort of making decisions, because I mean you could arguably have sent her across to the big hospital, in order to monitor her very closely. But that wasn't what she wanted and also it wouldn't have really changed the outcome. But it would have been easier then to turn round to family and say, "Well we've done everything we possibly can.""* [Renata interview]

The participants were aware of the clinical uncertainty in AEC and shared this with their patients. They explained their current understanding of the patients' illness, explored the risks and benefits and acknowledged the patient's views. The AEC clinicians outlined an initial AEC management plan but allowed room for negotiation once the patient had considered the options and tailored the plans accordingly. This required considerable knowledge of current best

practice, the patient's concerns and the potential benefits or adverse consequences of AEC treatment. In addition to explaining, exploring and acknowledging uncertainty, AEC clinicians also provided individually tailored contingency plan for patients, these are discussed next.

8.4.2b Contingency planning

Contingency planning, often referred to as safety-netting in the GP literature, was a common strategy to manage uncertainty during the management and prognosis decisions in the AEC consultation. Reuben succinctly explained what he thought this stage should contain. He felt that a contingency plan should contain a description of the likely trajectory of the next 72 hours with individualised warning signs that signalled that the patient was deteriorating.

> *"what the warning signs are for them, in terms of whether they should come back and how they should, you know, behave over the next, depending on the condition, next seventy-two hours essentially. And I think it's my, our role to give patients confidence wherever we can. So, for those conditions such as, you know, pain related conditions where you know the condition is self-limiting, then you've got to give patients confidence that the pain will be better in a couple of days, in a week, in a month, whatever the time frame is. And not making it too nebulous because I think they need to derive confidence from the confidence of the health care professionals to say, "This is the likelihood. This is what's going to happen," and then moving things forward from there."* [Reuben interview]

Ruth described how she used safety netting advice and telephone access to aid continuity of care. She thought that she used safety-net advice in a similar way in AEC as in General Practice. Ruth felt that having a telephone number for access to a team who had their clinical information reduced patient anxiety.

> *"We do a lot of it in ambulatory care here but then I used to do a lot of it as a GP, so I don't really see that any different. I don't think that's a difference because I mean we always safety net our patients in General Practice. So doing it comes naturally I think,*

and ambulatory care we do it and we use the Unit as a way of safety netting. So we do say, "If you're not feeling very well or you've got any queries particularly in the first seventy-two hours, then by all means comes back to us," particularly over, if you've discharge them on Friday and it's a weekend and they're going to have to phone 111 etc then we tend to, to make sure they know they can access us, and actually we don't get that much, we don't get that much. Out of all the people we see we don't get many people coming back to us and saying, "Actually, I don't feel well, can we do, you know, can I come back and see you?" So, it seems, it seems to be actually, most people are, "Oh thank goodness for that," when you give them a little pink card with a number on because they just feel they've got a point of contact. Most of the time they never need it." [Ruth interview]

Contingency plans, or safety-netting plans, were individually negotiated with patients during later stages of the AEC consultation. AEC Clinicians individually tailored their advice for each patient and the patient's predicted course of illness. They explained the warning signs to monitor for and explicitly discussed the mechanisms for seeking further medical attention.

AEC clinicians deliberately shared clinical uncertainty with their patients using three main strategies; explaining, exploring and acknowledging. Explaining uncertainty was used to share understanding of the clinical problem, broker possible solutions, and set treatment thresholds. Exploring uncertainty allowed negotiation of the AEC clinical plan focusing on what was important to the patient. Acknowledging and sharing uncertainty with patients facilitated individual tailoring of the AEC clinical plan. The information was used to individually tailor the contingency plan, providing clear advice when the patient required further medical attention.

8.4.3 Decision Support and Guidelines to manage Clinical Uncertainty

Decision Support and Clinical Guidelines are the resources available to clinicians to improve decision-making. In this thesis I provide examples of how these resources were used to manage clinical uncertainty in real-life AEC practice. Rhoda, Ralph and Reuben used guidelines or

decision support to aid their decision-making. Reuben uses his local knowledge of rates of myocardial infarction to decide the likelihood of cardiac pathology in a lady with chest pain. Similarly, Ralph, uses a scoring system to assess the likelihood of a gastrointestinal haemorrhage. Once the clinicians know what the likelihood of serious disease is, they are better able to tailor their management plan. In these cases, the patient's care was de-escalated as the clinical risk was felt to be lowered by information from the decision aid. Rhoda instead used decision support to tailor her management plan, she checked a medication formulary to aid her decision between alternate neuropathic pain agents.

> *"Ralph and the junior doctor discuss the Blatchford score for upper gastrointestinal bleeds and the CRB65 score for pneumonia = 0. They work the scores out together and discuss the antibiotic guidelines"* [Ralph fieldnotes]

For all three cases, decision support could only assist once the clinician has understood the clinical problem they faced and was able to formulate this into a specific question. This suggests that clinical algorithms are best used when precise queries are possible. It follows that decision support are only likely to aid decision-making where uncertainty has been reduced and the complexity understood sufficiently to formulate an answerable question.

8.4.4 Team decisions to manage Clinical Uncertainty in AEC

The final strategy used to manage uncertainty has not been described previously; the AEC clinicians deployed their MDT teams to aid problem solving. Rita and Roger asked their teams to aid the assessment of the patient's wider needs including physical function, home life and need for social care. For Roger's patient this was particularly beneficial as he could refer to the occupational therapist prior to the patient's arrival. For Rita's patient the therapy team's assessment of the patient's mobility assisted discharge planning.

> *"So on the ambulatory unit, I think we just tend to work as a big team and I, I feel like I could have made a single decision based on the medical side of things. But, so quite*

good support from therapies because they've come to see her, and actually our, are doing the assessments that are needed, in order to try and make sure that the discharge is safe" [Rita interview]

Ruby and Rosa considered how to use their teams to help assess the patient more efficiently. Both used their teams to perform a collaborative rather than sequential assessment, allocating clear job roles and responsibilities to team members, in order to speed up the assessment (Figure 2). For Rosa, this was driven by disease severity and a 1-hour target for antibiotics, whereas for Ruby it was prompted by the time of day (Figure 15).

"Interviewer: How do you think your, the team worked today for this patient?

Ruby: …you really get everyone involved,…I think what's great is when the patient comes in, it's almost like a sort of formula one pit stop" [Ruby interview]

Gaining a team view was felt to be important for AEC decision-making. Teams were often involved to sense check or provide a more holistic view of the patient. Renata described how she used the multidisciplinary team to help make decisions. She found it helpful to *"get other peoples' impressions of things"* [Renata interview] and gathered her team together for brief patient reviews. This also helped improve continuity.

"It's nice to be able to do that on the hoof…it just means that everybody gets to give their views and something you might have overlooked whilst making the decision yourself because, you know, other people have useful information." [Renata interview]

Collaborative team-based approaches to decision making were frequently seen in AEC. Teams were often involved directly with patient management decisions in AEC, which is a key difference to many other medical specialities. Information from the multi-disciplinary team could facilitate discharge and access the patient further help. For senior clinicians they also

provided a sounding board, supporting the cognitive and emotional load of working in urgent care (4.1.2e).

8.4.5 Continuity of care to manage Clinical Uncertainty

Clinicians often used continuity of care to help manage clinical uncertainty in AEC. When describing continuity of care most clinicians describes this as "*knowing*" patients. This was often meant as having previously been involved in their care. During the morning meeting, when Rosa recognised a patient that she had seen before, she offered to see them again. She stated that she knew the patient and this indicated to the team that she would like to take responsibility for this patient again. Roger as coordinator uses this to his advantage assigning patients to doctors who have seen them before to reduce the consultation time and improve patient flow.

Rowley thought it was much easier to assess patients that he has seen before rather than those seen by other team members.

> *"3.05pm I ask 'why it is different reviewing his own patients than those seen by others?'*
>
> *He replies, 'the writing', and then clarifies that it is easier to interpret his own plans*
>
> *He usually reviews the results and history and checks the plan seems correct but tries not to radically alter plans made by his colleagues.*
>
> *He also says 'it's easier to remember if seen initial episode of care'*
>
> *We discuss episodic vs semantic memory and how patients are 'known' to their doctors*
>
> *Rowley says it's 'easier to remember if he can remember the circumstances of the initial episode of care'* [Rowley fieldnotes]

For Reggie, building continuity into the discharge plan was a key aim. He was often asked by the junior doctors what an "ideal follow-up" was. He explained that continuity of care was useful aspects in ambulatory care to reduce patient and clinician anxiety and to monitor response to treatment. Reggie often used continuity of care to help mitigate clinical uncertainty in prognostic

decision-making. Sometimes this entailed arranging patient follow-up or checking who will be with the patient at home as part of the contingency planning (5.4.2b).

> *"So uncertainty, so I guess, more uncertainty I bring them back. So I like people to be with them, that's one big strand, somebody to be with them, and if there really can't be anybody with them and they live alone and they don't have anybody around then hospital at home can do that and they can round and see them later. That's a useful, useful tip. Obviously bringing them back is a useful thing or phoning them."* [Reggie interview]

He also explained that sometimes service demands could reduce continuity of care (4.1).

> *"So, an interesting part at the moment is trying to follow people up less in ambulatory care. So we used to follow people up far more and keep more of a hand on them and there's a future direction of trying to have less. But somebody like that who they're perhaps more complicated needs more follow up."* [Reggie interview]

The patients also valued staff continuity, the fieldnotes captures an exchange between patients and staff over 10 minutes during Roger's shift.

> ***"3.40pm*** *The patient, healthcare assistant and doctor discuss the doctor's new dog*
>
> *The patient says 'It's nice to see someone who knows me""* [Roger fieldnotes]

The sense of knowing a patient was important to the clinicians, they felt that continuity of care was an important strategy to manage clinical uncertainty. It often allowed them to notice changes and reassured both the patient and the clinician.

8.5 AEC as a Critical Example of Decision-Making in Clinical Uncertainty

In this chapter we have seen how clinical uncertainty can affect each stage of decision-making in AEC; triage, diagnostic, management and prognostic decisions (6.1.1). Uncertainty in clinical triage has rarely been discussed in the consultation literature but was a risk assessment process between health professionals. The thesis demonstrated that 8 of the 9 types of clinical uncertainty were observed in AEC.

Technical uncertainty was seen throughout the consultation with clinicians seeking further clinical information from the patient their relatives or further tests. In the early stages of the AEC decision-making CI it could affect triage and diagnostic decision making. Practical uncertainty affected the later stages of the consultation, where plans were individually tailored for the patient. Negotiated decision making in relational uncertainty was often seen to modify the AEC clinical plan; this could be patient or clinician driven. Cognitive uncertainty could arise from information overload or complexity in the patient case. Emotional and personal uncertainty were seen to cause some degree of clinician anxiety or frustration, often due to too little or too much clinical information. Conceptual uncertainty often resulted from AEC clinicians needed interpret best practice clinical guidelines for the AEC setting.

The effect of uncertainty on clinical decision-making included recognition of uncertainty, reduced risk tolerance, altered clinical behaviours. In AEC practice, this clinical uncertainty was managed by strategies that reduced and shared uncertainty, or decision support. Uncertainty was reduced by obtaining further information from patients and their families, further investigations and asking for a second opinion. Sharing uncertainty with patients was done by explaining the uncertainty, exploring the clinical risks and benefits and acknowledging the patient's views. This process facilitated individually tailored care plans. Two new management strategies were also identified for managing uncertainty; team-based decisions and continuity of care.

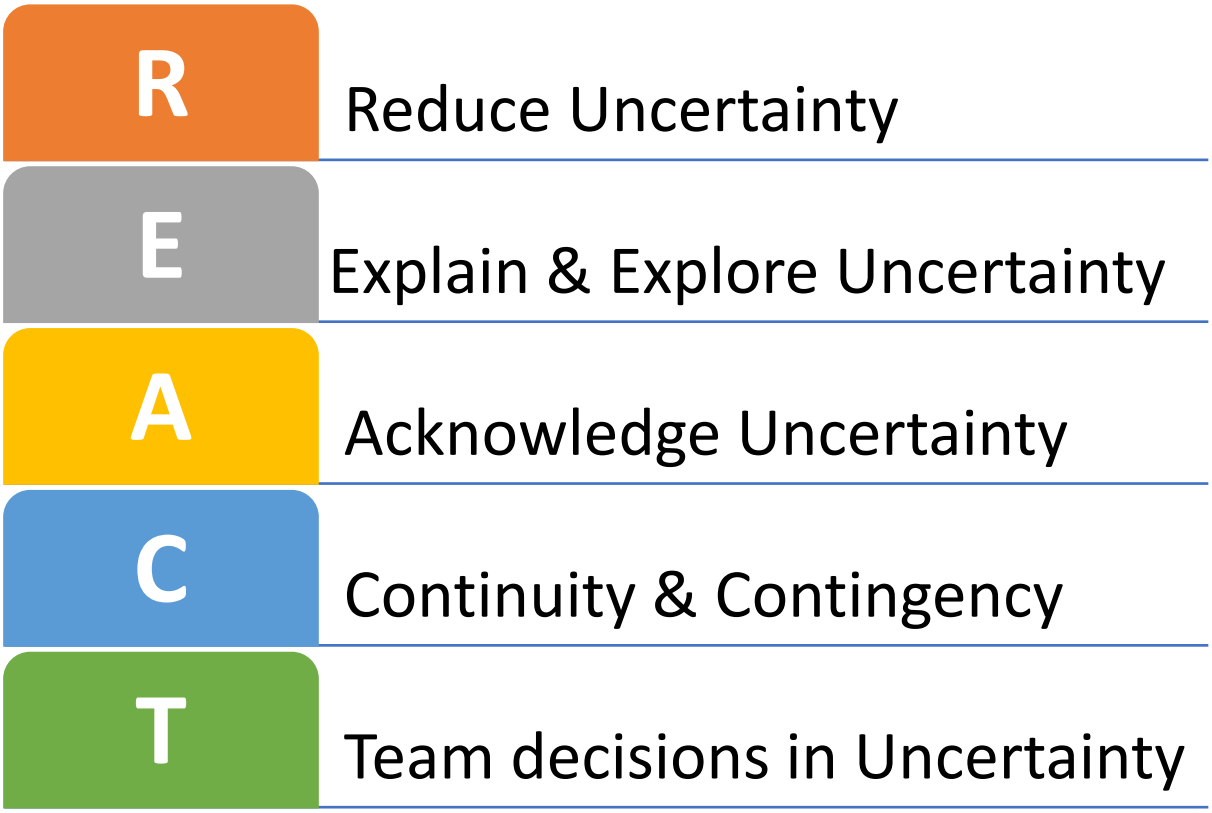
This chapter demonstrates that different types of uncertainty are present at each stage of the AEC decision-making process. These sources of clinical uncertainty could interact and often directly affected the AEC management plan. Uncertainty management relied on negotiated decision making to produce an individually tailored treatment plan. Team based decision-making improved patient care by accessing further assessment and provision for the patient and provided senior clinicians with cognitive and emotional support in the busy AEC environment. Continuity of care reduced the cognitive burden on clinicians and was valued by patients.

These findings have relevance for the future workforce in the NHS. The recent Long Term Plan outlined a vision for an adaptable workforce providing integrated care close to patients homes (NHS, 2019b). In these new integrated care systems, multidisciplinary teams are required at neighbourhood levels with an emphasis on new "*out-of-hospital*" models of care. However this and the reducing number of clinicians in general practice and emergency care specialities will require significant workforce change (Imison et al., 2016). This thesis provides evidence for the skills needed for senior clinicians managing uncertainty; flexibility and negotiated decision making are needed to facilitate individually tailored management plans for acute care in out-of-hospital settings.

This thesis also proposes an original model to help clinicians manage uncertainty in ambulatory and urgent out-of-hospital care; the REACT model (Figure 21). This model provides an overview of five key strategies that experienced AEC clinicians used to manage clinical uncertainty and risk. First to reduce uncertainty by gathering further information from patients, families, investigations, second opinions and contextual evidence. To discuss uncertainty with patients by explaining, exploring and acknowledging Uncertainty; explaining the clinical problem and where uncertainty was present; exploring the risk and benefits of ambulatory care in this illness and acknowledging the patients views and incorporating these into the AEC management plan. These negotiated individually tailored AEC management plans had continuity and contingency

planning are essential components. Finally, the holistic assessment of the whole AEC team is required to support multi-disciplinary patient care.

Figure 21 REACT Model of Managing Uncertainty in AEC



References

ABMA, T. A. & STAKE, R. E. 2014. Science of the Particular: An Advocacy of Naturalistic Case Study in Health Research. *Qual Health Res,* 24**,** 1150-1161.

ADAMS, E., GOYDER, C., HENEGHAN, C., BRAND, L. & AJJAWI, R. 2017. Clinical reasoning of junior doctors in emergency medicine: A grounded theory study. *Emergency Medicine Journal,* 34**,** 70-75.

AECN 2014. Directory of Ambulatory Emergency Care for Adults. British Association of Ambulatory Emergency Care for Adults.

AECN 2018. Directory of Ambulatory Emergency Care for Adults Version 6. *In:* NETWORK, A. E. C. (ed.). London: NHS Elect.

AGARWAL, D., CHANDRA, S., KOLB, L., BOGGUST, A., SMITH, V., SADOSTY, A. T. & HESS, E. P. 2013. A study to evaluate emergency provider efficiency and cognitive load using different methods of computerized physician medication order entry. *Academic Emergency Medicine,* 1)**,** S294-S295.

ALAM, R., CHERAGHI-SOHI, S., PANAGIOTI, M., ESMAIL, A., CAMPBELL, S. & PANAGOPOULOU, E. 2017. Managing diagnostic uncertainty in primary care: a systematic critical review. *BMC Fam Pract,* 18**,** 79.

ANDERSON, L. M., PETTICREW, M., CHANDLER, J., GRIMSHAW, J., TUGWELL, P., O'NEILL, J., WELCH, V., SQUIRES, J., CHURCHILL, R. & SHEMILT, I. 2013. Introducing a series of methodological articles on considering complexity in systematic reviews of interventions. *J Clin Epidemiol,* 66**,** 1205-8.

APPLETON, J. 2002. Critiquing approaches to case study design for a constructivist inquiry. *Qualitative Research Journal,* 2**,** 80-97.

ARTHUR, M. B., DEFILLIPPI, R. J. & LINDSAY, V. J. 2008. On Being a Knowledge Worker. *Organizational Dynamics,* 37**,** 365-377.

ATKINSON, P. 1984. Training for certainty. *Soc Sci Med,* 19**,** 949-56.

ATKINSON, P. 1995. *Medical talk and medical work : the liturgy of the clinic,* London, Sage.

ATKINSON, P. A. 2017. *Thinking Ethnographically,* London, SAGE Publications Ltd,.

AYIS, S., GOOBERMAN-HILL, R., BOWLING, A. & EBRAHIM, S. 2006. Predicting catastrophic decline in mobility among older people. *Age Ageing,* 35**,** 382-7.

BAIRD, B., BOYLE, T., CHAUHAN, K., HELLER, A. & PRICE, C. 2020. *How to build effective teams in general practice* [Online]. London. Available: https://www.kingsfund.org.uk/publications/effective-teams-general-practice#communication [Accessed 6.1.21].

BALLA, J., HENEGHAN, C., THOMPSON, M. & BALLA, M. 2012. Clinical decision making in a high-risk primary care environment: a qualitative study in the UK. *BMJ Open,* 2**,** e000414.

BARCLAY, S., MOMEN, N., CASE-UPTON, S., KUHN, I. & SMITH, E. 2011. End-of-life care conversations with heart failure patients: a systematic literature review and narrative synthesis. *Br J Gen Pract,* 61**,** e49-62.

BARKER, I., STEVENTON, A. & DEENY, S. R. 2017. Association between continuity of care in general practice and hospital admissions for ambulatory care sensitive conditions: cross sectional study of routinely collected, person level data. *BMJ,* 356**,** j84.

BARNETT, M. L., LINDER, J. A. & JENA, A. B. 2016. Day of the week and physician decision fatigue. *Journal of General Internal Medicine,* 1)**,** S172.

BARROWS, H. S., NORMAN, G. R., NEUFELD, V. R. & FEIGHTNER, J. W. 1982. The clinical reasoning of randomly selected physicians in general medical practice. *Clinical & Investigative Medicine - Medecine Clinique et Experimentale,* 5(1), 49-55.

BERESFORD, E. B. 1991. Uncertainty and the shaping of medical decisions. *Hastings Cent Rep,* 21, 6-11.

BESWICK, A. G.-H., R; SMITH, A; WYLDE, V, EBRAHIM, S 2010. Maintaining independence in older people. *Reviews in Clinical Gerontology,* 20, 128-153.

BIKKER, A. P., ATHERTON, H., BRANT, H., PORQUEDDU, T., CAMPBELL, J. L., GIBSON, A., MCKINSTRY, B., SALISBURY, C. & ZIEBLAND, S. 2017. Conducting a team-based multi-sited focused ethnography in primary care. *BMC Med Res Methodol,* 17, 139.

BISHOP, R. O., PATRICK, J. & BESISO, A. 2015. Efficiency achievements from a user-developed real-time modifiable clinical information system. *Annals of Emergency Medicine,* 65(2), 133-42.e5.

BLACK, N. 1994. Why we need qualitative research. *J Epidemiol Community Health,* 48, 425-6.

BLANC, X., COLLET, T.-H., AUER, R., FISCHER, R., LOCATELLI, I., IRIARTE, P., KRAUSE, J., LÉGARÉ, F. & CORNUZ, J. 2014. Publication trends of shared decision making in 15 high impact medical journals: a full-text review with bibliometric analysis. *BMC medical informatics and decision making,* 14, 71-71.

BLUMER, H. 1954. What is Wrong with Social Theory? *American Sociological Review,* 19, 3-10.

BOBLIN, S. L., IRELAND, S., KIRKPATRICK, H. & ROBERTSON, K. 2013. Using Stake's Qualitative Case Study Approach to Explore Implementation of Evidence-Based Practice. *Qualitative Health Research,* 23, 1267 - 1275.

BODY, R., COOK, G., BURROWS, G., CARLEY, S. & LEWIS, P. S. 2014. Can emergency physicians 'rule in' and 'rule out' acute myocardial infarction with clinical judgement? *Emergency Medicine Journal,* 31(11), 872-6.

BOOKER, M. J., PURDY, S., BARNES, R. & SHAW, A. R. G. 2019. Ambulance use for 'primary care' problems: an ethnographic study of seeking and providing help in a UK ambulance service. *BMJ Open,* 9, e033037.

BOOKER, M. J., PURDY, S. & SHAW, A. R. G. 2017. Seeking ambulance treatment for 'primary care' problems: a qualitative systematic review of patient, carer and professional perspectives. *BMJ Open,* 7, e016832.

BRAITHWAITE, J. 2018. Changing how we think about healthcare improvement. *BMJ,* 361, k2014.

BRELL, R. 2014. Hospital in the Home: risk management lessons — inquest into the death of Andrew Gilmore. *Australian Health Bulletin*, 2-3.

BRITTEN, N., JONES, R., MURPHY, E. & STACY, R. 1995. Qualitative research methods in general practice and primary care. *Fam Pract,* 12, 104-14.

BRODY, E. B. 1981. The clinician as ethnographer: A psychoanalytic perspective on the epistemology of fieldwork. *Culture, Medicine and Psychiatry,* 5, 273-301.

BRYMAN, A. 1984. The Debate about Quantitative and Qualitative Research: A Question of Method or Epistemology? *The British Journal of Sociology,* 35, 75-92.

BYRNE, A. 2011. Measurement of mental workload in clinical medicine: a review study. *Anesth Pain Med,* 1, 90-4.

CAPLAN, G. A., SULAIMAN, N. S., MANGIN, D. A., AIMONINO RICAUDA, N., WILSON, A. D. & BARCLAY, L. 2012. A meta-analysis of "hospital in the home". *Med J Aust,* 197, 512-9.

CAPLAN, G. A., WARD, J. A., BRENNAN, N. J., COCONIS, J., BOARD, N. & BROWN, A. 1999. Hospital in the home: a randomised controlled trial. *Med J Aust,* 170**,** 156-60.

CARTER, S. M. & LITTLE, M. 2007. Justifying Knowledge, Justifying Method, Taking Action: Epistemologies, Methodologies, and Methods in Qualitative Research. *Qualitative Health Research,* 17**,** 1316-1328.

CHARLES, C., GAFNI, A. & WHELAN, T. 1997. Shared decision-making in the medical encounter: what does it mean? (or it takes at least two to tango). *Soc Sci Med,* 44**,** 681-92.

CLARK, A. & SOUSA, B. 2018. *How to be a happy academic,* Los Angeles, Sage.

COHEN-HATTON, S. R. & HONEY, R. C. 2015. Goal-oriented training affects decision-making processes in virtual and simulated fire and rescue environments. *J Exp Psychol Appl,* 21**,** 395-406.

CONLEY, J., O'BRIEN, C. W., LEFF, B. A., BOLEN, S. & ZULMAN, D. 2016. Alternative Strategies to Inpatient Hospitalization for Acute Medical Conditions: A Systematic Review. *JAMA Intern Med,* 176**,** 1693-1702.

COOKE, G. P., DOUST, J. A. & STEELE, M. C. 2013. A survey of resilience, burnout, and tolerance of uncertainty in Australian general practice registrars. *BMC Med Educ,* 13**,** 2.

COOPER, N., FRAIN, J. & PROQUEST (FIRM) 2017. ABC of clinical reasoning. *ABC Series.* Chichester, England: Wiley Blackwell : BMJ Books,.

COULTER, A. 1997. Partnerships with patients: the pros and cons of shared clinical decision-making. *J Health Serv Res Policy,* 2**,** 112-21.

COULTER, A. & COLLINS, A. 2011. Making Shared Decision-Making a Reality: No decision about me, without me. London: The King's Fund.

COULTER, A., ENTWISTLE, V. A., ECCLES, A., RYAN, S., SHEPPERD, S. & PERERA, R. 2015. Personalised care planning for adults with chronic or long-term health conditions. *Cochrane Database of Systematic Reviews*.

CRAIG, P. D., PAUL; MACINTYRE, SALLY; MICHIE, SUSAN; NAZARETH, IRWIN; PETTICREW, MARK 2008. Developing and evaluating complex interventions: New Guidance. Medical Research Council.

CRANDALL, B., KLEIN, G. A. & HOFFMAN, R. R. 2006. *Working minds : a practitioner's guide to cognitive task analysis,* Cambridge, Massachusetts ; London, MIT Press.

CRESWELL, J. W. & MILLER, D. L. 2000. Determining Validity in Qualitative Inquiry. *Theory Into Practice,* 39**,** 124-130.

CROSKERRY, P. & SINCLAIR, D. 2001. Emergency medicine: A practice prone to error? *CJEM Canadian Journal of Emergency Medical Care,* 3(4)**,** 271-6.

CROTTY, M. 1998. *The foundations of social research : meaning and perspective in the research process,* London ; Thousand Oaks, Calif., Sage Publications.

DANCZAK, A. & LEA, A. 2014. What do you do when you don't know what to do? GP associates in training (AiT) and their experiences of uncertainty. *Educ Prim Care,* 25**,** 321-6.

DANCZAK, A. & LEA, A. 2018. Developing expertise for uncertainty; do we rely on a baptism of fire, the mills of experience or could clinicians be trained? *Educ Prim Care,* 29**,** 237-241.

DANCZAK, A., LEA, A., MURPHY, G. & ROYAL COLLEGE OF GENERAL PRACTITIONERS 2016. *Mapping uncertainty in medicine : what do you do when you don't know what to do?,* London, Royal College of General Practitioners.

DANCZAK, A., LEA, A 2017. The psychology of uncertainty in difficult decisions. *Innovait,* 10**,** 466–472.

DATTA, J. & PETTICREW, M. 2013. Challenges to evaluating complex interventions: a content analysis of published papers. *BMC Public Health,* 13**,** 568.

DAWSON, S., KUNONGA, P., BEYER, F., SPIERS, G., BOOKER, M., MCDONALD, R., CAMERON, A., CRAIG, D., HANRATTY, B., SALISBURY, C. & HUNTLEY, A. 2020. Does health and social care provision for the community dwelling older population help to reduce unplanned secondary care, support timely discharge and improve patient well-being? A mixed method meta-review of systematic reviews. *F1000Research,* 9**,** 857.

DE JONG, M., KAMSTEEG, F. & YBEMA, S. 2013. Ethnographic strategies for making the familiar strange: Struggling with 'distance' and 'immersion' among Moroccan-Dutch students. *Journal of Business Anthropology,* 2**,** 168-186.

DENNESS, C. 2013. What are consultation models for? *Innovait,* 6**,** 592-599.

DENZIN, N. K. 1970. *The research act in sociology: a theoretical introduction to sociological methods,* London, Butterworths.

DIESING, P. 1972. *Patterns of discovery in the social sciences,* London, Routledge & Kegan Paul.

DJULBEGOVIC, B., VAN DEN ENDE, J., HAMM, R., MAYRHOFER, T., HOZO, I. & PAUKER, S. 2015. When is rational to order a diagnostic test, or prescribe treatment: The threshold model as an explanation of practice variation. *European Journal of Clinical Investigation,* 45**,** 485-93.

DONALDSON, L., RICCIARDI, W., SHERIDAN, S. & TARTAGLIA, R. 2021. Textbook of Patient Safety and Clinical Risk Management. 1st ed. Cham: Springer International Publishing : Imprint : Springer,.

DOPSON, S. & FITZGERALD, L. 2005. *Knowledge to action? : evidence-based health care in context,* Oxford, Oxford University Press.

DRUCKER, P. F. 1967. *The effective executive,* London, Heinemann.

DUERDEN, M., AVERY, T. & PAYNE, R. 2013. Polypharmacy and medicines optimisation; Making it safe and sound. *In:* FUND, T. K. (ed.). London: The King's Fund.

EDWARDS, N. 2016. *The NHS workforce crisis may be irreversible* [Online]. London: The Nuffield Trust. Available: https://www.nuffieldtrust.org.uk/news-item/the-nhs-workforce-crisis-may-be-irreversible [Accessed].

EDWARDS, S. T., PETERSON, K., CHAN, B., ANDERSON, J. & HELFAND, M. 2017. Effectiveness of Intensive Primary Care Interventions: A Systematic Review. *J Gen Intern Med,* 32**,** 1377-1386.

ELIAS, T. C. N., BOWEN, J., HASSANZADEH, R., LASSERSON, D. S. & PENDLEBURY, S. T. 2021. Factors associated with admission to bed-based care: observational prospective cohort study in a multidisciplinary same day emergency care unit (SDEC). *BMC Geriatrics,* 21**,** 8.

ELLIS, G. W., M; O'NEILL, D; LANGHORNE, P; ROBINSON, D; 2011. Comprehensive geriatric assessment for older adults admitted to hospital. *Cochrane Database of Systematic Reviews*.

ELWYN, G., FROSCH, D., THOMSON, R., JOSEPH-WILLIAMS, N., LLOYD, A., KINNERSLEY, P., CORDING, E., TOMSON, D., DODD, C., ROLLNICK, S., EDWARDS, A. & BARRY, M. 2012. Shared Decision Making: A Model for Clinical Practice. *Journal of General Internal Medicine,* 27**,** 1361-1367.

ERICSSON, K. A. 2004. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. *Acad Med,* 79**,** S70-81.

EVANS, C., PEARCE, R., GREAVES, S. & BLAKE, H. 2020. Advanced Clinical Practitioners in Primary Care in the UK: A Qualitative Study of Workforce Transformation. *International Journal of Environmental Research and Public Health,* 17**,** 4500.

EVANS, L. & TROTTER, D. R. 2009. Epistemology and uncertainty in primary care: an exploratory study. *Fam Med,* 41**,** 319-26.

EWBANK, L. T. J. M. H. 2017. NHS hospital bed numbers: past, present, future. London: The Kings Fund.

FERLIE, E., FITZGERALD, L., MCGIVERN, G., DOPSON, S., BENNETT, C. & OXFORD UNIVERSITY PRESS. 2013. Making wicked problems governable? : the case of managed networks in health care. Oxford: Oxford University Press,.

FLOWERDEW, L., BROWN, R., RUSS, S., VINCENT, C. & WOLOSHYNOWYCH, M. 2012. Teams under pressure in the emergency department: an interview study. *Emerg Med J,* 29**,** e2.

FLYNN, D., KNOEDLER, M. A., HESS, E. P., MURAD, M. H., ERWIN, P. J., MONTORI, V. M. & THOMSON, R. G. 2012. Engaging Patients in Health Care Decisions in the Emergency Department Through Shared Decision-making: A Systematic Review. *Academic Emergency Medicine,* 19**,** 959-967.

FOX, R. C. 1957. Training for Uncertainty. *In:* MERTON, R. K., READER, G., KENDALL, P.L. (ed.) *The Student-Physician.* Cambridge, Mass. : Harvard University.

FOX, R. C. 1980. The evolution of medical uncertainty. *Milbank Mem Fund Q Health Soc,* 58**,** 1-49.

FROSCH, D. L. & KAPLAN, R. M. 1999. Shared decision making in clinical medicine: past research and future directions. *Am J Prev Med,* 17**,** 285-94.

GABBAY, J. & LE MAY, A. 2004. Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ,* 329**,** 1013.

GABBAY, J. & LE MAY, A. 2011. *Practice-based evidence for healthcare : clinical mindlines,* Abingdon, Routledge.

GEERTZ, C. 1973. *The interpretation of cultures : selected essays,* New York, Basic Books.

GEVERS, J., VAN ERVEN, P., DE JONGE, J., MAAS, M. & DE JONG, J. 2010. Effect of acute and chronic job demands on effective individual teamwork behaviour in medical emergencies. *Journal of Advanced Nursing,* 66(7)**,** 1573-83.

GILLICK, M. R., SERRELL, N. A. & GILLICK, L. S. 1982. Adverse consequences of hospitalization in the elderly. *Soc Sci Med,* 16**,** 1033-8.

GLOGOWSKA, M., CRAMER, H., PENDLEBURY, S., PURDY, S. & LASSERSON, D. 2019. Experiences of Ambulatory Care for Frail, Older People and Their Carers During Acute Illness: A Qualitative, Ethnographic Study. *J Am Med Dir Assoc,* 20**,** 1344-1347.

GOLD, R. L. 1958. Roles in Sociological Field Observations. *Social Forces,* 36**,** 217-223.

GOLDBERG, S. E., COOPER, J., BLUNDELL, A., GORDON, A. L., MASUD, T. & MOORCHILOT, R. 2016. Development of a curriculum for advanced nurse practitioners working with older people with frailty in the acute hospital through a modified Delphi process. *Age Ageing,* 45**,** 48-53.

GONÇALVES-BRADLEY, D. C., LANNIN, N. A., CLEMSON, L. M., CAMERON, I. D. & SHEPPERD, S. 2016. Discharge planning from hospital. *Cochrane Database of Systematic Reviews*.

GOUGH, D. 2007. Weight of Evidence: a framework for the appraisal of the quality and relevance of evidence. *Research Papers in Education,* 22**,** 213-228.

GRABER, M. L., KISSAM, S., PAYNE, V. L., MEYER, A. N. D., SORENSEN, A., LENFESTEY, N., TANT, E., HENRIKSEN, K., LABRESH, K. & SINGH, H. 2012. Cognitive interventions to reduce diagnostic error: a narrative review. *BMJ Quality & Safety,* 21**,** 535-557.

GRANT, M. J. & BOOTH, A. 2009. A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Info Libr J,* 26**,** 91-108.

GREEN, C. A., DUAN, N., GIBBONS, R. D., HOAGWOOD, K. E., PALINKAS, L. A. & WISDOM, J. P. 2015. Approaches to Mixed Methods Dissemination and Implementation Research: Methods, Strengths, Caveats, and Opportunities. *Administration and policy in mental health,* 42**,** 508-523.

GREEN, J. & THOROGOOD, N. 2018. Qualitative Methods for Health Research. *Introducing Qualitative Methods series.* 4th ed. London: SAGE Publications Ltd,.

GRIFFITHS, F., GREEN, E. & TSOUROUFLI, M. 2005. The nature of medical evidence and its inherent uncertainty for the clinical consultation: qualitative study. *BMJ,* 330**,** 511.

GUBA, E. G. 1990. *The Paradigm dialog,* Newbury Park ; London, Sage.

GUBA, E. G. & LINCOLN, Y. S. 1989. *Fourth generation evaluation,* Newbury Park, Sage.

HAMAD, M. M. A. A. & CONNOLLY, V. M. 2018. Ambulatory emergency care - improvement by design. *Clinical medicine (London, England),* 18**,** 69-74.

HAMMERSLEY, M. & ATKINSON, P. 2019. *Ethnography : principles in practice,* London, Routledge.

HAN, P. K., KLEIN, W. M. & ARORA, N. K. 2011. Varieties of uncertainty in health care: a conceptual taxonomy. *Med Decis Making,* 31**,** 828-38.

HANSEN, H., HOLMES, S. & LINDEMANN, D. 2013. Ethnography of Health for Social Change: Impact on public perception and policy. *Social Science & Medicine,* 99**,** 116-118.

HAWE, P., SHIELL, A. & RILEY, T. 2004. Complex interventions: how "out of control" can a randomised controlled trial be? *BMJ (Clinical research ed.),* 328**,** 1561-1563.

HEE 2017. Multi-professional framework for advanced clinical practice in England. . London: Health Education England, NHS England.

HEE 2020. The Future Doctor Programme: A co-created vision for the future clinical team. *In:* ENGLAND, H. E. (ed.).

HELOU, M. A., DIAZGRANADOS, D., RYAN, M. S. & CYRUS, J. W. 2020. Uncertainty in Decision Making in Medicine: A Scoping Review and Thematic Analysis of Conceptual Models. *Acad Med,* 95**,** 157-165.

HESS, E. P., GRUDZEN, C. R., THOMSON, R., RAJA, A. S. & CARPENTER, C. R. 2015. Shared Decision-making in the Emergency Department: Respecting Patient Autonomy When Seconds Count. *Acad Emerg Med,* 22**,** 856-64.

HEWSON, M. G., KINDY, P. J., VAN KIRK, J., GENNIS, V. A. & DAY, R. P. 1996. Strategies for managing uncertainty and complexity. *J Gen Intern Med,* 11**,** 481-5.

HICKMAN, L. D., PHILLIPS, J. L., NEWTON, P. J., HALCOMB, E. J., AL ABED, N. & DAVIDSON, P. M. 2015. Multidisciplinary team interventions to optimise health outcomes for older people in acute care settings: A systematic review. *Archives of Gerontology and Geriatrics,* 61**,** 322-329.

HIGGINBOTTOM, G., PILLAY, J. & BOADU, N. 2013. Guidance on Performing Focused Ethnographies with an Emphasis on Healthcare Research. *The Qualitative Report,* 18**,** 1-16.

HIPPOCRATES 400 BCE. *Aphorisms*, MIT.

HOGAN, T. M., RICHMOND, N. L., CARPENTER, C. R., BIESE, K., HWANG, U., SHAH, M. N., ESCOBEDO, M., BERMAN, A., BRODER, J. S. & PLATTS-MILLS, T. F. 2016. Shared Decision Making to Improve the Emergency Care of Older Adults: A Research Agenda. *Acad Emerg Med,* 23**,** 1386-1393.

IMISON, C., CASTLE-CLARKE, S. & WATSON, R. 2016. Reshaping the workforce to deliver the care patients need. Nuffield Trust.

JOHANSSON, G., EKLUND, K. & GOSMAN-HEDSTRÖM, G. 2010. Multidisciplinary team, working with elderly persons living in the community: a systematic literature review. *Scandinavian Journal of Occupational Therapy,* 17**,** 101-116.

JONES, C. H., GLOGOWSKA, M., LOCOCK, L. & LASSERSON, D. S. 2016. Embedding new technologies in practice - a normalization process theory study of point of care testing. *BMC Health Serv Res,* 16**,** 591.

JRCPTB 2010 (Amendments 2016). Specialty Training Curriculum for Geriatric Medicine Curriculum. London: Joint Royal Colleges of Physicians Training Board.

KALLBERG, A. S., EHRENBERG, A., FLORIN, J., OSTERGREN, J. & GORANSSON, K. E. 2017. Physicians' and nurses' perceptions of patient safety risks in the emergency department. *Int Emerg Nurs,* 33**,** 14-19.

KANZARIA, H. K., BROOK, R. H., PROBST, M. A., HARRIS, D., BERRY, S. H. & HOFFMAN, J. R. 2015. Emergency Physician Perceptions of Shared Decision-making. *Academic Emergency Medicine,* 22**,** 399-405.

KNOBLAUCH, H. 2005. Focused Ethnography. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research,* 6**,** 44.

KORTEBEIN, P. 2009. Rehabilitation for hospital-associated deconditioning. *Am J Phys Med Rehabil,* 88**,** 66-77.

KOSTOPOULOU, O. 2009. Uncertainty in Medical Decisions *In:* KATTAN, M. W. & COWEN, M. E. (eds.) *Encyclopedia of medical decision making.* Los Angeles ; London: Sage.

KRAUS, C. K. & MARCO, C. A. 2016. Shared decision making in the ED: ethical considerations. *Am J Emerg Med,* 34**,** 1668-72.

KU, B. & LUPTON, E. 2020. *Health design thinking : creating products and services for better health,* Cambridge, The MIT Press.

KUHN, G. J. 2002. Diagnostic errors. *Academic Emergency Medicine,* 9**,** 740-750.

KUO, Y. S., LU, H. P. & KUO, T. K. 2013. Usability of portable patient monitor in emergency medical services: An evaluation of the use errors caused by Interface design. *Journal of Medical and Biological Engineering,* 33**,** 564-568.

LAKER, L. F. 2017. The effects of interruptions and information overload on decision-making performance in knowledge-work. *Dissertation Abstracts International: Section B: The Sciences and Engineering,* 77**,** No Pagination Specified.

LAMBA, A., SCHAPIRA, M., FLETCHER, K. & SINGH, S. 2010. Inpatient work: A comprehensive list of tasks and the intensity associated with them. *Journal of General Internal Medicine,* 25**,** S315.

LASSERSON, D. 2017. Interface medicine: a new generalism for the NHS. *Br J Gen Pract,* 67**,** 492-493.

LASSERSON, D. S., HARRIS, C., ELIAS, T., BOWEN, J. & CLARE, S. 2018. What is the evidence base for ambulatory care for acute medical illness? *Acute Med,* 17**,** 148-153.

LATTIMER, V. 2010. The impact of changing workforce patterns in emergency and urgent out-of-hours care on patient experience, staff practice and health system performance. *In:* LATTIMER, V. (ed.). National Institute for Health Research Service Delivery and Organisation programme.

LAUREIRO MARTINEZ, D., BRUSONI, S. & ZOLLO, M. 2009. COGNITIVE FLEXIBILITY IN DECISION MAKING: A NEUROLOGICAL MODEL OF LEARNING AND CHANGE.

LAXMISAN, A., HAKIMZADA, F., SAYAN, O. R., GREEN, R. A., ZHANG, J. & PATEL, V. L. 2007. The multitasking clinician: decision-making and cognitive demand during and after team handoffs in emergency care. *International Journal of Medical Informatics,* 76(11-12)**,** 801-11.

LEVERS, M.-J. D. 2013. Philosophical Paradigms, Grounded Theory, and Perspectives on Emergence. *SAGE Open,* 3**,** 2158244013517243.

LINCOLN, Y. S. 1992. Sympathetic Connections between Qualitative Methods and Health Research. *Qualitative Health Research,* 2**,** 375-391.

LINCOLN, Y. S. & GUBA, E. G. 1985. *Naturalistic inquiry,* Newbury Park ; London, Sage.

LOWTHIAN, J., CURTIS, A., STRANEY, L., MCKIMM, A., KEOGH, M. & STRIPP, A. 2015. Redesigning emergency patient flow with timely quality care at the Alfred. *Emerg Med Australas,* 27**,** 35-41.

LUCK, L., JACKSON, D. & USHER, K. 2006. Case study: a bridge across the paradigms. *Nurs Inq,* 13**,** 103-9.

MACPHERSON, H. & SCHROER, S. 2007. Acupuncture as a complex intervention for depression: a consensus method to develop a standardised treatment protocol for a randomised controlled trial. *Complement Ther Med,* 15**,** 92-100.

MAHONEY, J. 2012. The Logic of Process Tracing Tests in the Social Sciences. *Sociological Methods & Research,* 41**,** 570-597.

MALSBARY, C. B. 2014. "It's not just learning English, it's learning other cultures": belonging, power, and possibility in an immigrant contact zone. *International Journal of Qualitative Studies in Education,* 27**,** 1312-1336.

MANGIN, D., BAHAT, G., GOLOMB, B. A., MALLERY, L. H., MOORHOUSE, P., ONDER, G., PETROVIC, M. & GARFINKEL, D. 2018. International Group for Reducing Inappropriate Medication Use & Polypharmacy (IGRIMUP): Position Statement and 10 Recommendations for Action. *Drugs & Aging,* 35**,** 575-587.

MANHAS, K. P., OLSON, K., CHURCHILL, K., VOHRA, S. & WASYLAK, T. 2020. Experiences of shared decision-making in community rehabilitation: a focused ethnography. *BMC health services research,* 20**,** 329-329.

MARTIN, M. M. & RUBIN, R. B. 1995. A New Measure of Cognitive Flexibility. *Psychological Reports,* 76**,** 623-626.

MCCARTHY, N., NEVILLE, K., POPE, A., GALLAGHER, A., NUSSBAUMER, A. & STEINER, C. M. 2016. The creation of a training model to support decision-making of emergency management practitioners: A design research study. *Journal of Decision Systems,* 25**,** 558-565.

MCKELVIE, S. 2016. *The Patient and Carer Experience of Ambulatory Care at the Emergency Multidisciplinary Units (EMU).* MSc Gerontology, King's College London.

MCKELVIE, S., JOHNSON, L., FAY, J., LASSERSON, D. & LYNCH, M. 2016. Emergency Multi-disciplinary Units. *InnovAiT,* 9**,** 316-318.

MCKELVIE, S. L., ELIZABETH; REEVE, JOANNE. Beyond Protocol Working; The development of a conceptual framework to further understand clinical decision making in uncertainty, . Society of Acute Medicine Conference, 27.5.20 2020 Glasgow.

MCROBERT, A. P., CAUSER, J., VASSILIADIS, J., WATTERSON, L., KWAN, J. & WILLIAMS, M. A. 2013. Contextual information influences diagnosis accuracy and decision

making in simulated emergency medicine emergencies. *BMJ Quality & Safety,* 22(6), 478-84.
MILES, M. B. & HUBERMAN, A. M. 1994. *Qualitative data analysis : an expanded sourcebook,* Thousand Oaks, Calif. ; London, Sage.
MOHAN, D., ANGUS, D. C., RICKETTS, D., FARRIS, C., FISCHHOFF, B., ROSENGART, M. R., YEALY, D. M. & BARNATO, A. E. 2014. Assessing the validity of using serious game technology to analyze physician decision making. *PLoS ONE [Electronic Resource],* 9(8), e105445.
MONTALTO, M. 2010. The 500-bed hospital that isn't there: the Victorian Department of Health review of the Hospital in the Home program. *Med J Aust,* 193, 598-601.
MONTGOMERY, K. 2013. *How doctors think : clinical judgment and the practice of medicine,* New York ; Oxford, Oxford University Press.
MOORE, G. F., AUDREY, S., BARKER, M., BOND, L., BONELL, C., HARDEMAN, W., MOORE, L., O'CATHAIN, A., TINATI, T., WIGHT, D. & BAIRD, J. 2015. Process evaluation of complex interventions: Medical Research Council guidance. *BMJ : British Medical Journal,* 350, h1258.
NEIGHBOUR, R. & READE, P. 1987. *The inner consultation : how to develop an effective and intuitive consulting style,* Lancaster, MTP.
NEVALAINEN, M., KUIKKA, L. & PITKALA, K. 2014. Medical errors and uncertainty in primary healthcare: a comparative study of coping strategies among young and experienced GPs. *Scand J Prim Health Care,* 32, 84-9.
NHS 2014. Five Year Forward View. *In:* ENGLAND, N. (ed.).
NHS. 2019a. *Digital Transformation and NHSX* [Online]. Available: https://www.england.nhs.uk/digitaltechnology/ [Accessed 14.3.21].
NHS 2019b. NHS Long Term Plan.
NHS 2020. Emergency Care Benchmarking Good Practice Compendium. *In:* NETWORK, N. B. (ed.) Dec 2020 ed.: NHS England.
OHLÉN, J., BALNEAVES, L. G., BOTTORFF, J. L. & BRAZIER, A. S. 2006. The influence of significant others in complementary and alternative medicine decisions by cancer patients. *Soc Sci Med,* 63, 1625-36.
OKKONEN, J., VUORI, V. & HELANDER, N. 2018. Enablers and restraints of knowledge work – Implications by certain professions? *Cogent Business & Management,* 5, 1504408.
PALINKAS, L. A. & ZATZICK, D. 2019. Rapid Assessment Procedure Informed Clinical Ethnography (RAPICE) in Pragmatic Clinical Trials of Mental Health Services Implementation: Methods and Applied Case Study. *Administration and policy in mental health,* 46, 255-270.
PAPARINI, S., GREEN, J., PAPOUTSI, C., MURDOCH, J., PETTICREW, M., GREENHALGH, T., HANCKEL, B. & SHAW, S. 2020. Case study research for better evaluations of complex interventions: rationale and challenges. *BMC Medicine,* 18, 301.
PARK, S. Y., LEE, S. Y. & CHEN, Y. 2012. The effects of EMR deployment on doctors' work practices: a qualitative study in the emergency department of a teaching hospital. *International Journal of Medical Informatics,* 81(3), 204-17.
PATTON, M. Q. 2002. *Qualitative research & evaluation methods,* Thousand Oaks, Calif. ; London, Sage.
PAUKER, S. G. & KASSIRER, J. P. 1980. The threshold approach to clinical decision making. *N Engl J Med,* 302, 1109-17.
PENDLETON, D. 1984. *The Consultation : an approach to learning and teaching,* Oxford, Oxford University Press.

PENDLETON, D. 2003. *The new consultation : developing doctor-patient communication,* Oxford, Oxford University Press.

PETHYBRIDGE, J. 2004. How team working influences discharge planning from hospital: a study of four multi-disciplinary teams in an acute hospital in England. *J Interprof Care,* 18**,** 29-41.

PHILP, I., MILLS, K. A., THANVI, B., GHOSH, K. & LONG, J. F. 2013. Reducing hospital bed use by frail older people: results from a systematic review of the literature. *Int J Integr Care,* 13**,** e048.

PICKERING, B. W., LITELL, J. M., HERASEVICH, V. & GAJIC, O. 2012. Clinical review: the hospital of the future - building intelligent environments to facilitate safe and effective acute care delivery. *Crit Care,* 16**,** 220.

PINKNEY, J., RANCE, S., BENGER, J., BRANT, H., JOEL-EDGAR, S., SWANCUTT, D., WESTLAKE, D., PEARSON, M., THOMAS, D., HOLME, I., ENDACOTT, R., ANDERSON, R., ALLEN, M., PURDY, S., CAMPBELL, J., SHEAFF, R. & BYNG, R. 2016. How can frontline expertise and new models of care best contribute to safely reducing avoidable acute admissions? A mixed-methods study of four acute hospitals. Southampton (UK).

POLITI, L., CODISH, S., SAGY, I. & FINK, L. 2017. Balancing Volume and Duration of Information Consumption by Physicians: The Case of Health Information Exchange in Critical Care. *Journal of Biomedical Informatics,* 11**,** 11.

POPAY, J., ROBERTS, H., SOWDEN, A., PETTICREW, M., ARAI, L., RODGERS, M., BRITTEN, N., ROEN, K. & DUFFY, S. 2006. Guidance on the Conduct of Narrative Synthesis in Systematic Reviews. ESRC Methods Programme.

POPAY, J. & WILLIAMS, G. 1998. Qualitative research and evidence-based healthcare. *J R Soc Med,* 91 Suppl 35**,** 32-7.

POPE, C. 2002. Contingency in everyday surgical work. *Sociology of Health & Illness,* 24**,** 369-384.

POPE, C., ZIEBLAND, S. & MAYS, N. 2000. Qualitative research in health care. Analysing qualitative data. *BMJ,* 320**,** 114-6.

PRASAD, P. 2005. *Crafting qualitative research : working in the postpositivist traditions,* Armonk, N.Y., M.E. Sharpe.

PURDY, S. 2010. Avoiding Hospital Admissions. Available: https://www.kingsfund.org.uk/sites/default/files/Avoiding-Hospital-Admissions-Sarah-Purdy-December2010.pdf.

RANCE, S., WESTLAKE, D., BRANT, H., HOLME, I., ENDACOTT, R., PINKNEY, J. & BYNG, R. 2020. Admission Decision-Making in Hospital Emergency Departments: The Role of the Accompanying Person. *Global Qualitative Nursing Research,* 7**,** 2333393620930024.

RAPLEY, T. 2008. Distributed decision making: the anatomy of decisions-in-action. *Sociology of Health & Illness,* 30**,** 429-444.

RAPLEY, T., FARRE, A., PARR, J. R., WOOD, V. J., REAPE, D., DOVEY-PEARCE, G. & MCDONAGH, J. 2019. Can we normalise developmentally appropriate health care for young people in UK hospital settings? An ethnographic study. *BMJ Open,* 9**,** e029107.

RCGP. 2021. *RCGP First 5 Scheme* [Online]. Available: https://www.rcgp.org.uk/first5 [Accessed 11.2.2021].

RCP 2007. Acute medical care. The right person, in the right setting – first time. *In:* TASKFORCE, A. M. (ed.). London: Royal College of Physicians.

RCP 2012. Hospitals on the Edge? Time for Action. London: Royal College of Physicians.

RCP 2013. Future Hospital: Caring for Medical Patients. Royal College of Physicians.
REEVE, J. 2015. Supporting expert generalist practice: the SAGE consultation model. *Br J Gen Pract,* 65**,** 207-8.
REEVE, J., BLAKEMAN, T., FREEMAN, G. K., GREEN, L. A., JAMES, P. A., LUCASSEN, P., MARTIN, C. M., STURMBERG, J. P. & VAN WEEL, C. 2013. Generalist solutions to complex problems: generating practice-based evidence--the example of managing multi-morbidity. *BMC Fam Pract,* 14**,** 112.
RICH, M. & GINSBURG, K. R. 1999. The reason and rhyme of qualitative research: why, when, and how to use qualitative methods in the study of adolescent health. *J Adolesc Health,* 25**,** 371-8.
RICHARDS, D. A. & HALLBERG, I. 2015. *Complex interventions in health : an overview of methods,* London, Routledge.
RICKHAM, P. P. 1964. HUMAN EXPERIMENTATION. CODE OF ETHICS OF THE WORLD MEDICAL ASSOCIATION. DECLARATION OF HELSINKI. *British Medical Journal,* 2**,** 177-177.
RITCHIE, J., LEWIS, J., MCNAUGHTON NICHOLLS, C. & ORMSTON, R. 2014. *Qualitative research practice : a guide for social science students and researchers,* London, SAGE Publications Ltd.
ROBSON, C. 2011. *Real world research : a resource for users of social research methods in applied settings,* Chichester, Wiley.
SANDELOWSKI, M. 2004. Using qualitative research. *Qual Health Res,* 14**,** 1366-86.
SAVAGE, J. 2000. Ethnography and health care. *BMJ,* 321**,** 1400-2.
SCHNEIDER, A., WUBKEN, M., LINDE, K. & BUHNER, M. 2014. Communicating and dealing with uncertainty in general practice: the association with neuroticism. *PLoS One,* 9**,** e102780.
SEABURN, D. B., MORSE, D., MCDANIEL, S. H., BECKMAN, H., SILBERMAN, J. & EPSTEIN, R. 2005. Physician responses to ambiguous patient symptoms. *J Gen Intern Med,* 20**,** 525-30.
SENNETT, R. 2009. *The craftsman,* London, Penguin.
SHACHAK, A., HADAS-DAYAGI, M., ZIV, A. & REIS, S. 2009. Primary care physicians' use of an electronic medical record system: a cognitive task analysis. *Journal of General Internal Medicine,* 24(3)**,** 341-8.
SHEPPERD, S., DOLL, H., ANGUS, R. M., CLARKE, M. J., ILIFFE, S., KALRA, L., RICAUDA, N. A. & WILSON, A. D. 2008. Admission avoidance hospital at home. *Cochrane Database Syst Rev***,** CD007491.
SHEPPERD, S., DOLL, H., BROAD, J., GLADMAN, J., ILIFFE, S., LANGHORNE, P., RICHARDS, S., MARTIN, F. & HARRIS, R. 2009. Early discharge hospital at home. *Cochrane Database of Systematic Reviews***,** N.PAG.
SHEPPERD, S. & ILIFFE, S. 2005. Hospital at home versus in-patient hospital care. *Cochrane Database Syst Rev***,** CD000356.
SILVERMAN, J., KURTZ, S. M., DRAPER, J. & KURTZ, S. M. 1998. *Skills for communicating with patients,* Abingdon, Radcliffe Medical Press.
SIMON, H. A. 1982. *Models of bounded rationality,* Cambridge, Mass. ; London, MIT Press.
SKAUGSET, L. M., FARRELL, S., CARNEY, M., WOLFF, M., SANTEN, S. A., PERRY, M. & CICO, S. J. 2016. Can You Multitask? Evidence and Limitations of Task Switching and Multitasking in Emergency Medicine. *Annals of Emergency Medicine,* 68(2)**,** 189-95.

SMITH, A., GOODWIN, D., MORT, M. & POPE, C. 2003. Expertise in practice: an ethnographic study exploring acquisition and use of knowledge in anaesthesia. *Br J Anaesth,* 91**,** 319-28.
SPRADLEY, J. P. 1980. *Participant observation,* New York, Holt, Rinehart & Winston.
STAKE, R. 2005. Qualitative Case Studies. *In:* DENZIN, N. & LICOLN, Y. (eds.) *The Sage Handbook of Qualitative Research.* Thousand Oaks, Calif. ; London: Sage.
STRAUSS, A. L. 1978. *Negotiations : varieties, contexts, processes, and social order,* San Francisco ; London, Jossey-Bass.
STUCK, A. E., WALTHERT, J. M., NIKOLAUS, T., BULA, C. J., HOHMANN, C. & BECK, J. C. 1999. Risk factors for functional status decline in community-living elderly people: a systematic literature review. *Soc Sci Med,* 48**,** 445-69.
SWELLER, J. 1988. Cognitive Load During Problem Solving: Effects on Learning. *Cognitive Science,* 12**,** 257-285.
THOMAS, G. 2016. *How to do your case study,* Los Angeles, SAGE.
THOMPSON, A. & WENNIKE, N. 2015. Testing the AMB score - can it distinguish patients who are suitable for ambulatory care? *Clin Med,* 15**,** 222-4.
TIAN, Y., DIXON, A. & GAO, H. 2012. Emergency hospital admissions for ambulatory care-sensitive conditions: identifying the potential for reductions. London: The King's Fund.
TUSHMAN, M. L. & SCANLAN, T. J. 1981. Boundary Spanning Individuals: Their Role in Information Transfer and Their Antecedents. *The Academy of Management Journal,* 24**,** 289-305.
VAN DER GEEST, S. & FINKLER, K. 2004. Hospital ethnography: introduction. *Soc Sci Med,* 59**,** 1995-2001.
VAN MAANEN, J. 1995. *An end to innocence : the ethnography of ethnography,* Thousand Oaks, Calif., Sage.
WELSH, T. G., AL; GLADMAN, JR; 2013. Comprehensive Geriatric Assessment - A Guide for the Non Specialist. *International Journal of Clinical Practice,* 68**,** 290-293.
WEST, M. A. 2012. Effective teamwork : practical lessons from organizational research. 3rd ed. Place of publication not identified: Wiley-Blackwell,.
WESTBROOK, J. I., RABAN, M. Z., WALTER, S. R. & DOUGLAS, H. 2018. Task errors by emergency physicians are associated with interruptions, multitasking, fatigue and working memory capacity: a prospective, direct observation study. *BMJ Qual Saf,* 27**,** 655-663.
WHITE, H. L. & GLAZIER, R. H. 2011. Do hospitalist physicians improve the quality of inpatient care delivery? A systematic review of process, efficiency and outcome measures. *BMC Med,* 9**,** 58.
WIND, G. 2008. Negotiated interactive observation: Doing fieldwork in hospital settings. *Anthropology & Medicine,* 15**,** 79-89.
YIN, R. K. 2009. *Case study research : design and methods,* Los Angeles, Calif. ; London, Sage.
ZIEBLAND, S., COULTER, A., CALABRESE, J. D. & LOCOCK, L. 2013. *Understanding and using health experiences : improving patient care,* Oxford, Oxford University Press.