The role of high sensitivity cardiac troponin assays in the assessment and experience of patients presenting to the Emergency Department with suspected acute coronary syndrome

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Abstract

The improved precision of high-sensitivity cardiac troponin (hs-cTnI) assays has enabled two advances in the assessment of patients with suspected acute coronary syndrome; 1) the use of sex-specific criteria for the diagnosis of myocardial infarction, and 2) the development of pathways to identify low risk patients in the Emergency Department setting, who may be suitable for immediate discharge.

This thesis had two overarching aims: to explore the gendered dimensions of the new assessment process and to examine how patient experience of chest pain may be shaped by the implementation of an early rule-out pathway for myocardial infarction. In order to achieve these, the study had two components: a quantitative analysis of the presenting characteristics of men and women diagnosed with myocardial infarction using sex-specific criteria, and a qualitative interview study with patients who experienced assessment either before or after implementation of an early rule-out pathway.

In the quantitative element of this thesis, I aimed to determine the frequency and predictive value of presenting characteristics in patients with myocardial infarction by evaluating patient reported symptoms in 1,941 patients (39% women) with suspected acute coronary syndrome. Typical symptoms were more common in women than men with myocardial infarction (77% [69/90] *versus* 59% [109/184], P=0.007), and were similar in those women and men who were reclassified with myocardial infarction due to the use of sex-specific

criteria (74% [20/27] *versus* 44% [4/9], P=0.22). In women, the combination of three or more typical features was associated with a significantly positive likelihood ratio for a diagnosis of myocardial infarction (LR+1.18, 95% CI 1.03 to 1.31), but this relationship was not observed in men (LR+ 1.09, 95% CI 0.96 to 1.24).

The improved precision of the hs-cTnI assay has enabled the diagnosis of myocardial infarction to be excluded in the Emergency Department without requiring hospital admission. Understanding the patient experience of earlier clinical decisions will ensure these new diagnostic pathways benefit both the healthcare system and patients themselves. The qualitative element was designed to explore how patient experience of chest pain may be shaped by the implementation of an early rule-out pathway. Patients attending the Emergency Department who had myocardial infarction ruled out were eligible for inclusion. Purposive sampling was used to ensure representation across age and sex categories. 23 participants were interviewed before, and 26 participants were interviewed after implementation of the early rule-out pathway one week following discharge.

The content of participant accounts did not appear to be dictated by whether they were assessed before or after implementation of the early rule-out pathway with many common themes arising from both pathways. Patient experience of chest pain extended both before and after the in-hospital period revealing a phased illness episode. Participants described how they appraised

their symptoms involving a complex process of interpretation and evaluation of the appropriate action. Patient accounts also revealed the differing priorities of the clinical pathway (the rule-out of myocardial infarction) to the holistic patient view desired by participants themselves. The confirmation of the absence of disease did not provide all patients with the reassurance that they desired. Providing pre-test information regarding the troponin test, in addition to active listening and the building of a trustful clinician-patient relationship appeared to relate to positive expressions of reassurance within participant accounts. Following discharge, participants had to continue to make sense of their chest pain experience. The way in which some participants made use of their acute chest pain presentation to hospital as an opportunity to consider their future heart health emerged as an unelicited theme. Participants assessed using the early rule-out pathway appeared to have a lesser orientation to use the episode of chest pain as a cue to action to appraise their future health status.

The findings of this thesis suggest that high-sensitivity cardiac troponin assays will aid the assessment of patients with suspected acute coronary syndrome in two important ways. Firstly, the clinical significance of typical symptom clusters and their correlation to myocardial infarction in women is highlighted. Secondly, the successful implementation of early rule-out pathways into the Emergency Department will be aided by the addition of simple communication interventions during the chest pain assessment process. Extending the focus of assessment beyond the rule-out of myocardial infarction may enhance the

care experience of patients. This thesis has also demonstrated how qualitative research has provided a mechanism through which to explore how the biochemical evidence of the early rule-out pathway may be applied in a clinical environment, enabling the application of trial data into a real-life clinical context that responds to patients' needs.

Lay Summary

Chest pain is the main symptom of acute coronary syndrome and is one of the most common reasons for presentation to the Emergency Department. Patient assessment is based around symptoms, their ECG and a blood test to measure a biomarker called troponin. The introduction of new high-sensitivity troponin blood tests has led to two advances in the assessment of patients with suspected acute coronary syndrome. Firstly, the use of different thresholds for the diagnosis of heart attacks in men and women, and secondly, the identification of low risk patients who may be suitable for immediate discharge because they are found not to have had or be having a heart attack. This thesis explores the role of these advances in the assessment and experience of patients presenting to the Emergency Department with suspected acute coronary syndrome. To assess the first, presenting symptoms as described by the patient were documented from 1941 patients attending the Emergency Department with suspected acute coronary syndrome. Symptoms were classed as typical or atypical based on pain location, nature, presence of radiation and associated symptoms. This analysis identified that typical symptoms were more common in women than men with heart attacks. This was also true for those patients diagnosed with a heart attack by the new test who would have been missed with the older test. In addition, the presence of three or more typical features predicted the diagnosis of a heart attack more strongly in women than men. An interview study looked at patient experience. Patients were interviewed either before (23 patients) or after (26 patients) the introduction of an early rule-out pathway. Participants talked about a phased

illness episode extending both before and after the in-hospital assessment. For some participants the rule-out of a heart attack did not give them the reassurance they desired. Providing patients with pre-test information about the troponin test, coupled with active listening and the formation of a trustful clinician-patient relationship helped to provide such reassurance. Additionally, some patients appeared to use their chest pain presentation as an opportunity to consider their future health. This was less evident in those assessed using the early rule-out pathway. The findings of this thesis firstly highlight the importance of typical symptoms and their links with heart attacks in women. Secondly, the successful use of early rule-out pathways in the Emergency Department will be aided by ensuring effective communication about the how the tests can rule-out a heart attack during the chest pain assessment process. This thesis has also demonstrated how an interview study has enabled clinical trial data to be applied in a real-life hospital setting taking into account patients' needs.

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Figures and Tables

Declaration

This thesis represents research undertaken in the Department of Cardiovascular Science, University of Edinburgh, and the Emergency Department, Royal Infirmary of Edinburgh.

The studies described were conducted as sub studies to the High-Sensitivity Troponin in the Evaluation of patients with suspected Acute Coronary Syndrome (HighSTEACS) clinical trial which was funded by the British Heart Foundation. Funding was also received from the Edinburgh and Lothian Health Foundation. Recruitment of the study population from which the data in chapter 6 is derived was assisted by research nurses of The Emergency Medicine Research Group. Dr Atul Anand ran the statistical analysis of this data set. The qualitative study was conceived in conjunction with the PhD supervisory team, with recruitment, data collection and analysis all performed by myself. This work has not been submitted for any other degree or professional qualification.

AMY V FERRY   18th June 2019

Acknowledgements

Chapter 1

Introduction

1.1 Background

Chest pain accounts for approximately 6% of all presentations to the Emergency Department each year (Goodacre et al., 2005). The aetiology can stem from many different systems including pulmonary, gastrointestinal, skeletal, psychiatric and cardiovascular (Swap and Nagurney, 2005). Whilst initial differential diagnoses may be broad, the exclusion of life-threatening conditions such as acute coronary syndromes is the focus of the initial assessment.

Acute coronary syndrome is a term representing a range of conditions from unstable angina to myocardial infarction. Myocardial infarction is described as either non-ST-segment-elevation myocardial infarction (NSTEMI), or ST-segment-elevation myocardial infarction (STEMI) denoting features on the electrocardiogram (ECG) associated with the event. Conditions on this spectrum arise due to a sudden reduction of blood flow to the heart, usually due to atherosclerotic plaque rupture within the wall of a coronary artery. This may result in the formation of a blood clot leading to decreased myocardial blood flow and oxygen supply, and in the case of myocardial infarction results in cardiac muscle cell necrosis. Acute coronary syndromes are medical emergencies. Treatment of myocardial infarction aims to restore coronary blood flow to limit heart muscle cell death. In the case of unstable angina, the treatment aim is to prevent progression to acute myocardial infarction (NICE, 2014a).

Five clinical categories of myocardial infarction exist. Type 1 myocardial infarction refers to rupture of an atherosclerotic plaque as described above and is a main concern of clinicians assessing patients attending the Emergency Department with chest pain. Type 2 myocardial infarction is the term used to describe cases of myocardial injury (defined by a high-sensitivity cardiac troponin I concentration above the 99th centile of the normal reference range) or necrosis where a condition other than coronary artery disease contributes to a myocardial oxygen supply and demand mismatch such as in anaemia, arrhythmia or hypotension. Treatment of these patients is primarily focused on management of the underlying imbalance issue. Type 3 describes a myocardial infarction resulting in death before biomarkers can be obtained. Type 4 myocardial infarction relates to procedural complications with 4a describing a troponin rise relating to a percutaneous intervention procedure, and 4b characterised by a troponin rise associated with stent thrombosis. Type 5 myocardial infarction is associated with a coronary artery bypass grafting procedure (SIGN, 2016).

Assessing patients for suspected acute coronary syndrome is based around three elements: clinical findings, electrocardiogram (ECG), and cardiac biomarkers (Carlton and Body, 2018). However, the evaluation of acute chest pain is challenging. No individual clinical features are useful in either ruling in or excluding an acute coronary syndrome (Mant et al, 2004) and while ECG characteristics are a major determinant of clinical decision making, only 14% of patients present to the Emergency Department with a diagnostic ECG (Goodacre et al., 2005). The addition of cardiac biomarker testing must

therefore be applied in order to assess for a diagnosis of acute myocardial infarction. High-sensitivity cardiac troponin is the biomarker recommended for use in routine clinical assessment by the joint European Society of Cardiology, American College of Cardiology, American Heart Association, World Heart Federation task force for the universal definition of myocardial infarction (Thygesen et al., 2018).

1.2 Cardiac troponin

Troponins are regulatory muscle proteins that are released into the circulation following acute myocardial injury. In the latest consensus document, the clinical criteria necessary for a diagnosis of myocardial infarction are a rise and/or fall in cardiac troponin, with one value above the 99th percentile of the upper reference limit, with evidence of acute myocardial ischaemia (Thygesen et al., 2018). The upper reference limit is defined as the 99th centile of cardiac troponin of a healthy reference population. Previous generations of cardiac troponin assays had limited sensitivity, with the level of imprecision greater than the accepted ≤10% and therefore higher diagnostic thresholds were applied (Apple *et al.*, 2012a). High-sensitivity cardiac troponin assays are defined as those that are able to quantify troponin above the limits of detection of the assay in 50% of a healthy population, and demonstrate an accepted level of imprecision below 10% at the 99th centile upper reference limit (Apple et al., 2012b). This improved sensitivity may impact the assessment of patients with suspected acute coronary syndrome in two ways. Firstly, the improved precision has revealed important differences in the reference range of cardiac

troponin between men and women (figure 1), with the 99th centile in men being twice that of women (34ng/L versus 16ng/L) (Apple et al., 2012b).
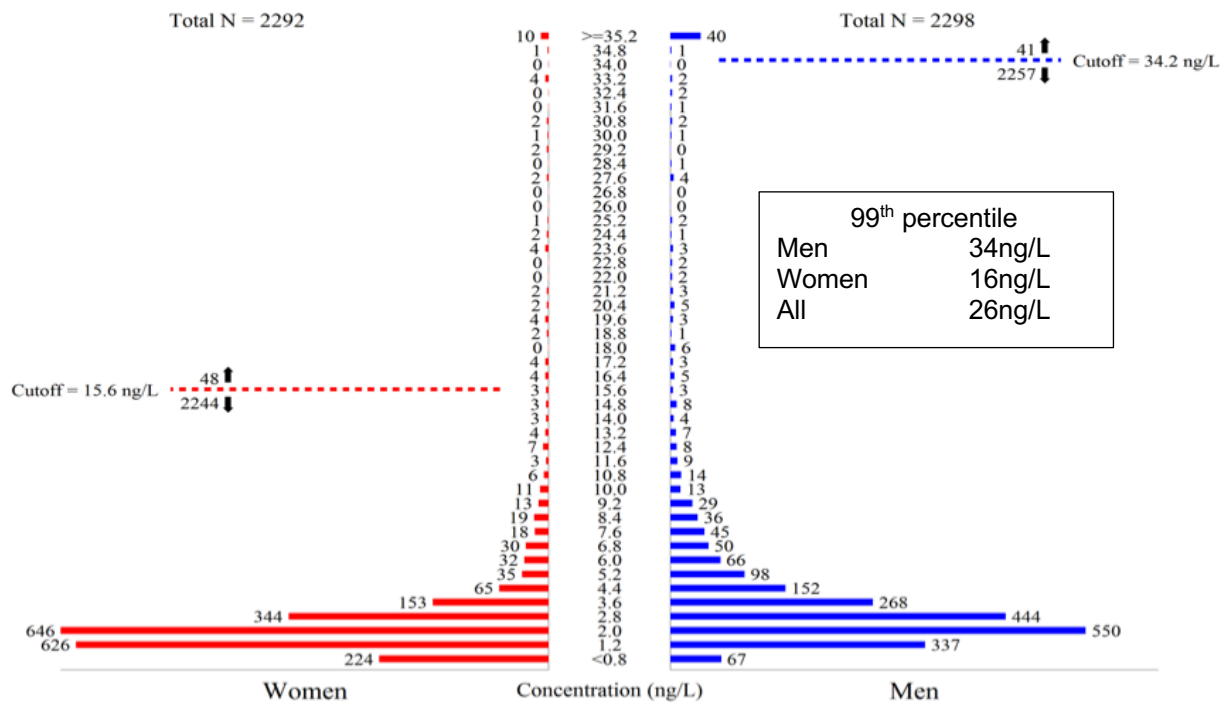
(Rogers *et al.*, 2013)

Figure 1 Distribution of troponin and 99th percentile upper reference limits in 4,590 samples from healthy man and women

Sex-specific diagnostic criteria are now recommended for diagnosis of myocardial infarction (Thygesen et al., 2018). Lowering of the diagnostic threshold to reveal previously undisclosed increases in cardiac troponin (due to the limitations of the previous generation of assays) will clearly identify more patients with myocardial infarction. In particular, the diagnosis of myocardial infarction was seen to double in women when a sex-specific threshold was applied (cardiac troponin concentration >16ng/L) compared to a single threshold with a contemporary assay (cardiac troponin concentration >50ng/L)

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(Shah et al., 2015a). The women who have been reclassified with a diagnosis of myocardial infarction due to the sensitivity of the new generation of cardiac troponin assays have not previously been recognised, therefore their presenting symptom profile is unknown. This thesis has therefore sought to determine the frequency and predictive value of typical presenting symptoms in men and women diagnosed with myocardial infarction using high-sensitivity cardiac troponin with sex-specific thresholds.

In addition to the use of sex-specific thresholds for the diagnosis of myocardial infarction, the advent of high-sensitivity troponin testing has also seen the endorsement of early rule-out pathways by both the European Society of Cardiology (ESC) (Roffi et al., 2016), and the National Institute of Clinical Excellence (NICE) (NICE, 2014b). A number of strategies have been proposed to identify low risk patients at presentation, or 1 to 2 hours after presentation, who may be suitable for immediate discharge directly from the Emergency Department (Rubini Gimenez et al., 2015, Pickering et al., 2016, Carlton et al., 2016, Bandstein et al., 2014, Body et al., 2011, Mueller et al., 2016, Cullen et al., 2013). Defining a threshold of cardiac troponin at presentation to the Emergency Department has enabled the identification of patients at low risk of myocardial infarction (<5ng/L) who may be suitable for immediate discharge directly from the Emergency Department (Shah et al., 2015b). Using high-sensitivity cardiac troponin for risk stratification (Figure 2) rules out myocardial infarction in 74% of patients either at presentation, or within 3 hours of presentation if further testing is required, but all within the Emergency

Department setting (Chapman et al., 2017a). This will undoubtedly have major benefits to health care providers due to a decrease in potentially unnecessary hospital admissions. However, with the implementation of early rule-out strategies, patients will spend less time within the healthcare setting, and will have fewer assessments from specialists, fewer opportunities to discuss the nature of their pain, and therefore may be less likely to be reassured that their symptoms are benign. It has been documented that patients with unexplained chest pain suffer from increased anxiety, use more hospital services, and have functional statuses that are comparable to those patients with coronary heart disease (Jerlock et al., 2005) (Janson Fagring et al., 2005). This thesis will therefore explore how the implementation of an early rule-out pathway for myocardial infarction, afforded by a high-sensitivity troponin assay, may shape patient experience of chest pain and the associated assessment process.

1.3 Research methods

Multiple research methodologies are employed in order to explore how the advances of sex-specific diagnosis and early rule-out of myocardial infarction, afforded by high-sensitivity cardiac troponin assays, may shape the patient assessment process. Each of the two research questions will be considered independently. Firstly, the challenge of using multiple methods must be addressed.

The nature of a research question drives the choice of methods. However, in order to consider using different methodologies, a researcher must be open to

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different forms of knowledge production and be transparent in their position as to how different forms of knowledge are interpreted. When engaging in these epistemological considerations, it was felt that multiple forms of knowledge were relevant in different situations depending on the research aim. Siting a piece of research within a research paradigm can help create a link between the study aim and the methods appropriate to achieving that aim. This idea of a research paradigm has been described to represent the researcher's world view and therefore shapes the research methods used (Houghton et al., 2012). After personal engagement with these debates, a pluralism of approaches appeared to serve the aims of the research questions proposed. This research is therefore sited within the paradigm of pragmatism (Creswell and Plano Clark et al., 2007). A full explanation of these methodological considerations is given in chapter 4.

1.4 Thesis aims

The overarching aim of this thesis is to explore how the assessment of patients presenting to the Emergency Department with suspected acute coronary syndrome may be shaped by the advent of high-sensitivity cardiac troponin assays into the clinic. This broad objective can be divided into two component parts which form my two research questions. Research question one aims to determine the frequency and predictive value of typical presenting symptoms in men and women diagnosed with myocardial infarction using high-sensitivity cardiac troponin with sex-specific thresholds. This question will therefore be answered using quantitative methodology. Research question two aims to

explore how the implementation of an early rule-out pathway for myocardial infarction, afforded by the high sensitivity-troponin assay, may shape patient experience of chest pain and the associated assessment process. For this question, qualitative methods exploring experience and meaning are most suited.

Aside from using multiple methods to answer the two different research questions, this study is embedded within a clinical trial (NCT03005158). The main trial will compare the primary efficacy end-point of discharge from the Emergency Department, before and after implementation of an early rule-out pathway. It is anticipated that implementation of the novel high-sensitivity cardiac troponin assay and an early rule-out pathway will be associated with major cost savings. The work of this thesis is to explore patient experience, and then to offer practical use of the knowledge gained to guide assessment of patients presenting to the Emergency Department with chest pain.

This study has been approached not only as an academic endeavour, but also from a clinical view point. In harnessing new diagnostic technologies, an opportunity exists to develop an assessment process that satisfies the demands of the healthcare system, and one that has a true patient focus. This research was performed against a background of aiming to improve health service delivery and patient care. As such, the pursuit of knowledge was logically directed towards uncovering findings that would benefit patients. While not being closed to any knowledge which inductively arose from the

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data, the health care application lens through which the qualitative data were generated, understood, and interpreted, enhanced its practical relevance.

1.5 Outline of the thesis

This brief introductory chapter has described the genesis of the thesis by presenting the background to the study, describing the context in which the research was performed, and outlining the study aims. A summary of the subsequent chapters will now follow providing a guide as to how the remainder of the reading will unfold.

Chapter 2 A summary of the sex and gender disparity in relation to coronary heart disease details why the introduction of sex specific thresholds for the diagnosis of myocardial infarction may have clinical importance. A narrative literature review then reveals the knowledge gap in relation to clinical symptoms of this newly defined group of patients.

Chapter 3 The results of a thematic synthesis of qualitative studies are presented relating to the second aim of the thesis exploring patient experience of chest pain.

Chapter 4 The research process, including how this developed, the methodological approach, the sample, data collection and analysis is discussed. An explanation of the rationale for the approach to inquiry based around epistemological and ontological positions is discussed. Methodological choices, and ethical considerations for undertaking this research are detailed.

Chapters 5a, 5b and 5c present the findings from the qualitative research, exploring how patient experience of chest pain may be shaped by the

implementation of an early rule-out pathway for myocardial infarction.

Chapter 5a An overarching feature evident throughout this analysis is the differing priorities of a clinical pathway, versus the holistic patient view. As the interviews uncovered a phased illness episode, this chapter considers the patient experience of chest pain in the form of an illness timeline. The analysis is presented in three phases (pre-hospital, in-hospital, and post-hospital) representing the stages through which a patient moves when they are confronted with an episode of chest pain.

Chapter 5b Mirroring the findings of the thematic synthesis, a major finding was that a discord existed between the interpretation of the rule-out of myocardial infarction by a clinician, and the meaning as felt by the patient. This chapter provides an in-depth analysis of the concept of reassurance, as expressed by the patient, and offers practical solutions that could be found from within the data that facilitated the development of reassurance.

Chapter 5c The way in which participants made use of their acute chest pain presentation to hospital as an opportunity to consider their future health was an unelicited theme within interviews and forms the topic of analysis for this chapter.

Chapter 6 The knowledge gap identified in chapter 2 is addressed by determining the frequency and predictive value of typical presenting symptoms in men and women diagnosed with myocardial infarction using high-sensitivity cardiac troponin with sex-specific thresholds

Chapter 7 This final chapter draws the findings together and begins with a discussion regarding the implementation of an evidence-based guideline (the

early rule-out of myocardial infarction) in the context of an Emergency Department consultation for chest pain. A section discussing possible reasons for the dominance of the atypical symptom presentation in women follows. The chapter then concludes with a piece of reflective writing on my growth as a researcher revealing how inclusion of qualitative research has provided the mechanism by which trial data can be translated into a real-life clinical context.
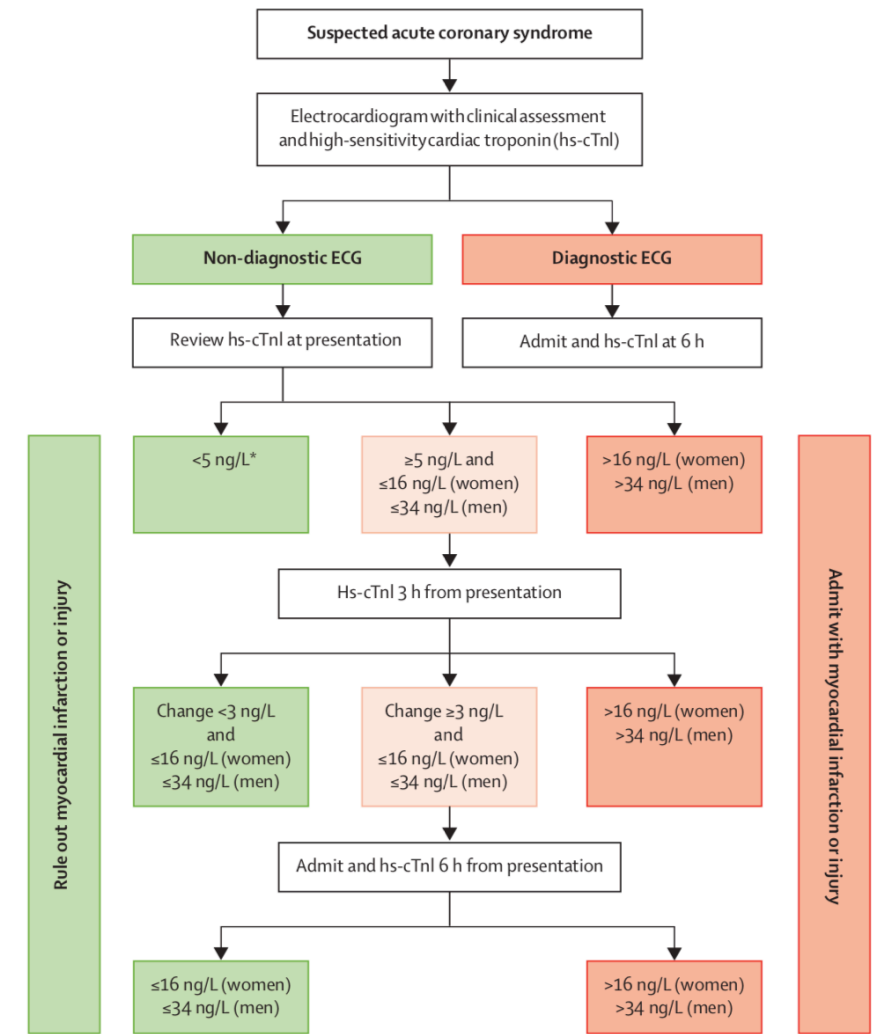
(Shah et al., 2016)

Figure 2 Chest pain pathway NHS Lothian

Chapter 2

Literature review

A narrative review of literature surrounding symptom presentation of men and women with myocardial infarction.

2.1 Sex and Gender disparity in cardiovascular disease

2.1.1 Introduction

This narrative review begins with a brief summary of the sex and gender disparity that exists in cardiovascular disease. It then aims to demonstrate the complexity involved when attempting to answer the question of whether sex differences exist in the presenting symptoms of men and women with myocardial infarction due to the selection of study participants, the method of data collection, the categorisation of symptoms into typical and atypical groupings and the criteria for diagnosing myocardial infarction.

2012 saw cardiovascular disease fall from being the main cause of death in the UK to being the second main cause for the first time since the 1960's (Townsend et al., 2014). This status has remained with cardiovascular disease being responsible for 27% of male deaths and 24% of female deaths annually (BHF, 2018). From 1990-2015, women accounted for more new cases of cardiovascular disease than men among European Society of Cardiology member countries (Timmis et al., 2018). Despite this immense non-discriminatory health threat, major sex differences remain in the diagnosis, treatment and outcomes of men and women with cardiovascular disease (Wenger, 2012).

Women suffer higher cardiovascular morbidity and mortality than men (Brewer et al., 2015). This is partly due to sex differences in the pathophysiology of disease seen in women (Mehta et al., 2016). Plaque erosions and coronary

microembolisation are more common in women than men (Farb et al, 1996), as are spontaneous coronary artery dissections (Thompson et al., 2005) and coronary microvascular dysfunction (Sara et al., 2015). In addition, sub-studies of several major randomised controlled trials have shown reduced treatment efficacy of percutaneous coronary intervention in women – a main treatment strategy for acute coronary syndrome (Clayton et al., 2005, Lagerqvist et al., 2001, Swahn et al., 2012). Layered on top of this biological variation which denotes sex differences, gender differences which are affected by environmental and social factors may also have an impact. Both female patients and their health care providers have been seen to be less likely to attribute symptoms of acute coronary syndrome to a cardiac cause (Lichtman et al., 2018). Women have been described to delay help seeking in response to possible cardiac chest pain (Schoenberg et al., 2003, Galdas et al, 2010, Foster and Mallik, 1998, Zerwic et al., 2003, Emslie, 2005). Also, even though clinicians considered a diagnosis of coronary heart disease as often in men and women, they displayed less certainty of diagnosis in women, and were therefore less likely to prescribe cardiac medications or order cardiac tests (Welch et al., 2012).

The first line of defense in redressing this disparity rests in the correct identification of patients with acute coronary syndrome. This ensures they enter the appropriate therapeutic decision pathway. Consequently, the accurate interpretation of clinical symptoms has major implications for patient triage, treatment and subsequent management. Failure to recognise

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symptoms as cardiac in origin, could result in misdiagnosis, delayed provision

of therapy, and could be a contributory factor to the worse outcomes seen in

women (Shah et al., 2017).

2.2 Usefulness of chest pain characteristics to predict myocardial infarction

In isolation, individual chest pain characteristics have limited value for the prediction of myocardial infarction. Chest pain nature, radiation, location, size of pain area, duration of pain, and pain severity, have all been investigated for their correlation to a diagnosis of myocardial infarction. Systematic reviews of studies indicate radiation of pain to the right arm or shoulder and radiation of pain to both arms or shoulders have likelihood ratios of 4.7 and 4.1 respectively and were the most useful features to indicate a diagnosis of acute coronary syndrome (Swap and Nagurney, 2005, Panju et al., 1998). Other work has shown non-pain features such as sweating and vomiting to be strong predictors of acute myocardial infarction (Body et al, 2010). Features making a diagnosis of acute coronary syndrome less likely were pain described as sharp, not associated with exertion, positional pain, or reproduced by palpation (Panju et al., 1998, Swap and Nagurney, 2005). A recent multi-centre study confirmed these results with radiation to the right arm most strongly associated with a diagnosis of acute coronary syndrome (McCord et al., 2019). None of these studies were stratified by sex to assess for differences in predictive value of clinical features between men and women. In the absence of further diagnostic testing, no individual features are powerful enough to either predict or rule out an acute coronary syndrome (Swap and Nagurney, 2005, Eslick, 2005, Dezman et al 2017). Chest pain history does serve a purpose in stratifying patients who should receive biomarker testing, and, may also indicate other causes of symptoms and trigger alternative therapeutic decision

pathways.

The definition of typical cardiac pain remains close to that first described by Heberden in the 18th Century; a painful sensation in the breast accompanied by a strangling sensation and anxiety, often occurring while walking or soon after eating (Heberden, 1772). While there may be a general consensus as to what constitutes typical pain, no outright definition exists. Furthermore, there is much less agreement as to what constitutes an atypical presentation. An atypical presentation can be broadly defined as either pain symptoms that are outwith those covered by the typical definition, or pain characteristics that indicate a decreased likelihood of cardiac cause (Swap and Nagurney, 2005). There is also a third category of atypical pain that covers pain free presentations (Mehta et al., 2016).

When considering the component parts of what forms a typical pain presentation, four domains appear to be important: pain location, pain nature, radiation, and presence of additional symptoms. The presence of pain radiation and associated symptoms is not required for a pain presentation to be deemed typical, but these features are recognised as important elements in the diagnosis of an acute coronary syndrome. Below, the definitions provided by two guideline bodies (figure 3), the European Society of Cardiology (Roffi et al., 2016) and American Heart Association (Luepker et al., 2003) demonstrate the variation in how symptoms are defined as typical and atypical.

	ESC	AHA
Typical location	Retrosternal	Chest, epigastric, neck, jaw or arm
Typical nature	Pressure heaviness	Pressure discomfort
Radiation	Left arm (right, or both arms) Neck, or jaw	
Associated symptoms	Sweating, nausea, abdominal pain, dyspnoea	
Atypical	Epigastric pain, indigestion like symptoms, isolated dyspnoea	Fatigue, nausea, vomiting, sweating, back pain

Figure 3 Definition of typical and atypical pain

This is problematic as it is often said that women more commonly present with atypical symptoms (Roffi et al., 2016, Mehta et al., 2016). Without a consistent definition, the meaning of this statement is unclear.

2.3 Evidence from guidelines

The European Society of Cardiology guidelines state that "atypical complaints are more often observed in women" (among other patient groups such as diabetics, the elderly, those with chronic renal disease or dementia) (Roffi et

al., 2016). The evidence used for this statement comes from three publications (Canto and Centor, 2002, Mackay et al., 2011, Rubini Gimenez et al., 2014). The first reports a high prevalence of atypical symptoms in women, (Canto and Centor, 2002) but the same group later recognises "the problem of making general and mutually exclusive statements about sex considering the substantial overlap of symptom presentation in women and men" (Canto et al., 2014). The concluding remarks of the other sources of evidence used states that 1) sex-specific differences are small with findings not supporting the use of sex-specific chest pain characteristics to aid in the diagnosis of myocardial infarction (Rubini Gimenez et al., 2014), and 2) there are more similarities than differences in symptom predictors for acute coronary syndrome in men and women (Mackay et al., 2011). The evidence used to substantiate the statement of atypical presentations in women, in this case, does not appear to support the published definition.

2.4 Symptom presentation of men and women with myocardial infarction

The subject of sex differences in presenting symptoms of myocardial infarction has been the subject of multiple research studies and review articles without resolution as shown in table 1.

Table 1   Studies investigating sex differences in symptom presentation of myocardial infarction

Author	Study population	% women	Findings in relation to symptoms
Asgar Pour et al., 2016	ED population suspected ACS N=438	42	Typical symptoms and number of typical symptoms more predictive of ACS in men.
Berg et al, 2009	Medical chart review of patients with first MI N=225	23	Chest pain is the most common symptom for men and women. Nausea, back pain, dizziness, palpitation more common in women.
Bruins Slot et al., 2012	Primary care population consecutive suspected ACS N=298	52	Symptom presentation largely similar between men and women.
Canto et al., 2012	Registry of confirmed MI patients N=11, 43513	42	Women significantly more likely than men to present without chest pain
Culic et al., 2002	Prospective study of patients admitted with first MI N=1996	30	Chest pain more common in men. Women more likely to report non-chest pain pain (other than epigastric and right shoulder) than men and more non-pain symptoms.
Devon et al., 2014	ED population suspected ACS N=736	37	More similarities than differences between men and women ruled in for ACS
Dey et al., 2009	Registry of patients with ACS who underwent angiography N=26, 755	29	Chest pain was the most common symptom for both men and women. Women more likely to have atypical symptoms such as nausea compared to men.
Dorsch et al., 2001	Medical chart review of ED population suspected ACS N=3684	Not stated	Women were more likely to present without pain.
Fiebach et al., 1990	Medical chart review of confirmed MI cases N=1122	30	More women had symptoms other than chest pain as their main complaint
Goldberg et al., 2000	Medical chart review of patients presenting with chest pain N= 889	38	Dyspnoea, arm pain, sweating and nausea commonly reported by men and women in addition to presenting complaint of chest pain.

Author	Study population	% women	Findings in relation to symptoms
Grace et al 2003	Self-report survey of confirmed MI population N=482	28	No gender difference in report of chest pain. No gender differences in the most frequently reported cardiac symptoms. Women experienced more symptoms in the 30 days prior to the cardiac event.
Hess et al, 2010	Prospective ED population with chest pain and suspected ACS N=970	40	Women had less typical features of chest pain than men.
Khan et al., 2013	Patients hospitalised for confirmed ACS N=1015	30	Chest pain was the most common symptom in both sexes but women were more likely than men to present without chest pain. Women reported a greater number of symptoms than men.
Isaksson et at., 2008	Confirmed myocardial infarction registry in Sweden N=6542	22	Chest pain most common symptom in men and women but significantly more often experienced in men. Atypical symptoms were more common in both men and women.
King et al., 2007	Confirmed MI symptom questionnaire N=60	50	Symptom presentations were largely similar but women were less likely to report pain in the centre of the chest and more likely to report right shoulder pain.
Kirchberger, et al., 2011	Registry study of patients hospitalised with first MI. N=2278	25	Men and women did not differ regarding the chief AMI symptoms of chest pain, tightness, pressure or diaphoresis. Women were more likely to have additional symptoms.
Lichtman et al., 2018	Confirmed MI population N=2985	67	Chest pain was the main presenting symptom for men and women. Women had a greater number of non-chest pain symptoms than men.
Lovlien et al., 2008	Questionnaire study of confirmed MI N=533	28	Men more likely than women to report chest symptoms. Women more likely to complain of nausea, palpitations, back pain, dyspnoea and fainting.
Mackay et al., 2011	Patients having non-urgent PCI N=305	40	No significant differences in rates of chest pain or other typical symptoms during ischaemia, although women were more likely to experience throat or jaw discomfort.
Martin et al., 2008	Confirmed MI Self-report questionnaire N=157	31	No gender differences in chest pain. Fatigue, arm pain, shortness of breath, sweating, jaw or back pain.

Author	Study population	% women	Findings in relation to symptoms
Milner et al.,1999	ED population suspected ACS N=550	41	Chest pain most frequently reported symptom in men and women. Men and women are more similar than different.
Milner et al., 2002	ED population suspected ACS N=522	47	Typical pain associated with diagnosis ACS in women but not men.
Milner at al., 2004	Confirmed MI registry N=2073	43	Women significantly less likely to complain of chest pain and more likely to have non-specific complaints.
Rosenfeld et al., 2015	ED population suspected ACS N=874	37	Highest proportion of women with and without ACS in class one (has highest probability of chest pain and highest number of non-chest symptoms).
Rubini Gimenez et al., 2014	ED population suspected ACS N=2475	32	Most chest pain characteristics reported with similar frequency in men and women. Women more often had dyspnoea, radiation to the back, throat and abdomen
Sederholm-Lawesson et al., 2018	Confirmed STEMI patients medical chart review N=532	24	Women were significantly less likely to present with chest pain. No gender differences in description of the pain. Pain in throat, back teeth, neck shoulders more common in women.
Thuresson et al., 2005	Self-report questionnaire of patients hospitalised with ACS N=1939	25	There were more similarities than differences between the sexes.

ED = Emergency Department, MI = myocardial infarction, ACS= acute coronary syndrome, STEMI = ST segment elevation myocardial infarction, PCI=percutaneous intervention

Several issues are encountered when trying to synthesise this data; the heterogeneity of the study populations enrolled, the data collection methods used, and the categorisation of symptoms.

2.4.1 Selection of participants

One of the first issues, is that women are under-represented in trial populations in cardiovascular research. The evidence base upon which guidelines and

care practices are based is therefore derived from largely male populations. The percentage of women enrolled in phase 3 and 4 cardiovascular trials sponsored by the National Heart Lung and Blood Institute between 1997 and 2006 represents only 27% of trial participants (Kim et al., 2008) which falls far short of the percentage of women affected by cardiovascular disease. The data describing symptoms of myocardial infarction are therefore only indicative of the minority of women enrolled in trial populations.

Some of the largest studies that have considered sex differences in presenting symptoms have used registry populations (Canto et al., 2012, Dey et al., 2009). These data report that women are more likely to present without chest pain and with atypical symptoms. The advantage of the large study population may be offset by limitations in selection of patients. For example, by enrolling a confirmed myocardial infarction population, the study will confirm its own bias in only being able to document the symptoms of participants already diagnosed with myocardial infarction.

Registry data sets aim to enrol an unselected patient population, but evidence may be reported from highly selected sub populations of the data set. An example is a publication investigating sex-related differences in the presentation, treatment and outcomes among patients with acute coronary syndromes enrolled in the Global Registry of Acute Coronary Events (Dey et al., 2009). This study population comprised of 26, 755 patients (28.5% women) with acute coronary syndrome who underwent coronary angiography. It is

widely acknowledged that women have less access to angiography than men (Shah et al., 2015a, Anand et al., 2005, Woods et al., 1998), therefore these data represent the presenting symptoms of a highly selected population. A prospective study population is therefore required in order to eliminate this bias.

Several groups have enrolled participants from a prospective suspected acute coronary syndrome Emergency Department population (Rubini Gimenez et al., 2014, Devon et al., 2014, Rosenfeld et al., 2015, Milner et al., 1999, Milner et al., 2002). All disagree with the contention in clinical guidelines that atypical symptom presentations occur more commonly in women. They do not support the use of sex-specific characteristics aiding identification of myocardial infarction in women. By enrolling patients with suspected acute coronary syndrome prior to the initial diagnosis of myocardial infarction, the risk of selection bias that may compromise findings in cohorts enrolled after the diagnosis of myocardial infarction is therefore reduced.

2.4.2 Method of data collection

Several methods of data collection exist to gather information on symptom presentation. These may involve medical chart review, self-administration of a symptom questionnaire (a closed method using predetermined symptom characteristics), direct patient interview recording data on a structured instrument (open method), or qualitative interviews (open method). Each

method has limitations (Canto et al, 2007, Dracup, 2007).

Large data sets often use medical chart review therefore represent clinician documented symptoms. These data rely on the accuracy of symptom documentation by the assessing clinician. This has been seen as problematic as clinicians may document symptoms that support the diagnosis of myocardial infarction rather than actual symptoms as experienced by the patient. Additionally, the purpose of medical notes is not only to record symptoms, but also to serve as a communication tool between professionals. Patient reported symptoms are therefore translated and summarised into accepted medical terminology which may be at odds with how the patient intended the description to be understood. Entry on the medical record regarding presenting symptoms has been compared with symptoms recorded from qualitative interview (DeVon et al., 2004). Chest pain was the most commonly patient reported symptom and most commonly documented symptom, but there was poor correlation between other symptoms reported. This study does have its own methodological limitations as, while the majority of qualitative interviews occurred within three days of presentation, they could occur up to 14 days after the event, bringing into question problems of recall bias. Furthermore, all interviews occurred after the confirmed diagnosis of myocardial infarction which may alter patient perception or reporting of symptoms. The poor correlation between health record and patient reported symptoms has previously been reported in many specialties (Pokhomov et al., 2008, Valikodath et al., 2017, Barbara et al., 2012). This discrepancy has been

used to suggest that the medical record may not provide a comprehensive representation of patient symptoms, as it documents the symptoms deemed to be relevant by the assessing clinician, and questions its validity for use in big data research (Valikodath et al., 2017).

Using self-administered structured data collection instruments eliminates the issues of clinician interpretation of symptoms, but may be limited by the closed nature of the predetermined symptom profiles presented to the patient.

The method of data collection has been the subject of previous research with differing results. Shin and colleagues (Shin et al., 2010) concluded that measurement strategy had no effect on outcomes and reported that women were more likely than men to report atypical symptoms. Conversely, whilst not performing a formal review, Mackay and colleagues (Mackay et al., 2011) noted that studies using open methods of data collection found no sex differences in presenting characteristics, whereas those using closed methods were much more likely to report sex differences (Mackay et al., 2011).

2.4.3 Categorisation of symptoms

As alluded to at the beginning of this review, the way symptoms are categorised into typical and atypical groupings has a profound impact when aiming to interpret statements such as "atypical symptom presentations are more commonly seen in women". For example, one registry study states that women are more likely to present with atypical symptoms including jaw pain,

nausea or vomiting (Dey et al., 2009). The American Heart Association definition of typical cardiac pain includes jaw pain in the typical location category, therefore using this definition, these women would have been categorised as having typical pain. The unsystematic collection and reporting of data renders these studies difficult to synthesise (Dracup, 2007). Where attempts have been made, important studies may have been excluded from the analysis due to the ways symptoms had been grouped e.g. combining symptoms as 'arm or jaw pain' led to studies being excluded from the review by Shin and colleagues (Shin et al., 2010). Other studies have grouped chest pain characteristics in such a way as to span typical and atypical definitions. Gimenez and colleagues (Rubini Gimenez et al., 2014) grouped pain descriptors of aching or burning as one unit. A descriptor of 'aching' would ordinarily fall into a typical definition, and 'burning' into an atypical bracket (Greenslade et al., 2012, Mehta et al., 2016). The richness of data gained from collecting highly detailed granular descriptions of presenting symptoms, may be offset by the potential for yielding false positive statistical differences due to multiple testing. Detailed exploration of data has repeatedly stated that women report a greater number of symptoms than men (Lichtman et al., 2018, DeVon and Zerwic, 2003, Milner et al, 1999, Granot et al., 2004, Canto et al., 2014, Dey et al., 2009, Rosenfeld et al., 2015), though no increase in number of symptoms experienced by women has been described by other groups (DeVon et al, 2008a, DeVon et al., 2008b, King and McGuire, 2007, Lovlien et al., 2006). What is more, in a real clinical situation, patients do not present with symptoms in isolation. Attempting to determine sex differences with individual

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chest pain characteristics may not align well with actual patient presentations (Rosenfeld et al., 2015). Additionally, some study populations were restricted to those presenting with chest pain (Thuresson et al., 2005), therefore denying recognition of symptom profiles in patients who do not use chest pain to describe their symptoms.

2.4.4 Identification of myocardial infarction

The final point to consider is the basis upon which the diagnosis of myocardial infarction was determined in order to select the patients for assessment of symptom profile. This is typically based on the diagnosis of the assessing clinician, incorporating signs and symptoms at presentation and at least one either predefined ECG changes, or elevated cardiac biomarkers (Canto et al., 2007, Eslick, 2005, Khan et al., 2013, Lichtman et al., 2018, Culic et al., 2002, Milner et al., 1999).

The definition of myocardial infarction is an evolving concept. It is based on signs and symptoms of myocardial ischaemia and evidence of myocardial necrosis. Whilst the broad definition is relatively consistent with the World Health Organisation statements developed for epidemiological studies (WHO, 1971), the ability to quantify myocardial necrosis has undergone significant development. The first serum biomarkers used to aid the diagnosis of myocardial infarction were aspartate transaminases in the 1950's followed by lactate dehydrogenase. Clinical diagnosis of myocardial infarction was then transformed by the discovery of the isoenzyme of creatinine kinase (CK-MB)

(Adams et al., 1993). Troponins followed, replacing CK-MB as the gold standard biomarker for the diagnosis of myocardial infarction. The last decade has seen the development of increasingly sensitive troponin assays from conventional assays, to contemporary assays, to the most recent high-sensitivity assays. Each development has enabled more accurate measurement of troponin at lower levels, improving the quantification of myocardial necrosis, and has therefore impacted the definition and diagnosis of myocardial infarction. The latest development enables quantification of troponin in the majority of healthy individuals therefore defining a normal reference range among a healthy population. A clear difference between men and women has also been demonstrated using a high-sensitivity assay with the upper limit of the normal reference range in men twice that of women. As a result, the latest definition of myocardial infarction recommends the use of sex-specific thresholds to reflect this finding (Thygesen et al., 2018). The use of high-sensitivity troponin has therefore identified a population of patients, particularly women where the sex-specific threshold is lower, who were previously unrecognised as suffering from myocardial infarction. The identification of study participants based on elevated cardiac biomarkers prior to the current definition of myocardial infarction, will therefore have neglected the symptom presentations of the undiagnosed women. The advent of high-sensitivity assays has revealed a knowledge gap as to the presenting symptoms of this previously undiagnosed group of women.

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Chapter 3

Literature review

Exploring the lived experience of an episode of acute chest pain

3.1 Exploring the lived experience of an episode of acute chest pain.

3.1.1 Background

Suspected acute coronary syndrome is one of the most common reasons for emergency admission to hospital (Makam and Nguyen, 2015). The introduction of high-sensitivity troponin assays allows measurement of troponin at much lower levels. This has the potential to transform the assessment of patients with chest pain through the development of strategies to rule out myocardial infarction in the Emergency Department at a much earlier stage in their presentation to hospital (Rubini Gimenez et al., 2015, Pickering et al., 2016, Carlton et al., 2016, Bandstein et al., 2014, Body et al., 2011, Mueller et al., 2016, Cullen et al., 2013). However, much uncertainty remains as to how these assays should be used in practice. Before adopting an early discharge pathway, it is necessary to understand the patients' beliefs, perceptions and experiences related to attending hospital with chest pain. It is these beliefs and concerns that are likely to drive repeat attendance if not addressed during their index presentation. An investigation of the subjective experience of patients will reveal factors shaping the patients' perception of their illness episode.

Qualitative research aims to unearth an in-depth understanding of human behavior by exploring attitudes, actions and experiences (Barbour, 2008). The synthesis of multiple qualitative studies is becoming more evident in health care and can make valuable findings accessible to health professionals. There is increasing interest in using such syntheses to inform health related policy

and practice (Mays et al., 2005). Multiple methodologies are available to researchers wishing to perform a synthesis of qualitative studies. The method chosen here is *Thematic Synthesis* as described by Thomas and Harden (Thomas and Harden, 2008). This method is ideally suited to conducting reviews which address questions relating to intervention need, appropriateness and acceptability (Barnett-Page and Thomas, 2009). The aim of this review was to conduct a synthesis of qualitative data to explore how participants experience an episode of acute chest pain from their decision to seek care, their understanding of the hospital assessment, and their feeling on discharge. The results of this thematic synthesis have informed the development of the topic guide for one of the main activities of this thesis. The resulting interviews will explore how early discharge pathways may shape the experience of patients presenting to hospital with suspected acute coronary syndrome.

3.1.2 Method of synthesis

The synthesis of qualitative data poses many challenges and is open to multiple methodologies. The different methods of synthesis lie in the differing epistemologies of researchers. Thematic synthesis involves the aggregation of studies using a critical realist approach, and aims to produce a product that is directly applicable to policy makers and designers of interventions. (Barnett-Page and Thomas, 2009)

3.1.3 Critical realism

When exploring how a patient experiences chest pain, attention must be given

both to the individual and societal contexts in which that experience occurs. The critical realist approach allows for examination of the potential contributions of individual agency and social structure when exploring a health experience (Angus, 2006). Critical realism offers an account of the social world which recognises the relationship between social structures and individual agency. This forms the basis of an individual's fate and experience in society, and suggests that attention should be focused on the interplay between the two spheres (Angus, 2006).

3.2 Search methods

Systematic review methodology was employed to identify relevant studies by searching Medline, EMBASE (Excerpta Medica database), PsychINFO, CINAHL (Cumulative Index to Nursing and Allied Health Literature), ASSIA (Applied Social Science Index and Abstracts), and Web of Science from inception to February 2019. The search process involved combining three concepts as either MeSH headings or key words, 1) chest pain (incorporating the terms non-cardiac chest pain and unexplained chest pain), 2) terms that would identify qualitative research (qualitative, interview, grounded theory). The term achieving the highest sensitivity for qualitative studies has been shown to be "interview" (Wilczynski et al., 2007), and 3) terms relating to patient experience (patient satisfaction, patient preference, need, communication, information seeking behavior, uncertainty). This search was first performed using OVID incorporating Medline, EMBASE, and PsychINFO, then repeated in CINAHL, ASSIA, and Web of Science. Searching the

reference lists of all included papers was also used (Greenhalgh and Peacock, 2005) which identified two supplementary titles not identified by the search criteria.

3.3 Search outcome

Inclusion and exclusion criteria are detailed below:

To be included qualitative studies reporting the views and opinions of patients experiencing chest pain must i) report methods of data collection and analysis ii) report patients' perspectives, beliefs, feelings, understanding or experiences of attending hospital with chest pain, iii) present views as data (e.g. direct quotes of participants or description of findings). The full paper must be available in the English language. Papers were excluded if the experiences related to a patient who was given a confirmed diagnosis of myocardial infarction. As data was gathered after this diagnosis was given, it is thought that this would impact on the recall of events the processing of information, and the significance given to particular events. The flow chart of papers selected can be seen in figure 4. The titles were reviewed of the 2067 records that were identified by the search. Of these, 43 abstracts were identified for further review. After removal of duplicates, 25 articles were assessed by reading the full text for eligibility. The final synthesis incorporated the results of eight studies.

3.4 Quality appraisal

Critical appraisal of qualitative studies is an attempt to measure the "quality"

of studies and as such tools have been developed to aid this practice. Articles were subjected to quality appraisal using the CASP tool (CASP, 2013) which prompts the reader to consider ten questions regarding methodology, recruitment, the relationship between researcher and participants, ethical considerations, analysis methods, the credibility of findings and the value of the research. No articles were excluded on the basis of quality. The study by White (White, 1999) scored lower on quality (6/10) as it did not make clear which respondents had received a diagnosis of myocardial infarction or give sufficient information on the research methodology. The decision was made to include this paper as it stated in it's aim that it wanted to include the views of participants who have experienced the fear that their chest pain *may* be of cardiac origin. It was also useful as a male only study as another included study represented the views of females only. One of the main ways in which the studies did not show evidence of rigour, was in failing to consider the relationship between the researcher and participants of the studies. Studies were reviewed independently by the author AVF.
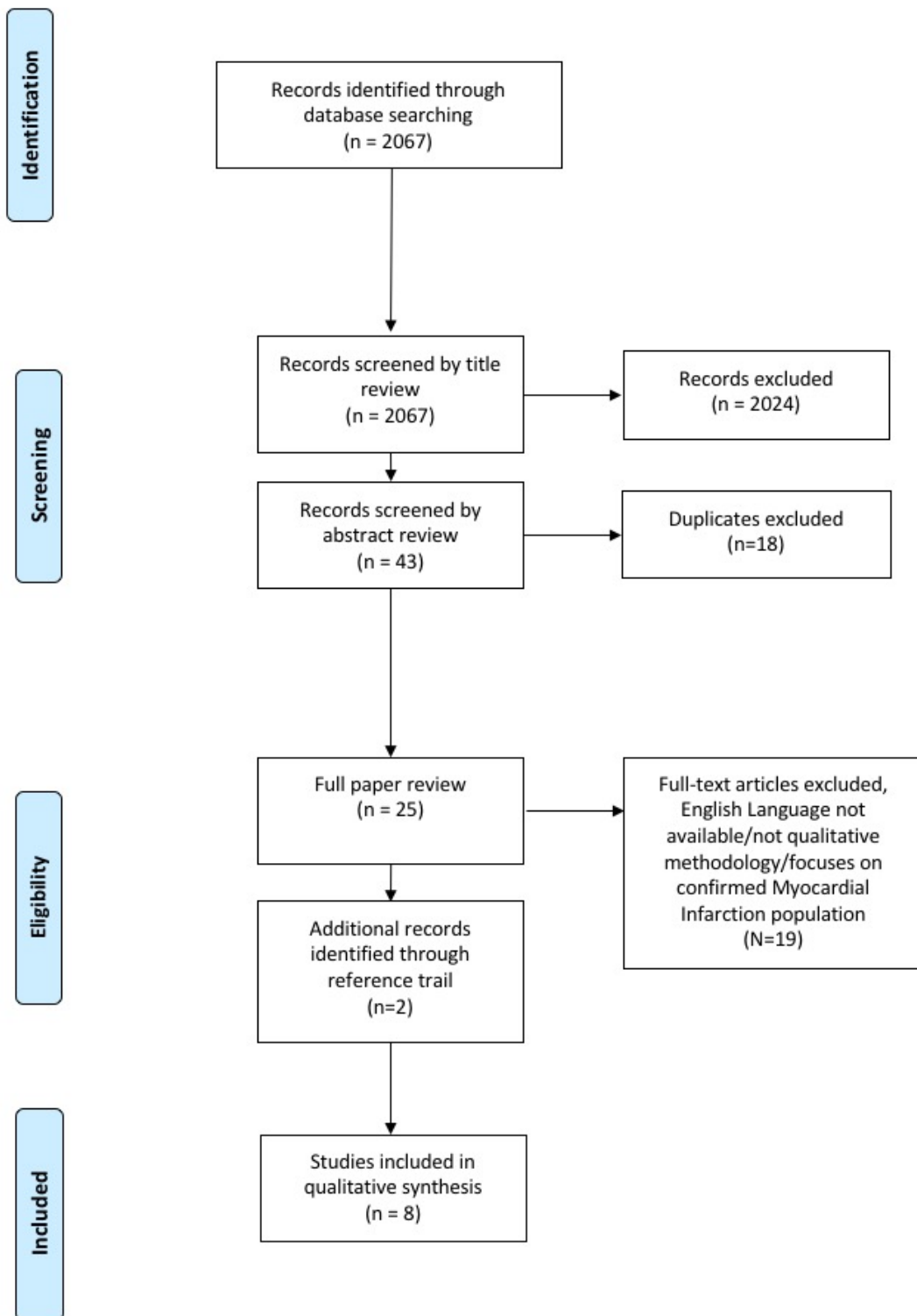
Figure 4 Selection of records for review

Table 2 Studies included

Authors /year	Aim of study	Method	Participants (% female)	Findings
White 1999 (White, 1999)	To determine men's reaction to chest pain and generate a theory on how men's behaviour can affect their reaction to ill health	Observation of all men admitted to the coronary care/intensive care units for chest pain. Unknown number of patients interviewed within 6 weeks of discharge	Men admitted to acute wards for assessment of chest pain (0%)	There is a need to consider theories on masculinity to interpret the reactions of the male patient and to help direct the care provided
Agard, Bently and Herlitz 2005 (Agard et al., 2005)	To explore experiences and concerns among patients being treated for atypical chest pain	38 semi-structured interviews prior to discharge from the chest pain unit	Patients admitted to an acute medical unit and discharged with the diagnosis of unspecified chest pain (53%)	Patients were discharged with unanswered questions and did not understand why more tests were not carried out
Forsland, Kihlgren, Ostman and Sorlie 2005 (Forslund et al., 2005)	To examine how patients with acute chest pain experience pre-hospital care and the emergency call	13 interviews (3 women, 10 men) 10 days to 3 months after the emergency call	Patients making emergency calls for chest pain and assessed as high priority (23%)	Patients experience vulnerability and dependency when deciding to call for help. Knowing when to call was the big decision
Jerlock, Gaston-Johansson and Danielson 2005 (Jerlock *et al*, 2005)	To describe patients' experience of unexplained chest pain and how it effects their everyday life	19 unstructured interviews (11 men 8 women). Timing of interview uncertain but suggest soon after discharge.	Patients admitted to the emergency department with chest pain of no apparent organic cause (42%)	Themes identified were 'fear and anxiety', 'feeling of uncertainty', 'feeling of stress', 'loss of strength'
Johnson, Goodacre, Tod and Read 2009 (Johnson et al., 2009)	Evaluation of chest pain unit care compared to standard care	26 semi-structured interviews, 4 weeks after discharge	Patients admitted to either a chest pain unit or emergency department with acute chest pain (35%)	Patients required information on investigations, diagnosis, and self-care advice. Patients with non-cardiac causes needed to feel more supported after discharge.

(table 2 continued)

Authors /year	Aim of study	Method	Participants	Findings
Turris and Johnson 2008 (Turris, 2008)	To explore womens' response to symptoms and experience of emergency department care	17 interviews 2-6 weeks post admission +100hr naturalistic observation in the emergency department	Women attending the emergency department with symptoms of potential cardiac illness (100%)	The basic social psychological process of maintaining integrity was identified, encompassing three distinct phases: "resisting disruption," "suspending agency," and "integrating experiences and knowledge"
Webster, Thompson and Norman 2015 (Webster et al., 2015)	To examine patients' perceptions and experiences of noncardiac chest pain within the common-sense model of illness framework	7 semi-structured interviews >3 months after discharge	Patients recruited from the Emergency Department with persistent noncardiac chest pain with elevated HAD scores and decreased SF-12 scores (71%)	Patients with noncardiac chest pain lack understanding of their condition and may be receptive to brief psychological interventions
Webster, Thompson, Norman and Goodacre 2017 (Webster et al., 2017)	The acceptability and feasibility of an anxiety reduction intervention for noncardiac chest pain patients in the Emergency Department	11 interviews with patients and focus group with 4 chest pain nurses	Patients discharged from the ED with a Generalised Anxiety Disorder-7 score >5 (55%)	The intervention was a leaflet describing causes of NCCP, a pain diary, methods to cope with pain and manage stress, Guidance on creating a plan to use these techniques was given. Psychological support on discharge is lacking.

3.5 Data abstraction and synthesis

Data was analysed according to the methods described by Thomas and Harden (Thomas and Harden, 2008). Each study was subjected to line-by-line coding of the findings, and primary codes generated were entered into NVIVO 10, QRS International. As each study was coded some concepts could be translated between studies and others were added to the bank of free codes. Stage two involved grouping codes and searching for similarities and differences between studies to develop descriptive themes. At this stage the synthesis had produced findings that remained close to those of the original studies. The third stage involved 'going beyond' the results of the primary studies to develop more abstract analytical themes.

3.6 Results

Analysis of the papers in the context of the review question yielded a bank of free codes that were grouped into 3 descriptive themes 1) decision to seek care, 2) incomplete care, 3) becoming a patient. The synthesis of the combined studies revealed the analytical theme of 'reconstructing personal stories into illness categories'. The development of free codes into themes is detailed in the table 3 overleaf.

Table 3   Code and theme development

Coded unit	Theme	Analytical theme
Lay consultation Call for help Resource Scarcity Previous experience	Decision to seek care	Reconstructing personal stories into illness categories
Patient perception of continuing care needs Discharge experience Time for questions Communication Uncertainty Information giving	Incomplete care	
Changing role to patient Frustration at hospital procedures Quality of interaction with professionals	Becoming a patient	

3.6.1 Decision to seek care

When faced with an episode of acute chest pain, the patient performs a lay assessment of symptoms to decide whether presentation at hospital is the appropriate course of action. Patients make this decision grounded in personal, family, moral, and health care contexts (table 4).

Table 4   Decision to seek care

Context	Meaning	Evidence
Personal	Previous experience of illness/ lay epidemiology	"So, this will be explained by, I don't know, too much coffee, too many cigarettes, or appalling lifestyle or. . I mean this will be it, you know, nothing serious is going to happen." (Turris and Johnson, 2008)
	Increased fear	"When I have this pain, I often fall asleep at night hoping I will not have a silent MI. I hope I will wake up in the morning." (Jerlock *et al*, 2005)
Family	Not wanting to disrupt others	He has to be at work at 5:30 so I think he dropped me off [at the ED] and I probably said, "It's fine and I'll let you know. I can phone and get you at [work], don't worry about it." (Turris and Johnson, 2008)
Moral	Seeking affirmation from family or friends regarding appropriateness of attending hospital	"They [physicians] are already busy and I don't want to take up any more of their time if it is not that important" (Agard et al., 2005)
Health care	Use of absolute resources	"I felt a bit of a fraud, actually, because I sort of had an idea of what it was and, you know, you think to yourself, 'There could be people having heart attacks and I'm taking a bed up', you know, that type of thing." (Johnson et al., 2009)

Relating illness experience to either a personal episode or having had exposure to illness experience through friends or relatives also shaped the decision to seek care. For some patients, having previous experience of chest pain equipped them to deal with the acute situation with less fear and uncertainty. For others, previous experience was used to assess their personal vulnerability to heart disease. Patients reflected over possible causes and weighed up the likelihood that their symptoms were serious based on their knowledge of risk factors and included factors such as age and sex. For other

patients, previous experience of chest pain led to increased fear.

"When I have this pain, I often fall asleep at night hoping I will not have a silent MI. I hope I will wake up in the morning."
(Jerlock et al, 2005)

3.6.2 Incomplete care

While some respondents stated that they had been generally satisfied with the care they received for assessment of chest pain, qualitative methods uncovered that the fact that a patient is satisfied with the care they received does not mean that their individual care needs have been met and their questions answered. (Agard et al., 2005). It is also of note that the study reporting patient satisfaction interviewed patients prior to discharge from the chest pain unit so patients had not yet had chance to reflect on their experience.

Once the clinician has ruled out a serious cardiac event as the cause of the presenting complaint the patient is discharged from hospital care. While clinicians may view care to be complete after having ruled out a serious condition, patients were left with unanswered questions and an ongoing sense of uncertainty about the future.

"They can't do anything for me. That's how it is. So they are letting me go home today and things will be the same as before at home, dealing with all the symptoms and the anxiety.... It really affects your state of mind. Where can I get help?"
(Agard et al., 2005)

"You know, when you're having a conversation, when you're half asleep, so I didn't really pay attention, but that's it, done, so I would have probably asked him more, you know, …to be fair to him, he looked and said whatever it is,

'It's normal for you', but it would have been quite interesting to say 'well, what is it, and how does it manifest itself, and can it, you know, be managed' sort of thing."
(Johnson et al., 2009)

In order for patients to feel a sense of completeness to their care they hope to be given a diagnosis. When patients are assessed for chest pain of suspected cardiac origin and a cardiac cause is ruled out, they are often given a vague 'non-diagnosis' of non-cardiac chest pain, chest pain of uncertain origin, or unspecified chest pain.

"It's not a heart attack (or a what-you-call-it), see you later. OK, well, fine, check me in to see if it was that or not, it's not. But it was something, you know, there was something going on, it's that not knowing really, you know. 'I initially thought it was that, it's not that, see you later', and I suppose the difficulty is then, is like, you want to check through everything, might it still be there now?"
(Johnson et al., 2009)

"And they said everything was fine, I've been able to keep telling myself it's not my heart, it's ok...but then I've had this irrational fear."
(Webster et al., 2015)

The recognition of the need for an anxiety reduction intervention for patients discharged with non-cardiac chest pain (Webster et al., 2015, Webster et al., 2017) exemplifies further the post-discharge care needs for this group of patients. It should be noted that this intervention was aimed at patients with a Generalised Anxiety Disorder-7 score of greater than 5 denoting mild anxiety, and was evaluated in patients with no known coronary heart disease. Patients with coronary heart disease may attend the Emergency Department with an episode of chest pain deemed to be non-cardiac for whom this intervention may not be appropriate.

While clinicians may assess the likelihood of acute coronary syndrome based on clinical assessment and diagnostic tests, patients have little faith in these if they have pre-formulated ideas of the cause of their chest pain. Even if test results are negative, not having an alternative diagnosis leads patients to form their own conclusions, they may continue to believe they have a cardiac disease even though a cardiologist has informed them otherwise.

"You get this feeling of uncertainty, which increases the longer you are from the time of the investigation. You become more and more uncertain and you take no risks."
(Jerlock et al, 2005)

Some patients felt they should be offered further tests until a diagnosis was achieved as they felt they had not received an adequate examination.

"He just said that the tests were good and that the ECG was good. There has to be some [explanation]. It is like someone telling you that you don't have that much pain.... I don't know if the pain will return. So, the information I've been given is not good enough."
(Agard et al., 2005)

One study did report that men viewed test results as the most important thing, and that they were looking for affirmation that their heart was healthy (Jerlock et al, 2005). This was not reported in women.

3.6.3 Becoming a patient

On presenting to hospital with chest pain all but one study reported that participants underwent a change adopting the character of 'patient'. Some participants viewed adopting the patient role as a positive event (Turris and Johnson, 2008), and relief was also described on arrival of the ambulance crew who were able to take over management of the situation (Forslund et al., 2005).

"It went really well. They just took over!" (Turris and Johnson, 2008)

This phenomenon was also discussed in a more negative way describing how study participants entered the hospital as individuals but moved through the system as patients which necessitated becoming socialised to the emergency department culture (Turris and Johnson, 2008). Insight gained through participant observation also identified with this theme (White, 1999). The process of "becoming a patient" is demonstrated by the assessment process. Patients underwent medical and nursing examinations and were labeled as potentially having suffered a cardiac episode and were expected to follow a predetermined cardiac regime. This process was reinforced by the choice of language used by staff and the use of monitoring equipment (Turris and Johnson, 2008).

3.6.4 Reconstructing personal stories into illness categories

Synthesis of the eight studies' findings revealed that patients felt their individual characteristics were overlooked and assessment appeared to focus on a purely biomedical model of illness. While patients accepted that a

clinician's main aim was to exclude a serious illness, care was felt to be lacking

as it failed to address the patient as a whole including psychosocial factors.

*"I am aware that their main task is to concentrate on cardiac diseases.
However, it would have felt good to talk about my social situation. I actually
think that stress related to work is the main cause of my problems."*
(Agard et al., 2005)

"It's not a heart attack (or a what-you-call-it), see you later."
(Johnson et al., 2009)

"It's a pity that you are only told that there is nothing wrong with your heart."
(Agard et al., 2005)

When delivering test results some patients were able to relate a negative test

result to a healthy heart but saw talking to a professional about their situation

as an equally important intervention as they thought this might help alleviate

stress and therefore their pain (Jerlock *et al*, 2005).

The phenomenon of 'reconstructing personal stories' is demonstrated by the

assessment process for suspected acute coronary syndrome. The patients'

symptoms were extracted from their individual story and used to build a picture

that either related to a cardiac picture of illness or not in the opinion of the

assessing clinician. The original story became even further removed from the

patient narrative as it was translated into medical terminology. The resulting

clinical summary of the patient was useful to clinical staff as the patient

presentation had been reconstructed according to what clinicians deemed

necessary information to make an assessment (Turris and Johnson, 2008).

This may reinforce the clinical representation of symptoms as commonly

accepted language is used to document the symptoms. Whilst not part of the

synthesis of evidence, this point relates back to the discussion of typical and atypical symptoms as presenting characteristics abstracted from medical notes can only represent what is documented by the clinician.

3.7 Discussion

The aim of this synthesis was to explore the patient experience of an episode of acute chest pain grounded in the findings of eight studies. It presents an interpretation beyond that of the original studies; describing how patients perceive the individual aspects of their story are reconstructed according to what clinicians feel are the salient aspects. The concept of reconstructing personal illness stories into illness categories is discussed in the context of gaining a patient history, the language used when discussing chest pain, affording patients time to talk during an assessment, and needing a diagnosis.

3.7.1 Textbook-led versus individual assessment

Health care professionals and patients appear to have differing views as to what is important during chest pain assessment. Obtaining a chest pain history complements other information such as electrocardiographic characteristics, physical examination and risk factors for coronary heart disease as the immediately available information that can be evaluated when forming diagnostic possibilities. The typicality of chest pain symptoms is used as part of the diagnostic criteria when considering cardiac chest pain. The process of clinical classification of symptoms and disease diagnosis is of great consequence to the patient as it drives management plans and treatment

options (Somerville et al., 2008). For clinicians, symptoms are removed from their individual context with regard to the patients' social world and reassessed against a set of biomedical criteria. A cardiac diagnosis is then either confirmed or dismissed. Patients on the other hand viewed their chest pain experience as individual to them and wanted their assessment to include an appreciation of their individual needs and personal life (Roysland et al., 2013). When patients feel that they are being listened to and treated as an individual they have an increased sense of self-worth, and trust develops between themselves and the health care staff (Forslund et al., 2005). Depersonalised care and lack of information has been shown to impose an increased sense of uncertainty, fear and anxiety on patients (McKinley et al., 2002). Of note is the study exploring experience of the emergency call and pre-hospital care where patients did recognise a sense of individualised care and patients felt trust towards the healthcare professionals. The reconstructing of individual characteristics does not occur until the hospital environment. This may be due to the differing roles of healthcare staff. The pre-hospital phase is focused on assessing the patients' need for emergency care and transferring them to a place of safety rather than determining the cause of pain.

3.7.2 Language used to construct cases

Patients can also experience 'reconstructing of personal stories' by feeling they are not being listened to. Physical symptoms are complimented with a spoken account of the nature of chest pain experienced. Clinicians pose a predetermined set of questions concerning the location, character and

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duration of pain and enquire about precipitating and relieving factors. During patient consultations, ethnography has shown clinicians to use a number of methods to attempt to fit a chest pain presentation into a tight set of diagnostic symptoms, namely ignoring contextual data in the patient narrative, repeatedly returning to the set questions, and discounting symptoms that do not fit the rigid criteria of typical cardiac chest pain (Somerville et al., 2008, Farmer et al., 2006). Clinicians restructure the patient story to either fit a cardiac or non-cardiac case in a language that is easily recognisable to colleagues. During a description of chest pain some patients may use words that are recognisable as typical angina pain, but others may use more diverse descriptors which will be less easy for clinicians to pigeonhole. A confirmed case of angina does not necessarily produce a patient narrative that is obviously one of cardiac chest pain (Jones et al., 2010). Neglecting to acknowledge cultural and social context of an illness presentation has also been shown to impede clinical history assessment (Farmer et al., 2006). Taking time to listen to a patient account rather than removing symptoms from their context may provide new information on which to base an assessment.

3.7.3 Time to talk

The lack of time for personal dialogue between clinician and patient was frequently mentioned in the selected articles as a source of dissatisfaction. A way of ensuring that patients do not feel that their illness presentations are being reconstructed and maintain a sense of individualised care, is taking time to listen to their stories. Many accounts made reference to the consultation

being rushed, patients being offered the opportunity to the ask questions but not being given adequate time to formulate these questions, and clinicians not taking the patient accounts seriously enough. Combining the ideas of gaining trust and giving time may aid in providing reassurance that cardiac tests are negative. If a patient is not given an opportunity to discuss their personal pain and illness beliefs, then any confidence that may be gained from a negative evaluation for cardiac disease may be eroded (Price et al., 2005). A systematic review of the reassuring value of diagnostic tests (ECG and laboratory test included as the tests under investigation) found that four of the five randomised controlled trials did not find any reassuring value in the tests, and one study showed reassurance at 3 months follow up which had disappeared by 12 months (van Ravesteijn et al., 2012). Studies have previously shown that ordering cardiac tests for the assessment of these patients can in itself cement illness beliefs and reinforce the belief that symptoms are more serious in nature than they are (Mayou et al., 1999). Providing good information prior to testing has been shown to increase the reassurance offered by diagnostic tests (Petrie et al., 2007). A strong doctor-patient relationship where time is spent listening to an individual person's concerns and beliefs provides an environment where reassurance from test results is more possible to develop (van Bokhoven et al., 2009). Early GP follow up to discuss and reinforce diagnostic reassurance has also been previously suggested as valuable (Dumville et al., 2007). The use of specialist nurses has been demonstrated to have a positive effect on building relationships with patients and is linked with increased satisfaction (Johnson et al., 2009). Not embracing the patient

consultation in full can also result in missed opportunities for health promotion activities (Johnson et al., 2009).

3.7.4 Needing a diagnosis

The classifying of patients into categories of cardiac or non-cardiac leaves those in the latter category without a diagnosis and feeling discarded. Patients felt they left hospital in the same way they arrived so they were concerned about inadequate testing or a missed diagnosis (Agard et al., 2005). Having a diagnosis allows the patient to name the source of discomfort and validate what they are feeling (Nettleton, 2013); providing a name can help patients decide on their next course of action (Jutel and Nettleton, 2011). Much has been written in sociological literature about diagnosis though this is not the focus of this synthesis.

3.8 Conclusion

Confirmation of the absence of disease does not in itself necessarily satisfy the care needs of patients. Employing a 'whole patient' approach to individualised chest pain assessment provides an environment where reassurance form negative evaluation for cardiac disease is more likely to develop. Understanding the patient experience of chest pain assessment will give valuable insight into the practical application of a new chest pain pathway supporting early discharge from the Emergency Department. The results of this review have contributed to the production of a topic guide (appendix 1) which has formed the basis of an interview study exploring the lived experience

of acute chest pain before and after implementation of an early rule-out pathway.

Chapter 4

Methodology

4.1 Introduction

This chapter details the research process, including how this developed, the approach, sample, data collection and analysis. I discuss the rationale for my approach to inquiry based around my epistemological and ontological position. I then detail the methodological choices, and ethical considerations for each of my research questions individually.

4.2 Approach to inquiry

I approach this research as a clinician with the aim of improving patient care, and new to the fields of qualitative research and the social sciences. When considering my ontological and epistemological positions, I have found my beliefs to be most closely aligned with the approach of pragmatism. Pragmatism avoids the constraints imposed by positivism and interpretivism, and instead focuses on the problem to be researched and the consequences of the research produced in the real world (Creswell and Plano Clark, 2007). I have chosen different methodologies for the different research questions, which could be viewed to sit at opposite extremes of the traditional realist/relativist or objectivist/subjectivist divide. Researchers with a realist stance prioritise a single form of knowledge as offering a single 'truth', dismissing alternative forms of knowledge. Conversely, at the other side of the debate, relativists with their association with the interpretivist tradition, view multiple forms of reality to offer alternative truths (Cornish and Gillespie, 2009). Healthcare practitioners, frequently have to apply evidence-based research findings with a single truth (e.g. statins reduce the incidence of recurrent

myocardial infarction) to real-life scenarios with multiple truths (e.g. a patient reluctant to take statins due to press reports of no survival benefit, and lay networks reporting a high incidence of muscle cramps attributed to statin use). Attempting to discuss this situation with a patient, acknowledging only the 'evidence' based truth, is unlikely to have the desired action of optimising the patients' secondary prevention medication to reduce the chance of recurrent myocardial infarction. Narrative based evidence, gained from dialogue with the patient, allows a problem to be contextualised. Pursuit of holistic health care has necessitated that empirical data is considered in the context of the particular health care environment, and through the lens of the patient's perspective (Muncey, 2009), therefore acknowledging the relevance of multiple truths from different viewpoints. The above example still maintains a hierarchy of truth – the aim remains to convince the patient to take the statin, but the clinician is required to consider multiple truths to enable him to understand and respond to individual patient experience. Considering this argument in the context of my particular research study, a clinical trial using empirical data has established the safety of early rule-out pathways for myocardial infarction in determining a particular threshold of troponin that can provide clinicians with confidence that the patient will not suffer a myocardial infarction on this admission. However, qualitative inquiry, and interpretation of the effects of the new process of assessment on patients and even the healthcare environment and clinicians, is needed to translate this research into improved patient care.

Pragmatism is founded upon the ideas of utility and efficacy in any given situation (Hussain et al., 2013). According to this approach, knowledge is viewed as a tool for action rather than an expression of knowledge. It is therefore evaluated according to whether it serves our desired interest (Cornish and Gillespie, 2009). Put simply, pragmatism asks 'what works?', 'does the tool serve our purpose?' It avoids the arguments of realism versus relativism, and instead of asking 'does this knowledge reflect the underlying reality?', it poses the question, 'does this knowledge serve our purpose?' (Rorty, 1999). By acknowledging the validity of a variety of perspectives and forms of knowledge, pragmatism enables critique of evidence and resulting action. Indeed, Cornish and Gillespie state that intellectual arguments about concepts dissociated from their practical base are inadequate (Cornish and Gillespie, 2009). If knowledge is to be critically evaluated according to whether it has useful consequences for the user (academics, health professionals, or service users) then pragmatism brings all users of that research to the fore, necessitating an evaluation of knowledge from different perspectives. Using the freedom afforded by pragmatism, this thesis has used different research methods to answer different research questions. This approach can be classed as multiple methods rather than mixed methods obviating the need to heavily engage in the mixed methods literature.

4.3 Research aim

Chest pain is responsible for approximately 1 million visits to the Emergency Department in the UK each year (Goodacre et al., 2005). Initial assessment of a patient with suspected acute coronary syndrome is based on three criteria: 1) the 12-lead electrocardiogram, 2) cardiac troponin, and 3) presenting symptoms. This thesis has sought to explore how advances in biomarker development may shape the patient assessment process. I will draw on the strengths of different research methods to answer different research questions. By integrating a variety of theoretical perspectives, and adopting a practical approach to the collection of knowledge, this research has the potential to reveal new insights regarding the patient assessment process.

The studies described in this thesis were conducted as sub studies to the High-Sensitivity Troponin in the Evaluation of patients with Suspected Acute Coronary Syndrome (HighSTEACS) clinical trial. The main trial recruited 48,282 consecutive patients from ten hospitals across Scotland. Participants recruited for the question of symptom presentation of women and men with myocardial infarction represent a consented sub population of the main trial (sub-study 1). Those recruited for the qualitative interview study are a sub population of participants from sub-study 1 creating the study population of sub-study 2 as shown below.

HighSTEACS trial
48,282 consecutive patients from 10 hospitals across Scotland

- Unconsented patients
- Eligible for inclusion if presenting with suspected ACS with paired troponin measurements from standard care and high-sensitivity assay measurements

Sub-study 1
Chest pain characterisation
1,941 consented participants from Edinburgh Royal Infirmary

- Eligible patients were >18 years with a troponin request for suspected ACS
- Recruited 8am-3pm Monday to Friday

Sub-study 2
Qualitative interview study
49 consented participants from Edinburgh Royal Infirmary

- Eligible patients were discharged home after serial troponin sampling before implementation of the high-sensitivity assay, or
- Directly discharged from the Emergency Department after implementation of the high-sensitivity assay.

Figure 5 Formation of study populations

4.3.1 Rationale for research question specific methods

Research question 1: Do sex differences exist in the presentation of men and women diagnosed with myocardial infarction using sex-specific criteria?

This question has been addressed with positivist, research methodology. The aim was to prospectively evaluate the frequency and predictive value of patient-reported symptoms in men and women with suspected acute coronary syndrome, in order to determine whether symptoms differ when the diagnosis

of myocardial infarction is based on sex-specific criteria. Details of the specific study design, study population, methodology and statistical analysis are fully explained in chapter 6.

Research question 2: What is the lived experience of an episode of acute chest pain, and how may this be shaped by the implementation of an early rule-out pathway for myocardial infarction?

The remainder of this chapter will focus on the development of the qualitative methodology. I aimed to understand the illness experience as recounted by the participants, how they came to make the decisions which shaped their illness experience, and how they interpreted and attached meaning to the chest pain assessment process.

Whilst working as a research nurse recruiting patients for the main part of the clinical trial, a patient said to me "Your blood tests don't work on me". I imagined that this patient was not alone in having a strong belief as to the cause of her pain, and little faith in the clinical tests we were offering her. Whilst early discharge pathways for patients without myocardial infarction may benefit healthcare providers, they may not work for patients if health care providers fail to consider the complex social context in which chest pain occurs. Understanding the patient experience of chest pain assessment will give valuable insight into the practical application of the new chest pain pathway supporting early discharge. My aim was to identify ways to support

patients during assessment and discharge, and to develop clinical guidance that will reduce the risk of inappropriate discharge, reattendance with unresolved concerns or symptoms, or the perception of unsatisfactory care.

This project could have collected data in a number of forms. Patient satisfaction questionnaires and measures of anxiety for example, would have provided validated and reliable data regarding the acceptability of early discharge protocols in a way that could easily be replicated. The genesis of the project came from a positivist paradigm and prior research indicating the possibility of anxiety among patients experiencing chest pain (Jerlock *et al*, 2005, Janson Fagring et al., 2005). It was therefore felt appropriate to include a quantitative measure of anxiety. Visual Analogue Scales (VAS) have been shown to be a reliable measure of state anxiety (Davey et al., 2007, Abend et al., 2014). Participants were given a Visual Analogue Scale for anxiety to be completed on discharge to capture a measure of anxiety at the point of discharge. This would then be repeated approximately one week later at the time of interview. In practice patients did not remember to complete the scale at the point of discharge. A literature search has not yielded any evidence to support completion of VAS-anxiety retrospectively therefore, there may be limited value of data gathered using this tool. The topic of anxiety tends to come up during the interview as we talk about various emotions during the hospital stay and I often refer to the tool at that point to ask participants to explain more about why they have rated their anxiety at a particular level. The tool therefore does have a physical presence in the interview and may lead to more discussion around anxiety than if it was not in use, so has served as a

prompt rather than a measure in its own right. I have also reflected upon the utility of a quantitative measure of anxiety in chapter 5b as conversations around anxiety have revealed the complex social context in which an episode of chest pain can occur. While the validated tools and scores may capture state anxiety, they fail to explore the reasons behind this anxiety, therefore any correlations between the implementation of the early rule out pathway and state of anxiety are difficult surmise. While I came to question the utility of this data, the decision was made to continue asking participants to complete the measure so as not to unfairly target anxiety as a focus of discussion in the pre-implementation interviews. However, it has not been formally included in the analysis as the measure did not add value to the study.

Understanding the patient experience of chest pain calls for real life contextual understanding. The value of the rich data revealed from qualitative methodology is increasingly recognised as important in informing health service organisation (O'Caithan and Thomas, 2006). Qualitative research aims to unearth an in-depth understanding of human behaviour by exploring attitudes, actions and experiences through the accounts of those involved (Barbour, 2008). Incorporating qualitative data into clinical trials can enhance trial data allowing policy and practice decisions to be better informed by consideration of the patient narrative (O'Caithan and Thomas, 2006). This may lead to uncovering both intended and unintended consequences of new arrangements (Mason, 2002). A pragmatic approach, sometimes referred to as a paradigm, allows a range of forms of evidence deriving from different

epistemological positions to be considered valuable. Rather than seeking to arbitrate between these, this approach enables multiple perspectives to be investigated, using different methods in order to provide evidence with a practical value i.e directly relevant to the real world of the early rule-out pathway and patient benefit therein. It engenders a focus on the problem to be researched and the consequences of the results.

When considering the various approaches to exploring this question, I drew upon interpretivist ideology, viewing personal accounts as a legitimate way of exploring the social world. In order to understand some of the complexity involved in illness experience, it seemed both appropriate and important to seek in-depth accounts of understanding and experience, therefore chose to use qualitative interviewing to provide a platform to explore in-depth illness experience. This overarching approach to inquiry has informed my data collection methods, the sampling and setting, my role as a researcher, and my approach to analysis.

4.4 Methodological influences

Having chosen to explore the phenomenon of chest pain through an interpretivist lens, the methodology adopted for this research is influenced by phenomenology and grounded theory. This reflects the view of using particular methodologies not as a rigid set of rules (Denzin and Lincoln, 2011), but as a guide and general structure within which adaptations can be made (SAGE, 2019).

Phenomenology explores the meaning that individuals (or a small group of individuals) attribute to their experience of the world. It has particular emphasis on the lived experience of human interaction and what such interactions mean in relation to the phenomenon in focus. Quite simply, it has a focus on feelings as they are felt and experienced in the moment, and how they are understood and made sense of after they are experienced. This methodology appears to fit well with the focus of my exploration being the interpretation of events and interactions during the chest pain assessment process. Phenomenology requires that the researcher must 'bracket' our 'natural attitude' about the world through techniques such as reflexive practice (SAGE, 2019). This is discussed in more detail with reference to collection and analysis of interview data in the following sections, and will be woven through the findings chapters to illustrate how I arrived at the interpretations that I made.

Alongside the principles of phenomenology, I have also been influenced by the ideas of grounded theory. Grounded theory seeks to understand how relationships, people, processes and events shape outcomes. As a focus of interest for this project rests around how the chest pain assessment *process,* and all actors within that process, may shape the interpretations and understandings of the patient experiencing chest pain, grounded theory is a relevant structure within which to work. My approach incorporates concepts from grounded theory, in that data generation, analysis and theory generation occur concurrently. As new interpretation and evidence came to light through

immersion in the data, I moved back and forth between data analysis and the process of explanation (constant comparison) in order to reveal meaning. My analytical approach aims to formulate explanation and theory from within the data (Charmaz, 2006), by moving between everyday concepts and meanings, lay accounts, and social science explanations (abductive reasoning) (Timmermans and Tavory, 2012). This adapted grounded theory approach iterates between data analysis and conceptual and theoretical refinement. With respect to sampling, I have differed from a pure grounded theory model. Some theoretical elements emerging from the data would have provided an alternative avenue of exploration had I followed a theoretical sampling route. I have begun to theorise for example, in the 'approaches to future health' theme, that 'coronary candidacy' (the extent to which the patient views themselves as vulnerable to heart disease) was more prominent among a younger patient population, and this perceived candidacy related to whether a patient would be prompted to consider their personal risk factors for coronary heart disease. With a grounded theory approach, I would have focused subsequent sampling to test this theory. My research question was looking at a broader illness experience therefore I was reluctant to focus my inquiry down this line. This tentative theory has formed the basis of a future piece of work.

To summarise, working within the paradigm of pragmatism afforded me the opportunity to benefit from a pluralism of approaches when conducting this research. The methodologies of phenomenology and grounded theory both provided appropriate lenses through which to explore the phenomenon of

interest and provided a structure to the data generation and data analysis process. It was my aim to produce evidence to benefit patients when presenting to hospital with suspected acute coronary syndrome. While the thick description of a phenomenological analytical approach uncovered deep insights into patient experience, it did not provide the practical interpretation required which could be translated into patient care. I therefore used a hybrid approach that combined the goals of phenomenology with grounded theory by situating my emerging findings within existing theory, while allowing for elaboration of these theories with new insights gained from my data (adapted grounded theory). In using this approach I was able to reveal findings that will benefit patients presenting to hospital with suspected acute coronary syndrome.

4.5 Study outline

I aimed to recruit patients presenting to the Emergency Department with symptoms of suspected acute coronary syndrome, in whom the diagnosis of myocardial infarction was ruled out. The following diagram details the routine assessment procedure for patients pre and post implementation of the early rule-out pathway. Eligible study patients are highlighted.
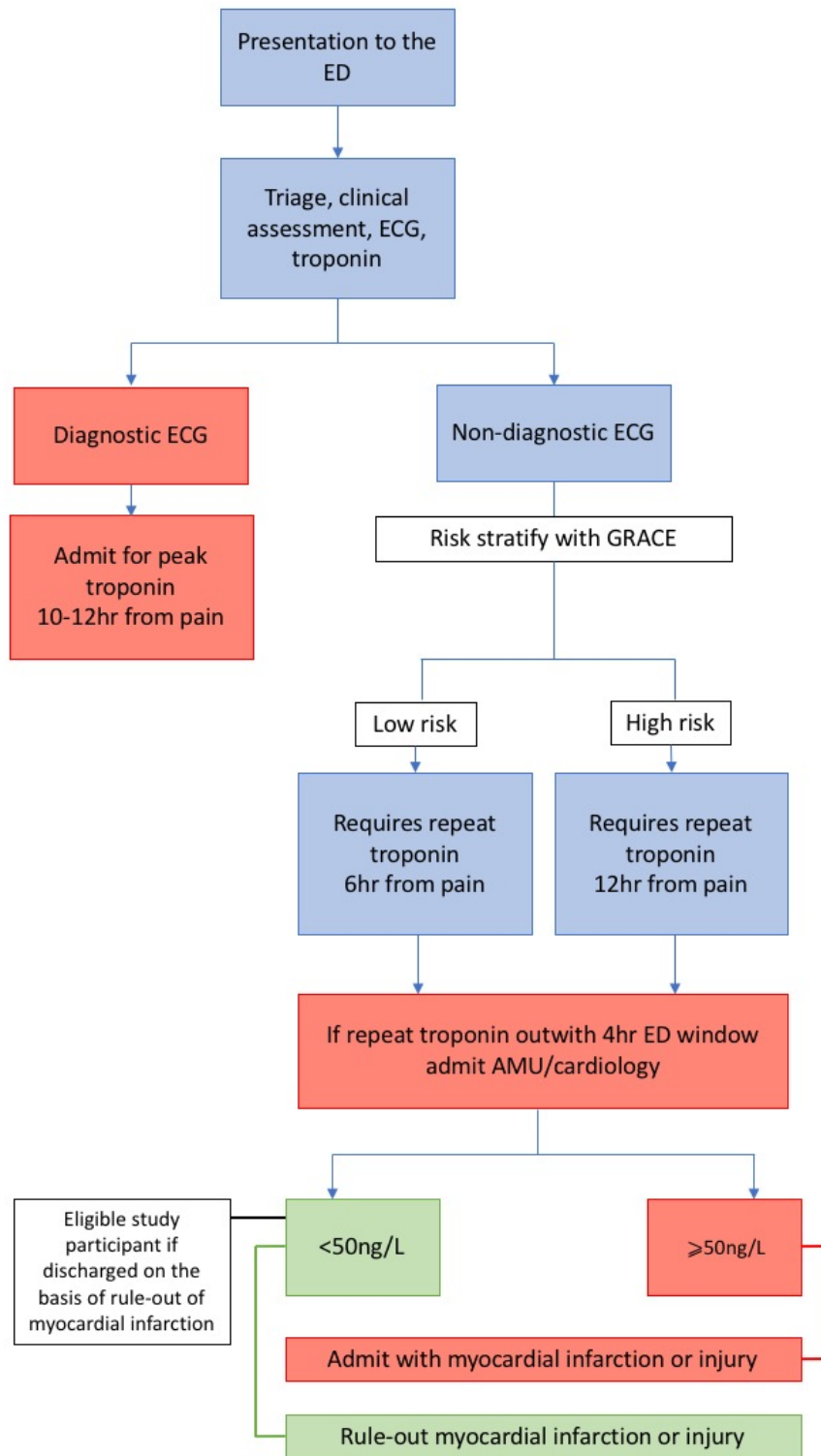
Figure 6 Pre-implementation of the early rule-out pathway
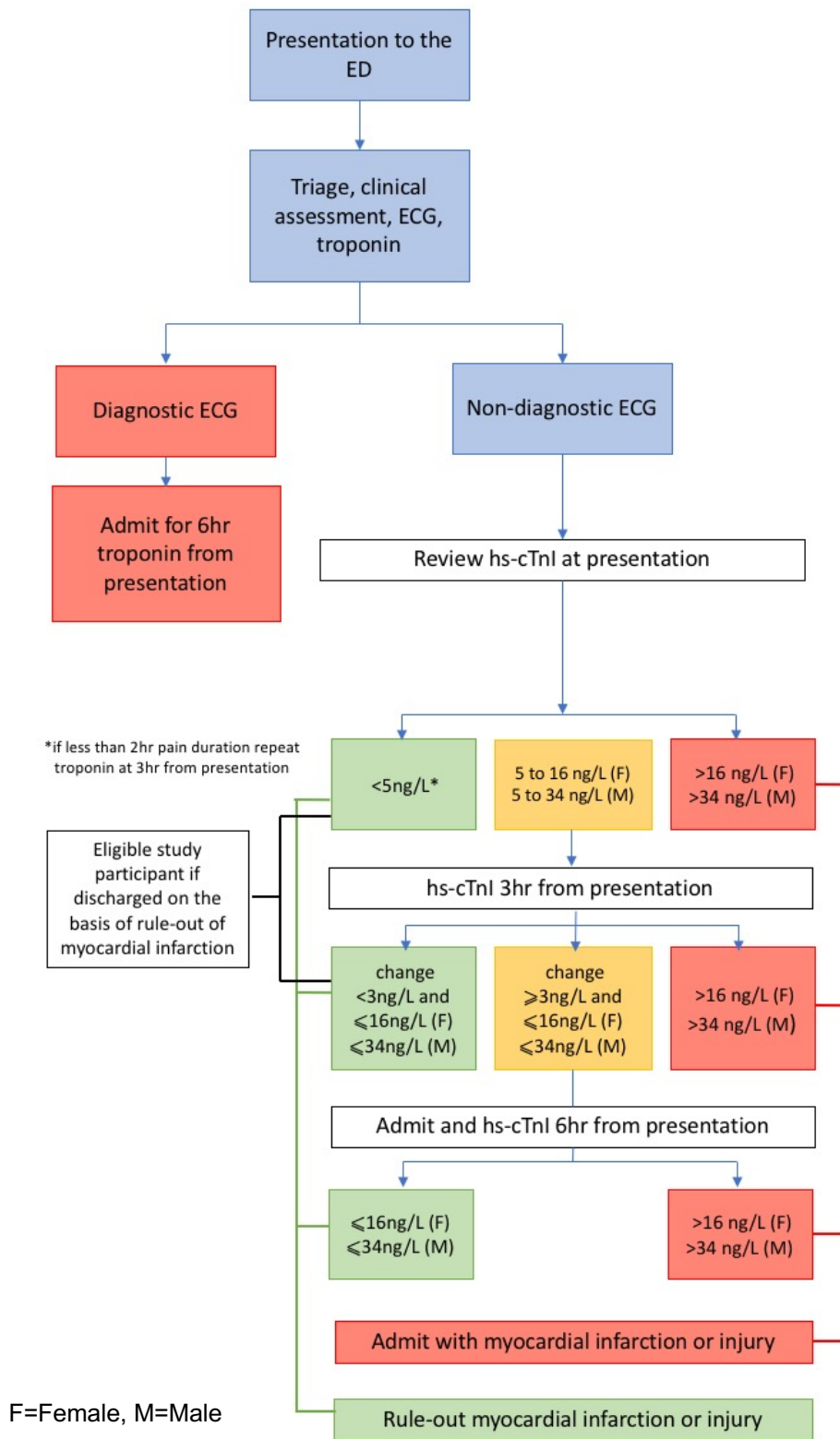
Figure 7 Post-implementation of the early rule-out pathway

4.6 Sampling

I have used purposive sampling to identify study participants. This allows the researcher to incorporate various dimensions which are thought to be of importance (i.e. age and sex), and as the project progresses and tentative themes begin to emerge, the inclusion criteria can be amended according to the requirements of the project (Barbour, 2008). I recruited patients from four categories: women and men, aged over 65 years and 65 years and younger. Ten participants in each group were considered to be sufficient to allow for comparison between age groups and gender, and should have captured a broad range of perspectives. The initial number of interviews planned was 40 prior to implementation of the new pathway and 40 post-implementation according to the sampling plan below (Table 5).

Table 5 Sampling plan

Sampling category	Pre-implementation	Post-implementation
Women >65	10	10
Women ≤65	10	10
Men >65	10	10
Men ≤65	10	10

This was not a rigid sample size but was thought sufficient to be able to draw conclusions and reflects the norms within qualitative methodology. Qualitative research occurs among natural rather than experimental populations therefore sampling seeks to reflect the diversity within a population. Within the age and sex categories, I therefore sought to include the full spectrum of cases of patients presenting to hospital with suspected acute coronary syndrome from those with first presentations of chest pain, to those with more complex medical histories from cardiac and other co-morbid causes. A fundamental

concept in phenomenology is that topics must be studied within the complexity of real life, and not subjected to the reductionist approaches of quantitative methodologies with clearly defined experimental populations (Gibson et al., 2004).

Semi-structured interviews were conducted with 23 participants pre-implementation of the early rule-out pathway, and 26 interviews post implementation of the early rule-out pathway. The object of this study was not to be a true 'before and after' study and use whichever pathway proved most useful to patients, but to gain a deep understanding of how patients experience chest pain, what effect the hospital assessment process may have on this experience, and to identify potential ways to improve the patient experience of the new pathway. The early rule-out pathway would have been implemented as a clinical guideline regardless of the findings of this study. It was important to explore patient experience before implementation of the new pathway to uncover how admission to hospital for assessment was interpreted and experienced by patients, and what effect this had on their overall interpretation of their illness experience. If analysis of the first set of interviews revealed particular aspects of care that patients found beneficial, then attempts could be made to incorporate these into clinical practice albeit in a much more limited time frame. While I was satisfied that my sample of 23 participants had revealed rich data (I have recorded in my research diary at participant 16 that I felt I may be approaching saturation), I felt older women may be under-represented due to low numbers recruited in this category. I ensured that this

category would be adequately represented in the next phase of the study. 26 participants were interviewed post-implementation of the early rule-out pathway. This reflected a point at which I had felt for several interviews that recruited participants represented a diverse sample, rich in characteristics and experiences. Review of successive data was not revealing new concepts, therefore it was deemed that continued recruitment would not further understanding. This concept is termed 'saturation'. The final study sample is detailed below.

Table 6 Participant recruitment

Sampling category	Number of participants recruited pre-implementation	Number of participants recruited post-implementation
Women >65	4	8
Women ≤65	5	5
Men >65	7	9
Men ≤65	7	4

4.7 Recruitment

This study is nested within a clinical trial. Participants were identified by a team of research nurses recruiting patients to the larger clinical trial, therefore these patients represent a sub-population of the larger trial. Research nurses identified potential participants and notified me of their presence in the Emergency Department. Where possible, I (rather than the Emergency Department research nurse) would give an information sheet to the potential participant, give a brief discussion of the study, and arrange to contact them by telephone in the next couple of days to discuss participation. Potential participants were always told that participation was entirely voluntary, and if they did not want any involvement in the study then they could ask me not to

contact them.

Out of 147 patients approached, 53 agreed to participate. No more than two attempts were made to contact the patient by telephone as my contact details could be found on the information sheet and in the telephone message if the patient did want to be involved. If my telephone call was not returned, and no attempt at contact was made by the potential participant, it was assumed the patient did not want to be involved in the study. The main reason for non-participation was being admitted for another medical condition, followed by non-return of phone calls. Six patients stated they would have liked to participate but a suitable interview date could not be agreed within the time frame. Four patients arranged a time for interview but either did not attend or were not home at the time of interview. This made a final study population of 49 participants.

Declined participation	15
Admitted for other condition	31
No response to phone contact	19
No suitable interview time	6
Did not attend/was not home for interview	4
Cancelled interview	2
Care out with normal clinical pathway	9
Lives out of area	1
Lack of understanding	3
Other	4

Participants screened 143

Participant recruited 49
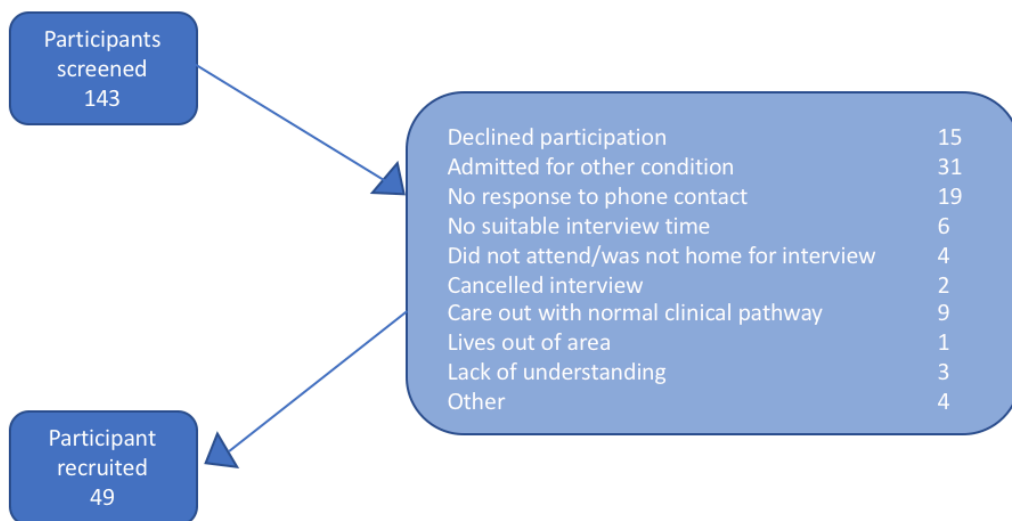
Figure 8 Formulation of study population for qualitative study

While it was my aim to schedule interviews around the participant's timing requests regarding work and family commitments, I think it is likely that patients were more willing to be involved in the study, and therefore give up their time to do so, if they had some remaining concerns about their heart. My study sample therefore possibly represents a more 'concerned' population. This is not the case with all participants, and does not detract from the fact that I have uncovered important themes, but is important to acknowledge.

In my early interviews I was surprised by how many people made specific mention of the biomarker troponin during their interview. I wondered whether this was due to their participation in the main trial, along with the fact that my initial information sheet mentioned the word 'troponin'.

> *"If the doctors caring for you say that you can be discharged home after the results of your troponin test is known, then you will be offered the opportunity to take part in this study."*

I therefore amended the information sheet to refer to 'blood tests' as opposed to 'troponin test,' and sought a protocol amendment to recruit participants from outwith the main clinical trial. After interviewing four participants not involved in the main clinical trial, I was satisfied that some of these participants also chose to talk using scientific terms such as troponin therefore I was happy with my participants being selected from the main trial population. Characteristics of the final study population are given overleaf.

Table 7 Baseline characteristics of study population

	Whole population	Implementation of the early rule-out pathway	
		Pre	Post
No. of participants, n (% female)	49 (45)	23 (39)	26 (50)
Age (years), mean (SD)	60 (14.7)	59 (14.4)	60.5 (15.3)
Past medical history			
Smoking, n (%)	20 (41)	11 (48)	9 (35)
Diabetes mellitus, n (%)	6 (12)	4 (17)	2 (8)
Hypertension, n (%)	22 (45)	9 (39)	13 (50)
Hyperlipidaemia, n (%)	19 (39)	9 (39)	10 (38)
Family history, n (%)	25 (51)	14 (61)	11 (42)
Angina, n (%)	11 (22)	5 (22)	6 (23)
Myocardial infarction, n (%)	15 (31)	9 (39)	6 (21)
Previous PCI, n (%)	11 (22)	7 (30)	4 (15)
Previous CABG, n (%)	2 (4)	1 (4)	1 (4)
Heart failure, n (%)	0 (0)	0 (0)	0 (0)
Cerebrovascular disease, n (%)	0 (0)	0 (0)	0 (0)
Peripheral Vascular Disease, n (%)	1 (2)	0 (0)	1 (4)
length of stay (hours), median (IQR)	-	10.5 (8.2-12.3)	3.4 (2.5-3.9)

4.8 Interview data

To prepare myself for carrying out a study using interview data I first completed a module in qualitative methods from a Masters in Public Health course to understand the theory involved. This module also involved practical sessions in interview technique. To further enhance my interviewing skills I then performed interviews with PhD students skilled in qualitative methods to critique my technique before finally carrying out practice interviews with members of the hospital volunteer team.

In-depth semi-structured interviews were the chosen method of data collection used for this project. Such interviews both define the topic under investigation and provide the opportunity to elaborate on some topics in more detail according to the cues provided by the interviewee. While interviews themselves do not belong to any particular epistemological stance, epistemological positions are important in understanding the knowledge produced in interviews (Kvale, 2006). It was not the aim of this research to gain a purely objective observation from the interview encounter - qualitative research is openly interpretive and subjective (Mays and Pope, 1995). I view the knowledge generated in an interview situation to be co-constructed at the time of interview with participants actively constructing their accounts during the interview encounter (Holstein and Gubrium, 2004). I also acknowledge the active role that I, as researcher, played in the construction of these accounts. I have approached the collection of interview data from the view that a real world exists independently, but can only be known or understood interpretively.

A criticism of interviewing is that it focuses on the micro (individual interpretation) at the expense of the macro (social structure). When exploring how a patient experiences chest pain, attention must be given both to the individual and societal contexts in which that experience occurs. The critical realist approach allows for examination of the potential contributions of individual agency and social structure when exploring a health experience (Angus, 2006). Whereas pure constructionists view interview exchanges to remain the product of the spaces in which they occur, and should not be viewed to represent a wider reality, critical realists view interviews to represent a method of gaining access to events and experiences as part of a wider complex social reality (Smith and Elger, 2012). Through the process of reflexivity, I considered my involvement in the construction of data throughout this project. This has been woven through the results and discussion sections where I have felt it befitting to acknowledge this process.

Participants were interviewed approximately one week after discharge from hospital in order to capture their early discharge experiences. Interviews were conducted at a place chosen by the participant, and lasted between 18 minutes and 88 minutes (average approximately 40 minutes). They were audio-recorded and transcribed by a professional transcription company. Professional transcripts were listened to against the audio recording to check for accuracy and to produce reflexive and reflective notes to supplement the raw data. Data management was assisted with the use of NVivo 11 software. Extracts of interview data will be used as evidence in this thesis. A prefix of *P:*

will be used when the participant is speaking and *I:* when the interviewer is speaking.

Some participants chose to return to hospital for the interview rather than me visiting them in their own home. I interpreted this as participants wishing to formalise the interview experience, possibly situating myself in my role as nurse rather than researcher. This is not to say that these accounts have taken the form of clinical interviews. Such accounts have revealed deep and emotive topics that the interviewees have felt a need to express, revealing they found the interview to be a therapeutic encounter. It is possible that the choice of interview location has analytical significance for these interview exchanges.

4.9 Reflexivity

The idea of a 'detached researcher' who will ask questions and record responses (Gubrium et al., 2012) has been replaced by the acceptance and acknowledgement of subjectivity, rather than an attempt to eliminate it (Finlay, 2002). Reflexivity aims to improve the rigour of data collection by increasing the researcher's self-awareness by acknowledging that responses are actively constructed interpretations of the researcher's experience in the field (McNair et al., 2008). McNair and colleagues demonstrated that reflexivity improved the ability to probe for responses, led to fewer assumptions, and avoided premature interpretation of data in their study of patient-doctor relationships.

I adopted researcher debriefing with a supervisor or colleague post interview

to promote reflexivity (Maritz and Jooste, 2011). Such sessions serve to highlight a researcher's values, prior knowledge and experiences and aid the formation of an awareness of how these may influence research outcomes. Debriefing is also useful to serve as an audit trail which demonstrates how a researchers' thoughts, perceptions and learning have evolved during the study. A decision trail enables the reader to follow the emerging research process (Rolfe, 2006) and increases the trustworthiness of a study. After each interview I wrote my reflections in a research diary. This firstly served the purpose of helping me to remember particular details of each participant, and secondly allowed me to jot down memos as my thoughts unfolded. I made full use of discussion sessions with my supervisor where I have had to consider my role as a nurse in the interview setting and my own experiences of health and illness. I felt some participants viewed talking to me as a clinical encounter. That is not to say that I have not had rich discussions with them, but the very fact that they seemed to value talking to me so much has led me to consider that they felt they needed contact with a health professional at that point. I have had to manage patient expectations of my role as a health professional able to discuss clinical details, and also my ability to give professional emotional support, while noting the analytical significance of these interpretations.

4.10 Interview structure

Interviews vary in the phrasing of questions which influences the freedom of response that the interviewee is able to provide (Mathers et al., 2002). It was my aim to provide the context within which the interviewee could engage in

dialogue in the form of a guided conversation (Holstein and Gubrium, 1995). Rich and varied exchanges are gained by encouraging the interviewee to expand on topics that they deem most pertinent to their story (Barbour, 2008). The quality of the interview depends on the interview design, the skill of the interviewer and on how engaged the interviewee is. As with all data, interview data can be exposed to error and bias. This can occur at the stages of asking questions, interpreting answers, recording answers and coding answers (Mathers et al., 2002). The relationship that I built with the interviewee had a great impact as to how successful I felt the interview encounter had gone. I aimed to meet participants while they were still in hospital so we were not meeting for the first time on the day of the interview. This was in part so participants would know whom they were inviting into their home, and also so I felt we had begun to develop a relationship prior to the interview. It was not always possible to meet the person face to face prior to the interview but we had always had a telephone conversation prior to meeting.

4.10.1 Social dynamics of the interview

Factors such as age, gender, socioeconomic status and ethnicity all influence the course and content of interviews, informing how data might be understood (Manderson et al., 2006). Skill in interviewing relies on the ability of the interviewer to interact flexibly with each participant, as each interview is unique to the characteristics of the individuals, and the time and place of the encounter. An interview in a public place may temper discussion of emotive topics, whereas an interview in a clinical area may glean mostly clinical

components of a story. It is widely documented that gender has an effect on the interview exchange with women speaking more freely and responding better to female interviewers, and men largely giving more minimal responses (Hamberg and Johanssen, 1999). Most patients accepted the offer to be interviewed at home, though four people requested that I go to their place of work, and eight people requested to come to the hospital. For four of these patients it was more convenient for them, but for the remaining four I question whether they felt in need of professional input as described previously. I have also been asked to meet in a café, which I preferred not to do. I did not feel a public place would allow for adequate discussion. Distractions may lead to some aspects of discussion being cut short – a pause in conversation to allow an interviewee time to consider their response may be filled with elements of conversation from the next table and a train of thought is lost. This interview occurred in a meeting room at the lady's place of work instead.

4.10.2 Power

Power in an interview setting can move between researcher and interviewee (Alex and Hammarstrom, 2008) and the interviewer must be alert to this. For example, an interview at the researcher's work place may privilege the interviewer, but allowing the interviewee to choose the site of the interview may redress the power balance in favour of the interviewee. Interviewers may be considered in a position of power as they determine the topic of interview, pose the questions and interpret the data (Kvale, 2006). Conversely, the respondent can choose the extent of what they would like to reveal, withhold information,

or steer the interview along a different path. The unstructured interview affords the respondent most power allowing them to direct its course (Vahasantanen and Saarinen, 2012). I have been aware of the process of power on several occasions. I aim to let the interviewee lead the conversation by what is important to them to hopefully make them feel at ease. My years as a clinical nurse have enabled me to feel comfortable with patients and form relationships with people from all backgrounds. The first time I really felt that a power imbalance existed was the first interview I did at a participant's place of work. I felt very nervous going into her professional domain. I did reflect later that I was happy for her to be in that position of power as she had kindly agreed to talk to me about a health issue that was personal to her. I am also aware when visiting people at their place of work that time may be a constraint for the interviewee, more so than in a home environment. With reflection I do not feel that these interviews have appeared rushed and the very fact that these participants are so keen to be involved that they wish to fit the interview in to their working day suggests to me that they are happy to spend time talking.

Self-disclosure is a method of addressing perceptions of power by promoting a sense of commonality (Manderson et al., 2006). Whereas some attempts at self-disclosure do serve to establish shared experience and provoke further insight from the interviewee, others can highlight difference. This is displayed in a study where the interviewer aims to create a shared experience by talking about music concerts, but it actually serves to emphasise the age difference between the interviewer and interviewee (Abell, 2006). From my own

experience I have found hinting at the shared experience of being a parent has possibly enabled participants to talk about that aspect of their chest pain experience more than if I had not disclosed that I was also a parent. I have also used the shared experience of poor communication within the healthcare setting regarding a member of my own family to promote further discussion around that topic. During these instances I have not talked freely about my own experiences, but hinted at them with comments such as "I can understand that", or "I've also had experience of that", without needing to reveal further information. As participants are aware that I am a healthcare professional I am sometimes conscious that they may not wish to say anything negative about their experience.

4.10.3 Development of interview guide

I developed an interview guide from a combination of personal clinical experience, gained from working with patients with chest pain over a twelve year period, and a thorough literature search which led to the production of a thematic synthesis of qualitative studies exploring the patient experience of an episode of acute chest pain (chapter 3). I piloted the topic guide first with other PhD students with experience of qualitative interviewing to gain general feedback on my interviewing style, and then with members of the volunteer team at the Royal Infirmary of Edinburgh who all had experience of a presentation to the Emergency Department, although not necessarily for chest pain. This exercise was useful in learning to give people space to expand on a topic rather than continuing the conversation by moving on through the topic

guide. The topic guide used in the interview can be seen in appendix 1.

4.10.4 Doing qualitative interviews

As has previously been stated, interviews represent an account of a situation played out in the context of a research interview – and in the case of my interviews, I am nurse and interviewer, which I think is highly relevant. I have been aware of my role as a healthcare professional and its impact on the interview. I believe some people take part in the interview because I am a healthcare professional and welcome more opportunity to talk about their chest pain experience. This is possibly analytically significant as people feel a need to say more about their illness experience, an opportunity that maybe was not afforded during the hospital assessment. As previously discussed, some participants have chosen to return to hospital for the interview rather than me visiting them in their own home.

Cornwell posits that Interview situations can yield two different types of accounts – public and private (Cornwell, 1984). Public accounts stem from talk that is deemed acceptable to other people and reproduces discourses that are commonly shared about the social world. Private accounts on the other hand are described as accounts revealed to 'people like themselves' (Radley and Billig, 1996). The type of account gained from a research interview depends on the relationship formed between the individuals involved. If the interviewee believes they are being questioned by an expert, then the account produced is more likely to be public. If a less formal atmosphere is allowed to develop,

where the interviewee is encouraged to reveal a story related to their experience, then a private account is more likely to develop. One of the challenges of interviewing people about a health concern as a healthcare professional, is creating an environment where the speaker feels able to produce an account where they do not feel their responses are being judged by an expert. This situation could lead the speaker to produce an account which they believe to be morally acceptable to others rather than revealing their true experience (Radley and Billig, 1996). I aim to prevent this from being the case by creating an informal atmosphere, and telling people I hope to just let them talk about their experience of attending hospital with chest pain, and there are no right or wrong things to say, but I wish to understand exactly what they feel and how they experience an episode of chest pain.

4.11 Analysis of interview data

Analysis of interview data was not an explicit phase but continuous throughout my project. It began at the level of listening to the participants' responses in the interview, which informed the next direction of questioning. Immediately after each interview I would listen to the audio recording and write reflexive and reflective notes in my research diary, beginning to make tentative connections and realise meanings that were emerging in the accounts. I outsourced the verbatim transcription of audio recordings to a professional transcription company. However, I was not neutral in this process. On return of the transcript I would listen to the original recording while reading the transcript to assess for accuracy. This would also allow me to re-read and re-

listen to the transcript with a focus on *how* the participants were talking as opposed to *what* they were saying. I would add memos to the text at this point to highlight interesting turns of phrase or intonations that may have analytical significance.

Analysis has followed the basic steps as outlined by Braun and Clarke (Braun and Clarke, 2006) detailed in table 8, bearing in mind the advice that it is how rigour and the incremental building up of explanation through systematic interrogation of data is demonstrated, rather than how the approach is labelled that is important (Smith and Osborn, 2003). The systematic, methodological process of reading and re-reading the data, coding, looking for patterns, forming themes, going back to the data to check themes work at an individual level and when applied to the whole data set appealed to how I would logically plan to explore a data set. The idea of 'constant comparison,' common to grounded theory, can also be seen in this method through the repeated revisiting of transcripts as new ideas unfold. The final stage of Braun and Clarke's method appears to finish at a stage prior to theory production. Developing thick description is a step in the analytical process, but the full value of the data is only revealed when the identified themes are interrogated and co-ordinated to produce an explanatory model (Bazeley, 2009). I have been influenced by the idea of abductive analysis which is aimed at theory construction (Timmermans and Tavory, 2012). Abductive analysis requires the researcher to be knowledgeable of theory (in direct contrast to pure grounded theory which requires that the researcher not be influenced by existing theory)

and situates new research findings against a background of existing sociological theories through systematic and methodological analysis. It aimed to add to the thematic analysis steps of Braun and Clark by describing more theoretical constructs from within the data. An example of the development of codes into themes and the progression to tentative theory is detailed in appendix 2.

Table 8   Phases of thematic analysis

Phase	Description
1. Familiarising yourself with your data	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas
2. Generating initial codes	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
5. Defining and naming themes	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

(Braun and Clarke, 2006)

Here is a worked example of the analysis process. From the first few entries in my research diary, I have commented that participants were taking about their future health. I assigned several individual codes to sections of text prior to deeper exploration of this phenomenon. Initial codes were 'incentive to change behaviour', 'opportunity for lifestyle intervention', 'questioning health status', 'heart health', and 'healthism'. These individual codes were then

collated into the theme of 'future heart health'. I then returned to the data set concentrating on transcripts where this theme was not apparent, aiming to search for meaning relating to the absence of this concept. In doing so, I revised the theme as I became aware of another category of participants who were referencing their future health, but in terms of the certainty of ill health. I therefore renamed the theme 'approaches to future health', and suggested that participants fell into three categories regarding their approach to future health. For some, continuing good health was taken for granted not having particular salience in everyday life. For others, the certainty of future ill health dominated their discourse. Finally, for some participants, the illness episode symbolised a significant event which prompted individuals to assess their future risk of cardiovascular disease. I therefore concluded that consideration of future health goals appears to be a reactive rather than a proactive process.

4.12 Ethical considerations

This study was conducted as an amendment to an existing clinical trial protocol with prior ethical approval (12/SS/0115). An amendment detailing the interview study was submitted to the NHS Research Ethics Committee and ethical approval was granted (REC 12/SS/0115 AM02) (Appendix 3). Standard NHS procedures for identification of participants and anonymisation of records were used. Participants were initially identified by and approached by myself or by clinical research staff in the emergency department and asked if they would be happy to receive an information sheet detailing the study. If they were happy to do so, I would then ask if I could contact them by telephone over the

next few days to discuss their involvement. Participants were informed from the outset that participation was entirely voluntary. They therefore had the opportunity to decline involvement on initial contact, and at the subsequent phone call. A suitable date and location for the interview were arranged according the preferences of the participant. A further discussion occurred prior to asking the participant to consent where involvement could also be declined. During this discussion on one occasion, it became apparent that the potential participant understood the visit by a researcher to her home to be part of the standard follow up procedure post attending hospital with chest pain. She did not appear to comprehend the concept of research involvement, therefore I suggested it was not appropriate to proceed with the interview, with which she agreed. Participants were also informed they could contact me at any point to withdraw from the study should they wish to do so. We also had a discussion prior to the interview starting that should they decide midway through the interview that they no longer wish to participate then they could withdraw at that point.

Interview recordings were transferred to a secure University of Edinburgh server as soon as practical after the interview. Files were then uploaded to a secure client area of a professional transcription company in accordance with the University of Edinburgh's Centre for Population Health Sciences policy and their approved provider. Identifiable data such as names or places were removed at the point of transcription therefore maintaining confidentiality.

In addition to the formal process of gaining ethical approval, I have considered my ethical conduct throughout this project. I have already made reference to managing my researcher role and professional identity. From a clinical perspective, my years as a cardiology nurse have meant I am familiar with caring for patients experiencing chest pain, though more commonly due to myocardial infarction. While I described myself to participants as a researcher from a cardiovascular research team, I did not hide my clinical identity if asked. Indeed, some participants inquired about my qualifications and background. I have noted in my research diary that I was happy to be asked such questions, as I felt it may help to address any power imbalance due to having to justify my involvement in this research directly to participants.

It was necessary for me to build relationships with participants very quickly. Again, my clinical background has equipped me with the skills to be able to do this, though the resulting relationship differs from a clinician-patient interaction. In a clinical situation the patient profits from the relationship with the provision of care, in a research context, emphasis is on a different outcome. While it is hoped that having the opportunity to discuss experiences of ill health is beneficial to participants, the true aim of recruiting participants was to gain interview data to inform future practice. The relationship formed therefore has a different dynamic due to the differing profiters of the interaction. I have been conscious throughout my data collection to allow space for participants to also profit from the process.

The use of the interview experience as a therapeutic encounter by some participants has also caused me to reflect on the process. On some occasions, I have had to manage patient expectations of my role as a health professional able to discuss clinical details, and also my ability to give professional emotional support. The participant information sheet stated:

"The interviews will involve discussing issues that are important to you and will give you the chance to talk about your experiences."

It was therefore important that I gave participants the opportunity to talk about what was important to them, even though the content of discussion may have been far removed from the interview aims. On two occasions I felt it necessary to advise participants to see a GP to access counselling services.

Ethical considerations as both procedure and process are significant within this project. Due to the privileged position we hold as healthcare researchers, I have aimed to hold the principles of ethical practice at the forefront of my mind during the preparation and conduct of this study.

Chapter 5

Findings from the qualitative study

5a   Patient experience of an early rule-out pathway for myocardial infarction

5b   The development of reassurance

5c   Approaches to future health

Including adaptations from:

Chapter 5a

Patient experience of an early rule-out pathway for myocardial infarction

5a.1 Introduction

Emergency Departments are under increasing pressure to reduce the number of patients admitted to hospital (Boyle and Weber, 2017). Patients with suspected acute coronary syndrome represent one of the most common reasons for emergency presentation to hospital (Goodacre et al., 2005). The majority of patients with chest pain do not actually experience myocardial infarction (Cullen et al., 2015), though previous clinical guidelines have recommended serial testing of cardiac troponin requiring admission to hospital in order to safely rule out myocardial infarction (Hamm et al., 2011, NICE, 2010). The advent of high-sensitivity troponin testing has seen the endorsement of early rule out pathways by both the European Society of Cardiology (ESC) (Roffi et al., 2016), and the National Institute of Clinical Excellence (NICE) (NICE, 2014b). A number of strategies have been proposed to identify low risk patients at presentation, or 1 to 2 hours after presentation who may be suitable for immediate discharge directly from the Emergency Department (Rubini Gimenez et al., 2015, Pickering et al., 2016, Carlton et al., 2016, Bandstein et al., 2014, Body et al., 2011, Mueller et al., 2016, Cullen et al., 2013). One strategy defines a threshold of cardiac troponin at presentation to the Emergency Department (<5ng/L), to identify patients at low risk of myocardial infarction who may be suitable for discharge directly from the Emergency Department (Shah et al., 2015b). Using high-sensitivity cardiac troponin in risk stratification is able to rule-out myocardial infarction in 74% of patients in the Emergency Department (Chapman et al., 2017a) and therefore

has major benefits to healthcare providers. With the implementation of early rule-out strategies, patients will spend less time within the healthcare setting, and will have fewer assessments from specialists, fewer opportunities to discuss the nature of their pain, and therefore may be less likely to be reassured their symptoms are benign. It is widely documented that patients with unexplained chest pain suffer from increased anxiety, use more hospital services, and have functional statuses that are comparable to those patients with coronary heart disease (Jerlock et al., 2005) (Janson Fagring et al., 2005).

This analysis has aimed to explore how the implementation of an early rule out pathway for myocardial infarction may shape patient experience of an episode of chest pain.

Beyond the illness episode

The methodological approach allowed the participants to lead the interviews in order to explore what was important to them. Each interview began with the same opening question of "Could you tell me what happen to take you in to hospital last week?" This focus revealed how, for the patient, the chest pain experience and assessment process extended both before and after the hospital episode. An overarching feature, evident throughout this analysis, is the differing priorities of a clinical pathway versus a holistic patient view.

As the interviews uncovered, from a patient's perspective, a phased illness episode, this chapter will consider the patient experience of chest pain in the

form of an illness timeline. The analysis will be presented in three phases (pre-hospital, in-hospital, and post-hospital) representing the stages through which a patient moves, when they are confronted with an episode of chest pain. A brief outline of each phase is given below to guide the reader through the subsequent analysis.

Pre-hospital phase; participants described the processes employed in order to perform a self-appraisal of their symptoms. They used the concepts of coronary candidacy to assess personal risk and also involved a wider social network through lay consultation and on-line sources of information. Participants also revealed how they had to negotiate competing priorities of daily life with their health. A wider societal issue regarding appropriate use of the health service was also addressed.

In-hospital phase; participants framed the care received as part of the chest pain assessment process against a back drop of a political and economic climate failing to support the health service. Also featuring in patient accounts was the influence that Emergency Department activities and routine care procedures may have on patient interpretation of events.

Post-hospital phase; for many participants, their illness episode did not conclude with the rule-out of myocardial infarction and they continued to construct meaning from their illness episode post discharge from hospital. These participants expressed uncertainty over their health status unsure of

how to interpret symptoms should they recur. Information seeking continued post discharge in the same way as in the pre-hospital phase. Some participants used the acute chest pain episode as an opportunity to consider their future health.

5a.2 Pre-hospital phase

5a.2.1 Self-appraisal of health status

On experiencing symptoms of chest pain, participants described how they made the decision to attend hospital for assessment. They drew on information from a number of sources when aiming to evaluate the most appropriate course of action. Participants used their own health knowledge of symptoms of a heart attack, and also employed the concept of 'candidacy' to assess their personal risk. Additionally, they involved a wider social network as they performed lay consultation. It was necessary for them to engage in the work of prioritising their health complaint against other competing responsibilities.

The concept of 'candidacy' is a way in which general knowledge about illness causation aids individuals to assess personal risk (Davison et al, 1991). Individuals interpret information from multiple sources (media, official bodies, reports from family and friends) to produce an image of a 'coronary candidate' against which they are able to cross-check for factors present within themselves (Morden et al., 2015). Transcripts provide evidence of people going through this self-assessment process.

P: It was only because it was in my chest, and that's what you see on telly, and everything...that that's where...you know, people are always clutching their chest"

(participant 1, ≤65 male)

In the following extract the participant is discussing the thought processes she went through when appraising her symptoms.

P: There…it, it did cross my mind but only because my sister, who had taken me up to the out of hours care appointment, had said to me, you know, are you sure you're not having a heart attack? I was like, well, I don't know, I don't know, I've never had one before [laughs], I don't know…what a heart attack feels like. And I'd mentioned to her about the, the NHS symptom checker and, you know, we both had a laugh, but then, you know, I started thinking, well, my mum's mum died of a heart attack, my mum's sister died of heart disease whilst waiting on a heart transplant. So it does…it did start going through my, my head, well, you know, there is the chest pain but it's not on the left hand side, which you always…all the movies and everything you see, it's quite a dramatic and sudden.

(participant 9, ≤65 female)

This extract also reveals the process of lay consultation (Friedson, 1960, McKinlay, 1973). Lay views of health and illness do not simply replicate the biomedical view, but are shaped by cultural perspectives and social class (Pill and Scott 1982, Richards et al., 2002). Participant 9 discussed her symptoms with her sister, but participants reached out to a number of sources.

P: I had a discussion with my husband about what we would do, what would we do. And, erm [sigh] I, I think part of the trouble is, his…one of his brothers is a doctor who had a, erm, similar…he always warns us that he had chest pains and things like that, and he's always, sort of, stressed to us, in, in the recent year, to…you know, don't just ignore it.

(participant 3, >65 male)

This extract also demonstrates how lay referral networks often include someone with a degree of professional knowledge.

P: I went back to bed, and I think I sort of, maybe drifted off for half an hour.

And by the time I came to, erm, I was waiting 'till [name, care worker], who's the manageress, she comes on about eight o'clock-ish. And, erm, I thought, well I'll wait until eight thirty, for [name], and she would come along and talk to me, and because she's got great experience of dealing with the elderly.

I: *Okay.*

P: *And, erm, she would come, basically, I know what she would say - get on...*

I: *Yeah.*

P: *...get the ambulance. But I just wanted to, to be confirmed.*

(participant 6, >65 male)

Additionally, internet use as a point of reference now contributes to the 'lay health work' routinely carried out as people seek information about health and illness. Some participants in this study, like 35% of the general population, engaged in internet use for symptom appraisal (Mueller et al., 2017). Use of the internet has also provided access to professional knowledge about health and illness. Such practice has become embedded in peoples' approach to seeking health knowledge and information more generally (Nettleton et al., 2004). When discussing information gathering behaviour in relation to the risk of developing diabetes with one participant, she stated in a somewhat brusque tone "*Well, you know, I'm perfectly adept at using Google,*" signifying how internet use is, for many, domesticated and part and parcel of everyday existence.

One of the most common ways that individuals use Web based material as an information source for symptom appraisal, is basing searches on symptoms experienced rather than potential diagnostic conditions (Mueller et al., 2017). Evidence from transcripts details participants searching both for symptoms such as 'chest pain', but also hypothesised condition specific searches such

as 'symptoms of heart attack', and even more specifically 'heart attacks in females'.

P: You know, as I say, NHS had been one of the first things that came up and I noticed that they had the symptom checker so I put everything in and all the questions…answered all the questions. So it was, yeah, just one of the first things that popped up on Google.

I: Did you look at any others or did you just stick with the NHS?

P: Um, it's quite a long…no, I think I just stuck with the NHS because after it had come up with, you know, please call 999, I was like, oh, I'm not going to bother looking at anything else.

[Laughter]

P: You know, as I say, I'd already laughed that off…

I: Yeah.

P: …um, so I wasn't, you know, I wasn't going to waste my time.

(participant 9, ≤65 female)

Interestingly, the relationship between technology and subsequent social action appears dependent on interpretative practices. Some people may use the information gained to address certain factors in consultations with health professionals. For others, the insights gained may be used purely to feel better informed. Participants turned to the internet, and in particular reputable health sites such as the NHS (going as far as stating they would not use American sites or those with affiliations to the pharmaceutical industry) in an information gathering capacity, but then appraised the information offered and sometimes opted for alternative action. Participants were also aware of potential pitfalls of on-line health information, showing critical, reflective capacity.

P: But it can be dangerous too, you know, because it's not my profession and doctors…

I: Yeah.

P: …hate you going along and saying, by the way I was having a google and

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you can see them going…

I: *[Laugh].*

P: *…don't down…don't go down that path, you know.*

I: *Yeah.*

P: *Yeah.*

I: *Uh-huh.*

P: *Because if you…if you've googled and you've self-diagnosed, why bother a doctor with an appointment, you know? Yeah.*

(participant 40, >65 male)

Also visible was the problematic engagement with technology experienced by some people. One participant used a stored telephone number to telephone her daughter to call an ambulance, rather than using the push button telephone to call the emergency services herself.

Once an individual has made use of information from lay and official self-help sources to assess their symptoms, participants then assessed whether to act on the health issue, according to the impact this may have on their immediate circumstances. Some participants chose to delay seeking help due to caring responsibilities for other people. The participant below had previously been referred for investigations for angina by his GP, but his wife then suffered a stroke. Caring for her, and managing her appointments became his priority over a personal illness.

P: *Um, I possibly put it down to just over exertion and just tiredness and anxiety and the doctor said…GP said, well, yeah, basically possibly, but the symptoms are similar to possible angina…*

I: *Right.*

P: *…which I'd never had any symptoms like that before. And she said, so we'll, um…just to be on the safe side, er, we'll treat you with possible angina as well. So that was fine. Er, so appointments for cardiology etc. which for various reasons I haven't been yet, er, basically because they've coincided*

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with things that [wife] has had to do which were more important, you know."
(participant 40, >65 male)

P: I thought right, I can't take this chance I need to…

I: Yes.

P: …just in case it is a heart attack…

I: Uh-huh.

P: …or another dissection, just, so yes, that was it.

I: Was anyone with you, did you discuss it with anyone?

P: Erm, I…no, I made the assessment and phoned my mother-in-law to see could she come over. I had been trying to get in touch with my husband but he wasn't picking up his phone. So, then when he did pick up his phone, he was like, yes, you need to phone an ambulance now, erm, so yes.

I: Okay. And, how did you feel through that situation?

P: Erm, I suppose I was probably getting a bit more panicked each time there was a chest pain and each time…erm, when I phoned the ambulance I think then like the panic…I wasn't like really panicky, but I suppose that it brought back previous memories of when I had my heart attack…

I: Uh-huh.

P: …and dissection, so yes, I was a bit kind of on edge after I phoned them. Erm, and just want…anxious about what was going to happen.

I: Uh-huh.

P: Yes.

I: What was going to happen …what, what do you mean by what was going to happen?

P: Just, whether, were the pains going to go away…

I: Yes.

P: …or was this the start of another heart attack or yes. And, I was also concerned about [name, daughter], because my mother-in-law is blind, so she couldn't really be left…

I: Oh, okay.

P: …you know, I had phoned her and all friends that I call on normally, they were all in situations that I couldn't call them on that morning.

I: Oh dear.

P: So, but it was fine because I got a hold of my husband and he…they all arrived at the same time, ambulance and mother-in-law and husband.

(participant 13, ≤65 female)

In the next extract, the young man experienced his chest pain whilst at work in

the hospital. His colleagues made the decision to take him to the Emergency Department, but he describes how he would have dealt with the situation differently if he had been at home. At the beginning of this interview he clearly stated that he believed he was having a heart attack.

P: I think I would have...I probably would have gone on for longer, I don't know what time, how long that went on for before I would have changed my mind, but because I was here...

I: Uh-huh.

P: ...and some, somebody else intervened.

I: Yes.

P: But, if I'd been at home I probably would have just muddled on with things.

I: Okay.

P: I probably, I would have had something else to do, I probably would have been, this one needs the nappy changed or he needs his lunch made...

I: Okay.

P: ...or just nip out to the garden and get the washing in.

I: Right.

P: There would have been something else to probably get in the road.

(participant 24, ≤65 male)

Treatment seeking delay among women has been offered as an explanation of the worse outcomes experienced by women with myocardial infarction (Khraim and Carey, 2009). The desire to maintain social control and responsibilities, by upholding their roles as good spouses, good parents, and good employees/employers has been used to explain treatment seeking delay among women (Isaksson et al., 2013, Turris and Finamore, 2008). The populations under consideration in these studies are female only, therefore it cannot be stated that these factors are only relevant to women. Data from the extracts above demonstrate how both men and women must negotiate the competing priorities their daily lives have with their own health.

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In addition to the impact an ill health episode may have on those around them, some participants revealed that the personal significance of an ill health episode resulting in a heart attack was so great that it deterred them from seeking help.

P: I didn't know if it was cardiac, anxiety, neck problems that was causing the discomfort and that, and I put it off, but one of the reasons that I was, um, reluctant to go down, and I…I went to the option of trying to get to see the doctor was, I don't like going down to the hospital. I always feel, for all I'm always treated well, it's…it's going down there, finding out, how am I going to handle this if it is another cardiac issue.

I: Ah, okay.

P: This is going to set me back, and I put it off, put it off.

I: Right.

P: And it's…I know I have to, sometimes, I have no option, that's what I'm saying, but the problem is that I just…it stresses me out going down there, um, not because of the treatment and…and…it's the potential outcome.

(participant 29, >65 male)

P: Well, I did think it was maybe my heart.

I: Right.

P: Yeah. But I've always tried to say no, there's nothing wrong with my heart.

I: Okay.

P: I'm not having that one. Erm, and then I thought it was maybe the angina, but I just didn't know what it was. It was just…Well, my ex-husband has lots of problems with his heart. And erm, my mother's family had problems with their back, and I'm just not going to have that.

(participant 39, >65 female)

5a.2.2 Morality, politics, and use of the health service

When traversing the complexities of decision making in response to a threat to health, a wider societal issue regarding appropriate use of the health service, and also a concern about an over-stretched health service was

evident in accounts. Here participants reinforced that they were responsible users, melding an awareness of healthcare organisation concerns with appropriate personal action.

There is a widely held view that people use the health service inappropriately (Adamson et al., 2009). Participants therefore had to think carefully about their personal justification to use this shared resource. This was firstly revealed by participants expressing reluctance to phone an ambulance on experiencing chest pain, even in cases explicitly stating they thought their pain may be due to a heart attack.

P: *Erm, and then it started to ease off, about six o'clock. But I was really, you're really hesitant to phone 999, although everybody has told me, that's what you do. But you're fr...frightened to do it, in case it's not anything, and you've wasted their time.*
I: *Right.*
P: *That's how you feel. Maybe this generation feels like that.*
(participant 31, >65 female)

P: *But you do feel, you know, watching the TV now and seeing all the sort of comments about how busy the nursing staff and the doctors are and how people are going into hospital that don't need to, you sort of think, oh, God, shall I go or not? Well, I thought, I can't get an ambulance. There's people need it more than me [laugh].*
I: *Really.*
P: *Again it was…I think it's the whole thing. I think my age group especially and older, it's the whole thing about, are we wasting everybody's time?*
I: *Mmm.*
P: *You know, are we going to be sort of getting an ambulance when there's somebody that really needs an ambulance, you know, can't get it 'cause I'm sitting in it and I'm fine.*
(participant 46, >65 female)

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Due to this reluctance to use the emergency services, participants sought assessment through other health service avenues first, aiming to confirm that their symptoms warranted professional healthcare assessment. Only 7/49 participants made the decision to attend the Emergency Department independently. Many patients, (30/49) had sought advice by contacting a GP surgery or NHS 24, with the recommendation to attend hospital for assessment, or the even stronger message of "phone 999". The remainder sought advice from lay networks some of which included healthcare professionals. Prompts from within the health service to request an ambulance, or attend the Emergency Department directly, allow the patient to negotiate access to care, and construct attendance at the Emergency Department as an appropriate action (Pattenden et al., 2002).

P: Well, it's, it was certainly, um, again, I mean, it was one of these situations where, you know, I had to phone up and the receptionist said, is it an emergency, and I said, well, all I can tell you is this is what's happened…

I: Yeah.

P: …this has been my experience, and she said…so she made the de, decision, the receptionist made the decision…

I: Right.

P: …which was great because I didn't want to be wasting the, the GP's time…

I: Yeah.

P: …having had that experience thinking I was wasting their time.

(participant 38, ≤65 male)

I: Okay. So why NHS 24?

P: That was…I don't know. That was…to me, that's a step before you phone 999 for an ambulance.

I: Okay.

P: Erm, and then you're giving somebody else the decision to…

I: Yes.

P: …if, though…if they think it's serious enough, then I, I…I'm wary about taking up people's time, et cetera…

I: Okay.

P: …if it's, you know, not warranted, sort o' thing.

(participant 19, >65 female)

The idea of sharing the decision-making burden regarding attendance at the Emergency Department, may also be relevant to the work done by lay consultation prior to contacting healthcare services. The consent of others to use this shared healthcare resource, appears to justify this as a more appropriate response. While there may be a commonly held perception of inappropriate use of the health services, some participants were keen to make clear, quite explicitly, that their own individual use was justified.

P: But, there was iller people than me from looking around.

I: Right.

P: Erm, lots of complex people sitting around.

I: And, how did that make you feel in amongst everything?

P: I, I was there, I was there on my own merits, so I kind of...I knew I was there because I had to be there to get that checked out...

(participant 24, ≤65 male)

Another participant appeared to talk in a way that aimed to justify why he found it difficult to differentiate between the two types of pains he suffered from by giving a 'text book' account of cardiac pain. It was as if he was conforming to an accepted script of cardiac pain that would render his symptoms more credible. By doing so, he was portraying a picture of a responsible user of the

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health service by deploying his textbook symptoms to justify why he attended hospital. He also used my status as a nurse to validate his symptoms often adding, "*as you'll know*", or "*obviously as you're aware,*" therefore using my medical knowledge to substantiate his interpretation of events. This was also a method he used to place his symptoms amongst those experienced by other people with cardiac pain, again validating his symptoms and his choice of action. There is also evidence that receiving advice to attend the Emergency Department may actually strengthen the patient's belief that their symptoms are serious in nature.

P: *And I was quite glad that the receptionist actually phoned the doctor to get advice, and then phoned me back about twenty past eight, um, rather than waiting 'til the doctors came in at nine.*
I: *Mm.*
P: *So that...I was…I was happy that…*
I: *Yeah.*
P: *Um, but again the earlier you get these things looked at, the better.*
I: *Yeah.*
P: *So I was on my way down to A&E by half past eight.*
I: *Okay.*
P: *If I'd phoned nine nine nine, I'd probably have had to wait two or three hours…*
I: *Mm.*
P: *…'cos I wasn't necessarily an emergency.*
I: *Right, okay.*
P: *Or they might have not have deemed it such.*
I: *So when you got the advice to attend A&E…*
P: *Mm-hmm.*
I: *…how did you feel about that?*
P: *Oh, that…that…it…it then went from, I've got a pain in my chest to, I've got a pain in my chest and someone thinks that my symptoms are serious.*
I: *Right.*
P: *Um, so it…it escalated a wee bit.*
I: *Yeah.*

P: So I went from thinking, well, maybe there's something wrong to, well, it's maybe more than a maybe.

I: Yeah, yeah.

P: It's a…it's a…it's a strong possibility now, because, um, if a…if a medic has listened to symptoms and come to that conclusion, well, um, yeah…

I: Yeah.

P: …I..I felt it was…it was more serious.

I: Yeah.

P: Escalated up two or three notches.

(Participant 49, >65 male)

P: I phoned the GP, phoned the sur…the, the…

I: Phoned, sorry, yeah, just…

P: …ph, ph, phoned the thing, and the receptionist there said anything…because, because you're having chest pain and there's been a sort of ongoing thing, you know, we suggest you go straight to A&E, which, which in itself, um, it kind of just puts it then up a notch, I suppose the anxiety…

I: Right, okay.

P: …because you're hearing, well, if it's chest pain, blah, you know, so if perhaps I'd seen a GP and they were able to sort of reassure me that it wasn't something, then that might have saved time here, I don't, I don't know.

(Participant 38, ≤65 male)

Much of the literature surrounding Emergency Department usage focuses on reasons for inappropriate attendance (Patton and Thakore, 2013, Baker et al., 1995). Contrary to this, participants in this study attempted to use primary care services but were directed towards the Emergency Department. Participants reported telephoning the GP surgery for advice, and either receiving a telephone consultation with a duty doctor directing them to attend the Emergency Department for assessment, or the GP practice call receiver directing the patient towards the Emergency Department, bypassing GP assessment.

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In addition to the moral use of the health service, some participants have revealed a political discourse relating to provision of healthcare. The lived experience of everyday life and social interactions can inform us about social and economical conditions and institutional frameworks (e.g. the health service) through which ordinary lives are lived (Barbour, 2008). This is an example of how an appreciation of the macro can be gained through study of the micro in the form of individual interviews. Hence, the discussion surrounding access to GP services, reveals how the setting and cultural climate in which individuals must make decisions regarding their health, may impact the choices they make. Participants expressed having no other option but to attend the Emergency Department due to the scarcity of appointments available in primary care.

P: The biggest obstacle for that is of course is actually getting to see the GP.
(participant 33, ≤65 male)

P: Erm, but you just get the feeling that you don't know who you're going to see, for a start.
I: Mm.
P: And, erm, because if I did name a doctor then it would be a week anyway ahead.
(participant 34, >65 female)

When talking about health and illness, the influence of current cultural discourses is revealed in the language that interview participants disclose (Nettleton, 2013). Commonly, participants rationalised aspects of healthcare viewed as substandard in the context of a health service under pressure due

to the current economic climate of 'cut backs' to services.

P: If they take the politicians out the NHS, we'd have a better NHS, and get
     rid of the senior managements, the fat cats.
(participant 6, >65 male)

P: I had, I had, I had the CPN nurse coming here.
I: Right.
P: I had her for two year, but because of all the funding, and that, it's been cut.
I: Okay.
P: They've cut it all. Like, everything else, everything's getting cut, and we're
    left in limbo. And I've been trying to get my head round a lot of things, my
    daughter having cancer, and all that."
(participant 18, >65 male)

P: He's now not living here, but he had been for many years, and the toll was
    phenomenal, but having been through a lot of things with him and
    community mental health being cut to the bone and us going through that
    with them, um, was a big eye-opener to me. I'd been out of health for a long
    time but I was…again, I was very naïve. When he got ill and came out of
    hospital I expected all kinds of things to just fall into place…
(participant 46, >65 female)

"They are so busy there, I mean when I was in the Infirmary they were looking
    for patients, they were coming along and checking, oh no, it's no you we are
    looking for and this. And I think that shouldnae happen but it does happen
    and there's nothing we can do about it because they are no getting the funds
    for the NHS which is ridiculous."
(participant 44, >65 female)

In summary, the pre-hospital phase of an episode of chest pain, involves a

complex process of symptom interpretation and evaluation of the appropriate

action. Symptom appraisal, together with cognitive and emotional processes,

individual beliefs and values, and the influence of the context of the event, all

shape the way in which an individual may respond to symptoms and subsequent assessment for chest pain.

5a.3 In-hospital phase

This section of analysis focuses on themes pertinent to the in-hospital phase.

5a.3.1 Healthcare system issues

Continuing from the pre-hospital phase, references to the political climate were also evident surrounding the in-hospital phase. Participants were seen to justify less positive aspects of their experience, not to the individual actions of healthcare professionals responsible for their care, but to a political and economic climate failing to support the National Health Service to the required capacity. Concern over use of the NHS has now extended beyond appropriate personal use, to concern for the health system and its staff.

P: *They're very reluctant to tell you anything at all, it's like drawing teeth. [laughs] You've got to…you know, you've got to…come on, could you explain that more or…and…and more or less they're not patronising, but they're…you know, I'm the doctor, I know better, um…*

I: *Right.*

P: *But again, if they would…some of them would maybe, um, be a wee bit more…I know they've got to be careful because obviously they're not wanting to alarm people and that, but if they were more forthcoming, especially if they know people like myself have got issues with anxiety and so on, just to explain it a wee bit more to them, but some of them don't.*

I: *Mm.*

P: *It's, um, you know, they're not very…they've not got the…the kind of X factor, as it were, to come across, and again I understand that too because especially in the circumstances at the Royal, big hospitals, must be dreadful, the pressure everybody's under, nursing staff and so on, um, and obviously they're trying to…they're trying to get their patients, you know, find out what's going on, do we have to admit them, find them a bed, are they okay, so they're under pressure for time and that, so obviously it's not always…I was particularly…Friday morning, it was fairly quiet, so the doctor had time to, you know, explain things and what they'd done and so on. Um, in the past sometimes it…it's just been a case of, right, everything's fine, you're*

getting discharged, we'll get all your bits and bobs, um, we'll send a…a… you know, your discharge information to your GP. Well, that's it, they don't always tell you, but, um, I know their intentions are…good

I: Mm.

P: *…but they're under immense pressure, stress, I can understand that.*

(Participant 33, ≤65 male)

Praise of individual members of NHS staff was common in accounts, a concept mirrored in other studies (Zeibland et al., 2011).

P: *When I first got admitted to the ward, I mean, you know, the one staff nurse was…I think the other staff nurse must have been off on a break, or something, and she was trying to do…about ten different things at once. Erm, but still kept smiling, amazingly, through the whole thing."*

(participant 20, ≤65 female)

One participant who recounted a previous negative experience of hospital assessment for an episode of chest pain, framed the short falls in his care against a background of budget concerns and staffing issues.

P: *Because these people that test the blood, they must feel [clearing throat] overworked. Is it because they're overworked, because they have to test for cancer, liver, kidneys, all, I know there's all different kinds of test in the hospital that they have to do. There's no a specific, erm, department just for the heart.*

I: No, but they...

P: *All the people that test all these things.*

I: Yeah.

P: *Because I, I think that the reason why they don't test, because they, they, these people that test for things, are overwhelmed with certain tests that they've got to do. And I think, they're, well, well, we'll not test for the heart, because if somebody comes away and says, I've got a chest pain, they could be overwhelmed with having to test, and it's not that. Because, with, with, usually, the machine [ECG machine], the machine is telling us, he's not having a heart attack, so why...*

I: Right.

P: *...why, erm, put a blood test in.*

I: Uh-huh.

P: *If that machine's telling us he's not having a heart attack, why, why, why go through all that trouble, testing, doing a blood test.*

I: Yeah.
P: If the machine's telling them.
I: Yeah.
P: Why do it, save us time, save us money.
(Participant 25, >65 male)

Reference to healthcare budgets dictating care were also evident in the context of the clinical assessment being focused solely around the rule-out of myocardial infarction. While this may understandably be the main aim for the clinician, some participants suggested a more comprehensive view of their health would have been more valuable to them.

P: But that was the…the only question or explanation I didn't get…why am I…why are you not dealing with my high blood pressure now then if it's such a concern to you?
I: Yeah. Yeah.
P: That…that would be my only con…
I: Uhm-hmm.
P: …my only issue. If…it's not an issue really…
I: Yeah.
P: …because I understand the…the…the budget responsibilities in care. Plus the fact, because they didn't medicate me there and then, it said to me that there wasn't a major problem.
(participant37, >65 male)

The participant below had presented to the Emergency Department multiple times with chest pain, receiving rule-out of myocardial infarction on every occasion. He makes an analogy from his professional life within the prison service, suggesting a more comprehensive approach to his care, rather than the single aim of rule-out of myocardial infarction, may be beneficial for the health service in the future.

P: And I think it's a…I mean it…again I'll not go on at length here because I could, it's…it's the lack of connectivity of joined-upness, and I…I…I

experience that a lot in the prison service where, you know…you know, people going back to the communities; everybody has their job and they do their job, but they don't necessarily maximise their engagement with the…the next person on the line so to speak…

I: Right.

P: …so how…how do you…could you…by spending a bit – not in A and E – but by…

I: Yeah.

P: …spending a little bit more time now can you actually save time in the future.

(participant 41, ≤65 male)

5a.3.2 Influence of Emergency Department routines

Certain factors that occurred due to the influence of the Emergency Department environment, were noted to have a bearing on how participants interpreted the chest pain assessment experience.

Protocol driven care

Several participants spoke in terms of being part of a 'process' within the Emergency Department. For some participants, the routine nature of the assessment process was evidence that clinicians would perform appropriate actions as they were following a protocol. Suspending individual agency and handing over care to the healthcare team can be viewed as positive (Turris and Johnson, 2008).

P: I wasn't apprehensive in any way because I felt at that time I was getting sucked in to being looked after by the health service professionals and that they were going to be managing my visit through, er, A&E.

(participant 37, >65 male)

P: The people who are doing all these things in hospital, somebody somewhere has assessed and they've done their uni or whatever, you know, so the job that they're doing, er, they're…they're qualified and capable of doing that. Um, so at the end of the day…this sounds a bit

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mechanical, they're only doing a process…

I: Mm.

P: …and it's that process that comes back and they're telling me the process that we've done, whether it's a blood test or something like that, tells me that you are fit/not fit, that sort of thing.

(participant 40, >65 male)

This view has been mirrored in other work, with guideline driven care being viewed by patients as a method to ensure receipt of 'best practice' care (Louden et al., 2014). Conversely, concern over 'applicability of guidelines' was identified as a major theme in a systematic review of patient and public attitudes to clinical practice guidelines. Patients wished to be seen as individuals with unique experiences and healthcare needs, and had concerns that guidelines may not be applicable to their individual situations (Louden et al., 2014). This perception of lack of personalised care was strongly evident in some participant accounts regarding the early rule-out protocol.

P: If, if the emergency department are going through their protocols, then clearly that's their protocols for, for that. If, however, there is, something that's flagging up, then I think it should either be referred back to the GP to take up…

I: Mm-hm.

P: …or sent to whoever needs to make, you know, the decision-maker. I think not being listened to is critical.

(participant 38, ≤65 male)

This participant goes on to give a detailed account of the significance of effective communication between the patient and clinician. It is clear to see that for him, the stand-alone protocol driven care pathway is ineffective in providing a comprehensive assessment of his illness experience in the absence of the affective human factors that should also form part of a clinical

assessment.

P: Engaging, engaging with, with, with people I think is very important…
I: Mm.
P: …um, because it values whoever it is that is having the problem, um. The consultant…I was in the cubicle there, the consultant was standing there clearly looking at my m, notes and didn't engage at all, didn't look, didn't speak, it was all done by, you know, this sort of thing and the younger doctor and the student doctor all sort of just having a, having a chat. You know, I'm there, I can hear what you're saying, it would have been nice for them to just turn round and say, well, actually, you know, this is what I think or…
I: Mm.
P: …what have you. I don't know what, I don't know what the protocols are for that, but that's, you know. I think it's very important to value, value people who, who are coming in if, if, you know. You…even folk who are living on the street, you know, you, you have to engage and value, you know, when they were born or growing up, they didn't say to their mummy and daddy, you know, I'm going to, I'm going to live on the street because that's what I want to do, you know, there's a life story, life history…
I: Yeah.
P: …there, so it's, it's, it's important, regardless of who, where, whatever, it's very important to engage and listen and value the individual."
(participant 38, ≤65 male)

As participants entered the environment of the Emergency Department for assessment of their chest pain, some spoke of transitioning from individuals to patients.

P: He was just on a sort of, he was on a roll, describing everything to me, and I just thought, I'll just nod my head, you know, and be the patient, take the patient role, and he can be the consultant person. So that was the way it worked.
(Participant 23, ≤65 male)

Their presenting problem is translated from their individual experience, to a clinical case defined by the healthcare team with an aim oriented towards the treatment of acute illness (Turris and Johnson, 2008). Symptoms became

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framed in the context of biomedical knowledge rather than the personal context in which they are experienced by the patient. The interview extract below is from a participant describing a protocol driven assessment which she considered flawed by the lack of a person-centred approach.

P: I didn't think there was any communication at all. They were only interested in getting this blood out, sending the blood away, then out the door. You weren't treated as a person. You've got a pain in your chest, right, get that blood out, do that test, and out. I felt as though nobody had done anything to help. I was right, you can go out, you can go home. Nobody had helped me because I felt the same as how I felt when I went in."
(Participant 39, >65 female)

A detailed analysis of how a discord was found to exist between the objective interpretation of a troponin value by the clinician (as directed by a chest pain assessment pathway), and the significance that result holds with the patient in the context of their illness experience can be found in chapter 5b. The idea of discord was evident in both arms of the study, and so was not determined by the pathway itself. The aim of assessing a patient with suspected acute coronary syndrome is to rule-out myocardial infarction, and either provide an alternative diagnosis, or reassure the patient their symptoms are not a cause for concern. Where discord was present, this reassurance was much more difficult to achieve (chapter 5b).

5a.3.3 Interpretation of routine clinical care

Patients admitted to hospital for serial troponin testing were more likely to negatively discuss aspects of their care than those discharged directly from the Emergency Department (18/23 versus 4/26). This was particularly in

relation to repeating symptom history to multiple practitioners.

P: It was frustrating, you know, to have to tell the nurse what had happened, and then frustrating to have to tell someone else what had happened, and then a doctor what had happened, and then the consultant what had happened, you know what I mean. So there was, I was thinking, Jesus, can we not just get everybody in the room, and I'll tell you, look, here is what happened, guys".
(Participant 23, ≤65 male)

P: I think I saw maybe two or three doctors, and at this stage I'm used to just repeating…I'm used to the hospital procedure where you have to repeat yourself five or six times.
I: Yeah, yeah.
P: I do wonder though why that is, but I suppose if it's a teaching hospital I'm putting it down to the junior doctors having to go through that process…
I: Mm hmm.
P: …um, but, yeah, it does, it does always baffle me the way [laughs] you have to keep repeating yourself but…
I: Yeah.
P: …yeah, I presume it's just in case somebody misses something."
(Participant 13, ≤65 female)

"P: It was, it was…the only thing that got, got quite tiring was, I seemed to be telling the same story…
I: Yes.
P: …over, and over and over again. But I, you know, you felt, well, are they checking to see if they can catch you out, and you change your mind?
I: Yes.
P: Which I didn't really believe…
I: Yeah.
P: …but you, you began, in the course of the morning after, you know, several hours, and people were still asking you, you know, what was…how did this start, and all the rest of it: I thought, oh my…I was really getting to the point where I didn't want to, to, er, tell it again."
(Participant 3, >65 female)

In addition to repeating symptom stories, the ambiguity over when a patient

would be discharged was a further source of frustration. The original pathway

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dictated that patients must be admitted for peak troponin sampling 10 to 12 hours post pain. If this time point was late at night, or the clinical care team thought it appropriate to discuss the patient with a senior doctor, or someone from another speciality, then the patient may be informed they would remain in hospital overnight. It was not uncommon for these decisions to be very fluid. The patient was therefore left in a state of uncertainty as to whether they would be discharged or not, or, on the other hand being discharged when they had prepared for a night in hospital. The following participant spoke at length about the distress he felt at the perceived lack of structure to his hospital stay.

P: Now, by this time, it was about one o'clock, and again, I was tired. But I didn't want to lie down on the bed, er, because I thought their rounds would be coming shortly. So, but there was one woman, a patient, obviously, waiting. And she was getting quite a bit stressed, she wanted to see a doctor, and they said, yeah, the rounds. And this was about two o'clock. Well, the doctors didn't come round until about four thirty. Now, it's understandable, doctors are busy, so I didn't mind. But eventually, they did come round, and again, I asked, will I be getting home sometime. And they said, yeah, probably. They couldn't say yeah, or nay, which again, I accepted. So, four o'clock became six o'clock, and I got something to eat. Six o'clock became eight o'clock. Now, I'd never slept since three o'clock, the follow...following morning. And I hadn't gone to bed because I thought, well...and I hadn't showered, and I needed to have a shower, because I was hot, and clammy, and everything else. And I was getting to the point, I thought, now I need to get home, get a shower.

So, I asked the nurse on duty, I said, when will I see a doctor again, to confirm yay or nay to going home. Well, I believe they're waiting on the blood results, and I said, fine. So I waited, and waited. So, nine o'clock - by that time, it's almost twelve hours in hospital. Er, she says, do you want to go to bed. Well I knew within myself...there was monitors beep, beeping all over the place. Now, I knew they could put them down a bit, but I knew I wouldn't sleep, I just knew. And, (a) I snore, very, very badly. And I thought, it's not fair, just for an assessment. And I asked...one doctor came back, he says, well we're still waiting on the blood, I'll have to see my colleague. So he went away for about twenty minutes, or so, and the both of them came back and said, look we would like you, er, we would like you to stay, 'till the morning, so the consultant can see you, and give the answer to what's wrong. What we know is there's nothing on the heart, there's been

no damage, the heart is all clear. But we found something in the blood which we're trying to isolate. I says, okay. I says, is this life threatening, and he says, I don't think so, but we don't know.

So, I says, okay. Er, er, the two of them were trying to persuade me to stay 'till the morning. And I know - I've been in hospital before - the consultant, you get woken up, six o'clock in the morning, erm, you're sort of on standby for the consultant, who may not come until ten, eleven, who knows."

(participant 6, >65 male)

This participant self-discharged due to the continuing indecision over his care.

A further example involves a participant who had been informed she would have an overnight stay, but was subsequently discharged unexpectedly at 11pm.

P: *Everyone was really, really nice, but it was one doctor, she said, um, oh no, you'll no be going home, because, she says, we'll know about the results of the blood test…'til probably after 12. And she says, there's no way we're going…they're going to send you home at that time of night. So that's when I says to (name), well you better go home and bring me in, you know…*

I: *Yeah.*

P: *…what you need for…and then once I get…and my friend had brought (name) in and once, um…they've went away. I says to the nurse, can I just go and put my pyjamas on. Oh, she says, no, no. She says, I think you'll be going home. So they came…um, another doctor appeared and he said, right, um, we're going to get that blood test done. And, er, make sure everything's alright. So they came about ten past nine and the nurse came through, I'm going to take it. And it was about twenty past ten, um, the nurse says, well you'll probably…we've had…had the results back. Um, your heart's okay. And then somebody else said, right you can just go home. So I was actually walking along the corridor when I…I phoned [laugh] (name) and I says, I'm on my way. I says, um…*

I: *[Oh okay 07:58].*

P: *I've got to come home. Which I thought was a…I mean, as I say, 'cause the…the doctor down…as I said, they were saying, oh no, you have to stay…*

I: *Yeah.*

P: *…overnight. And as I said, that was my only thing. And I still had the pain in here, like, you know…*

(Participant 5, >65 female)

The way in which these factors may influence on-going perception of symptoms and illness is discussed in detail in chapter 5b. This is a further example of how the stand-alone protocol driven care pathway may be ineffective in providing a comprehensive assessment of illness experience in the absence of the affective human factors so critical to clinician-patient communication and patient experience.

Admitting a patient to an assessment ward from the Emergency Department to await serial blood sampling as in the original pathway was, once again, a further source of frustration. This was often framed in the context of ineffective use of NHS resources.

P: *Well, it was massively frustrating, because, erm, not only was I under time pressure, particularly this day. Because there was very immediate issues with trying to get to the dentist, to make sure I was signed out for that. But also, it just, I felt, you know, again, there was the frustration about why did I have to wait so long for the second stage. And not only that, you know, the time that, sometimes, it can take a consultant to come round and just sign you out. So it was a whole, it's a whole day...*

I: *Hmm.*

P: *...wasted, and, you know, with, obviously a blocking of some sort of potential beds, and so on. And taking a lot of resource. So I just felt it was an awful waste of time, for both me and you."*

(Participant 23, ≤65 male)

P: *But my mind is thinking now, okay, that's a bed taken up. Sheets have got to be cleaned, it's all money. Er, yes, there was two gentlemen at the other end who did need beds, because they were not in good shape - yes, that's understandable. But for someone like me, to lie in a bed all afternoon, when - okay, I was tired, but the bed wasn't going to solve the problem. I suppose I could have maybe slept, I don't know. But I thought, in a way, it was a waste of a bed."*

(Participant 6, >65 male).

As the early rule-out pathway eliminates the need to admit patients to a ward for repeat testing, these views were rarely seen within transcripts of participants assessed using this pathway.

The standard assessment procedures carried out by hospital staff could be interpreted by patients in a manner different to that intended. Firstly, the efficiency and speed with which Emergency Department staff carried out initial assessment procedures was interpreted by some participants as confirmation that their symptoms were a cause for great concern.

P: There was, and in the reception area, you had a lot of people with things, you know, wrong with them. But, but to be very fair to the staff..I, I said to the reception lady that I had chest pains...and to be very fair to the staff, er, I was seen very, very quickly. Very, very quickly, er, put on the machines, and very, very quickly assessed. Which, for a wee bit was a bit concerning...
I: Right.
P: ...how quickly.. they were not really talking, and getting me on stuff."
(Participant 11, ≤65 male)

P: I was in the door five seconds and ECGs were being attached to me so, er, probably didn't do anything, to sort of satisfy my stress levels a little bit because it was so...it was so flat out for the first little bit but then it did seem to just calm down after that.
I: Right.
P: But, by the doctors own admission, she said, you know, although they didn't diagnose at the end of it all, she said, you know, when you were wheeled in it only looked like one thing you know, she said quite honest that was her statement, so I kind of was like, well, that's fine, I only felt like one thing too.
I: Yes.
P: But, yes, that first bit was quite, you know, the, the nurses that came through from orthopaedics were brilliant, erm, but I don't really think...at that stage I was kind of at the heightened sort of stage of probably stress anyway. Erm, but, yes, like straight in ECG leads attached, that really didn't settle you that much.

I: Right, yes.
P: But, it was necessary.
(Participant 24, ≤65 male)

The routine nature of repeat blood sampling for peak troponin could also be interpreted to signify a higher likelihood that their symptoms may be due to a heart attack.

P: When, when I got moved out of the A&E, I was slightly concerned. Because I thought, if I'm having to go onto a ward, why am I, why am I here longer. Why am I not just sort of checked, and as you said, previously, then out you go, sort of...

I: Yeah.

P: ...type thing. So that slightly concerned me a wee bit. But the way I was, the way I was, erm, transferred, if you want to call it that, or the way I was taken through, and the way I was asked just to sit on a seat. There was no real urgency, or, erm, everything was nice, and normal, and calm.

I: Uh-huh.

P: So that was, that was fine. The reason I, the reason, I think, I was asked about the sec...the second blood, was because of a history in my family, just to double check. So, erm, my father died of a heart attack when he was forty-nine.

I: Right, okay.

P: So they asked us previously, did I have any history, and I says, yes I do. So I think that's why they possibly wanted to take another, another test. So, they did.

(Participant 11, ≤65 male)

This was also demonstrated by one participant who interpreted the normal procedure of repeating an ECG recording after a period of time, to signify an abnormality had been found on the first trace. Literature also supports the idea that more testing does not necessarily aid the development of reassurance in patients (Serinken et al., 2009). Explanation of assessment activities that may seem to be routine care to clinical staff, may mitigate against patients worrying

unnecessarily due to misconstruing clinical care.

P: Er, the second…the second time they did it, I was a bit more concerned that they'd actually found something on the first trace…

I: Ah okay.

P: …and they said…they didn't explain it then. [Cough] That's not a criticism.

I: Yeah.

P: I wasn't apprehensive in any way because I felt at that time I was getting sucked in to being looked after by the health service professionals and that they were going to be managing my visit through, er, A&E. So that was how I felt at that time, so…

I: Right. But the fact that they repeated that test…

P: That was a concern…

I: Right.

P: …because in health…if you have a test result that you're not sure of or abnormal…

I: Okay.

P: …you confirm that that's the case.

I: Yeah. Yeah.

P: You don't confirm normal tests…

I: Yep.

P: …unless it's inconsistent with the clinical symptoms.

I: Yep. Okay.

P: So that was…that was my thought process.

(Participant 37, >65 male)

A similar concept was also seen with some participants admitted to an assessment ward to facilitate repeat blood sampling. Again, this could be viewed as confirmation that symptoms may be suggestive of something serious.

P: And, eh, then a lady came back and then she said I needed to take an aspirin and I would need to stay in till after 12:00 to get another blood test, because it...she said if it was the heart and any damage had been done, this test showed up something that's released into the blood. Em, and then

> *I thought, oh, no. Then it was...slight panic set in, because I thought, it's not as straight forward as I thought."*

(Participant 14, ≤65 male)

Chapter 5b gives a detailed analysis, framed around the concept of reassurance, of how effective communication from the clinical team can aid the patient in gaining a more satisfactory conclusion to their illness episode.

5a.4 Post-hospital phase

5a.4.1 Uncertainty

For many participants, their illness episode did not conclude with the rule-out of myocardial infarction as it may have done so for the assessing clinician. After discharge from hospital, participants revealed how they continued to construct meaning from their chest pain experience. For many participants, the episode of chest pain was not interpreted as an isolated event, but in the context of an illness history, whether or not a link between symptoms and known illness may be deemed to exist clinically. The concept of illness uncertainty was a salient experience for some participants as they sensed a loss of control and a feeling of doubt over their health status.

This following extract is from a young man who has had multiple presentations to the Emergency Department with chest pain, all concluding with the rule-out of myocardial infarction. He was also one of the few participants who had experienced assessment with both care pathways. His chest pain occurs in the context of blackouts for which he has a loop recorder in situ (a small device

that detects the electrical activity of the heart). Here, he is discussing his chest pain in the context of his wider symptoms for which he receives out-patient follow-up. It is an example of how for this patient, the single rule-out of myocardial infarction does not signify the end of his illness experience.

P: I'm like literally in and out the room, like I'm, it's like a half an hour drive up, I'm two minutes in the waiting room, lie on the bed, put it on me, just take it oot, right, that's you done, and that's it, literally two minutes, I'm in the room, if that. Erm, by the time my mum sits down on the seat outside, 30 seconds later she's back up and we're away.

I: Right.

P: So, it's very quick, like very quick in and oot. Erm, he'll maybe go, aye, everything looks all right or, or he'll be whispering to the guy next to him and pointing at certain things. Erm, but I think it's got to the point now where it's like I'm just that nervous, eh, I, I dinnae ask too many questions.

I: Okay.

P: Er, which is obvi...which is like my own doing, if that makes sense, that's my own fault, like I, I could ask questions and I probably should. Erm, but even when I get told things I get reassured things, like I, that, that's been good this month everything looks fine. I take it, I take it in and I'm happy about it, but then I start to get these pains and that, and when I start to get these pains and that maybe a week later or two weeks later or whenever it is like pain and then...I'm talking pain when I can't even stand or pain when I'm just, like I'm literally stuck to the couch, I can't move, I can't even sit up if I faint, erm. Like in February I fainted and smashed my head off my dog at the time. Erm, I was...like my tongue was at the back of my throat and I was unconscious right up until I was in the ambulance.

I: Right.

P: So, I was like, it's, it's fear, I think it's fear...

I: Uh-huh.

P: ...I think that's the, I think that's the best word to describe me. Like I'm, just, I'm, I'm like I'm in fear constantly.

I: Uh-huh,

P: It's always well, like what's going to happen next kind of thing. Erm, because there always is something going on..."

(Participant 28, ≤65 male)

Another young lady, who had suffered a recent heart attack, expresses concern that she may go on to experience further episodes of pain.

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I: And so how did you feel then? [on being informed of discharge]

P: Quite happy. [Laughs]

I: Yeah.

P: Um, but, again, very, very slight anxiety because, you know, having to go back into as if nothing had happened…

I: Mm.

P: …and then, again, the worry, you know, is this going to happen again and again and again?

I: Mm hmm.

P: Am I ready to, to just leap back into, to normal life and, you know, go home and do the dishes, do the washing…

I: Yeah.

P: …look after my little girl, you know. Am I going to have the strength and all the rest of it to do that? And the mental, the mental strength as well.

(Participant 9, ≤65 female)

The participant in the extract below was given an alternative diagnosis, but continues to wonder how she would interpret similar symptoms if they occurred again. She accepts the rule-out of myocardial infarction, but is aware that rule-out on this occasion does not mean that she is immune to suffering a myocardial infarction in the future.

P: Erm, and then when I came home and thought about it, I thought, well, you know, if I hadn't had a heart attack last time, how am I gonna know, you know. I don't want to keep calling - not that I'm necessarily gonna keep having repeat attacks. But, and I guess if I had a series of ones, then perhaps they would do further investigations. Erm, but I did in fact have, on Monday, much, much milder, but quite similar symptoms, and I got up and took the, erm, stuff that they gave me, the medicine, for sort of, heartburn and whatever it is.

I: Yeah.

P: And, erm, I've been taking that on a fairly sort of regular basis. So, I think it probably is. But then, you know, you start to wonder, when you have little sort of twingey pains, even in your breast area, you start to think, oh god, is that...

I: Hmm.

P: ...you know. So it does plant, you know, some seeds of, of potential worry

there...

I: Yeah.

P: ...you know. Erm, but, you know, you realise you don't want to be living your life anticipating something like that.

(Participant 16, ≤65 female)

Patients experiencing chest pain fall in to three main categories. They may experience acute chest pain due to chronic coronary heart disease, they may experience chest pain as a medically unexplained physical symptom, or they may experience an acute episode of chest pain as an acute non-cardiac event attributed to an alternative diagnosis such as gastro-oesophageal reflux disease. The uncertainty that people may suffer when affected by illness has been the focus of analysis for patients with both chronic illness and unexplained symptoms. The concept of 'liminality' - a state of 'health-but-not-health' (Blows et al., 2012), has been used to depict the uncertainty that some individuals may feel when affected by illness, and can be seen in participant transcripts. In the extract below, the participant appears perplexed by the explanations he was given regarding his chest pain, and questions what this means for his interpretation of symptoms.

P: I was, I was giving information, but what, um, obviously my symptoms were not clinical, um, and just because it's not clinical, doesn't mean to say there's not something going on, and it was only afterwards when I left I actually thought, well, okay, the…clinically my heart is supposedly fine, um, the test came back fine, why am I having the symptoms.

I: Mm.

P: Nobody had mentioned anxiety or, um, anything like that, it was only when I saw, you know, the duty GP sort of on the, um, Thursday I think it was that, that was mentioned. Um. [Pause]. Um, I was also told to stop taking the ni, the ni, ne, glycerin spray.

I: Yeah, okay.

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P: Because that was a placebo effect. So, um, it was only afterwards I thought, well, that's a funny thing to say, um, so basically is that somebody saying, you know, you're not having, you're not having these symptoms so you shouldn't be having it, whereas the GP said, actually, if you're having these symptoms, you should be taking them.

I: Yeah.

P: So, you know, you're getting a…

I: Yeah.

P: …you know, and I can, I can understand if, if I'm, if there's, nothing's happening then, um, or there, there isn't a problem, but that I would have thought is what the thing's for.

I: Mm-hm.

P: Bearing in mind I hadn't u…had to use it or felt, felt the necessity…

I: Yeah, yeah.

P: …to use it for…since I'd had my stent, that was a year ago.

I: Mm-hm.

P: So for, for me to start having to or feeling the necessity to use it and I actually feel some sort of relief, whether it was…whether – well, I don't think, possibly psychosomatic or or placebo or whatever, I mean, if, if you're having a chest pain and you feel a tightness and you use it, then…and you, you get, you do get some sort of relief from it, then, I don't know, I would assume that's what it's for.

(Participant 38, ≤65 male)

This participant finds himself in the grey area encountered by many patients who experience symptoms which are not attributed to a definitive disease state. Legitimacy can be afforded by diagnosis when symptoms are linked to a specific disease (Bruce et al., 2014). Several examples show participants questioning themselves after they have been denied legitimacy of their symptoms.

P: And, as if sometimes I think do people actually think I'm just making this up?

I: Mmh.

P: Do, do people actually think I would choose to call an ambulance, when my two year old is in the house, on my own, knowing that I didn't have anybody there to…you know, my neighbour was gone and my friends just had a baby

that I would normally call on. You know, the stress of having to call an ambulance. Like because I'm normally quite blasé about my chest pain, they just come and go and think, you know, oh, I have another pain in my chest, so I just deal with it. But, yes, it just kind of left me feeling a bit… And, more the feeling of, oh, here we go again.

[Laughter].

I: *Mmh.*

P: *It's like banging your head against a brick wall.*

I: *Mmh.*

P: *But, I suppose at this stage when the…most of me has accepted that I would just encounter this, and, and he did, you know, say but if this happens again you need to do the exact same thing.*

I: *Okay.*

P: *Because, you know, with you, you can't, you need, if this happens you just need to call an ambulance, you did the right thing. They've said to you that's what you had to do so…*

I: *Yes.*

P: *Yes.*

I: *Yes.*

P: *So, that I suppose did make me feel, well, okay, I did the right thing, you know.*

I: *Uh-huh.*

P: *But, you do sometimes think, well am I wasting everybody's time?*

I: *Mmh.*

P: *Erm, but deep down I know that it was chest pains.*

I: *Uh-huh.*

P: *Because I can, you know, I can feel my heart squeeze, and I can feel…so, erm. Yes, I was just frustrated more than anything.*

(Participant 13, ≤65 female)

In the example below, the man had a suffered a heart attack two months prior to his most recent chest pain admission. He had received treatment to unblock one of his coronary arteries but remembered a conversation about a further artery being diseased but the decision being made not to intervene at that time. His care, as dictated by the early rule-out pathway, meant he was discharged from hospital to await his routine outpatient appointment post his initial heart

attack. The man expressed a state of doubt about how to interpret his current symptoms and used the interview as an opportunity to question myself about what his test results meant for his health status.

P: But it has, it has knocked me, it's knocked me right back.

I: Yeah.

P: But, erm, every twinge, and every pain I get in my chest, it just reminds me of my heart attack.

I: Uh-huh.

P: And it's gonna take a long time to, to get my head round this.

(participant 25, ≤65 male)

Several participants revealed uncertainty as they continued to question the cause of their symptoms post discharge from hospital. The single rule-out of myocardial infarction had not provided them with confidence in their current health status allowing a sense of doubt to dominate.

P: It's because of the…how would you put…uncertainty.

I: Okay

P: It's, is everything gonna be alright? Is…is that tablet gonna work out? Is…is the blood clot away? Or could it come back. I…is the heart gonna be alright? Or could it come back? It's things like that that's going…

I: Uhm-hmm.

P: It's going round in your mind because it's so fresh that it's happened. And you've just got out that night. You're sitting in there. You've no got the back up o' the hospital.

(participant 18, >65 male)

P: I was anxious when I left 'cause…

I: Right.

P : …I was worried I was get…[laugh]. I was worried, I was…I mean, I have a very good friend who had a stroke [laugh] about a year ago, erm, and she was a very active lady and obviously that was a big shock and I thought,

God, I hope I'm not going to have a stroke but maybe that's because my friend had it and…

I: Mmm.

P: *…I'm thinking, oh, why am I dizzy? What if it's not anxiety? So I suppose I…I was anxious when I came away for a couple of days but I think as the time's gone one I'm less anxious about it.*

(participant 46, ≤65 female)

P: *I still have, in the back of my mind, that, is it the heart. Because, as I said, I have, I feel that I have little palpitations, little flutters. So, I should possibly take myself back off to the doctor, but...*

I: *Uh-huh .*

P: *...no, I haven't done that.*

I: *Okay.*

P: *I should make an appointment for my own GP, anyway, but I just, I don't know, I haven't done it yet.*

I: *Right.*

P: *But, yeah, I suppose, it's still in the back of my mind, that, is it this, have they missed something.*

(Participant 48, ≤65 female)

This lady went on to describe how she had felt unable to return to her usual activity of going for long walks due to fear that something may happen while she was out on her own.

5a.4.2 Approaches to future health

The way in which participants made use of their acute chest pain presentation to hospital, as an opportunity to consider their future heart health was an unelicited theme within interview transcripts. Participants demonstrating an awareness of future heart health did so in three main ways. Firstly, they discussed their incentive to modify their lifestyle as a result of an acute chest pain admission. Secondly, some participants suggested their acute chest pain

presentation and assessment was an appropriate opportunity for health promotion activities. Thirdly, some participants discussed how the rule-out of myocardial infarction related to their overall heart health, and their future susceptibility to heart disease. Some patients made no reference to their future health at all during the course of the interview. This analysis has consequently revealed three possible perspectives by which participants may relate to their future health status. For some, continuing good health was taken for granted therefore did not have particular salience in their everyday lives. For others, the way in which they reacted to the chest pain episode varied in accordance with their position in the adult life course and their current health status (Lawton, 2002). Some of these participants used the chest pain presentation, and therefore the recognition of a physical manifestation of ill health, as a trigger to appraise health behaviours. For others, their current health status appeared to have dominance over the acute chest pain episode, leading to discourses of fatalism and certainty of future ill health. A full analysis of the 'Approaches to future health' theme is given in chapter 5c.

5a.4.3 Information seeking post discharge

In the same way that participants undertook the work of information seeking through lay networks prior to presentation to hospital, this endeavour continued post discharge. Participants reached out to the same sources of information including family and friends, web-based sources and primary care. For some participants, these lay consultations provided answers where the professional assessment had failed to do so. Where the rule-out of myocardial

infarction had not provided an alternative cause to the symptoms, participants chose to associate their symptoms with an alternative which appeared plausible.

P: And they were nae sure what this pain was, um, and it continued and continued and I've still got it yet and a weakness in this arm, and my brother had had a heart attack, um, a fortnight, three weeks prior…

I: Oh gosh.

P: …to me. I went, 'cos he's five years younger than myself, um, and my father, he had heart problems as well, but then on the Friday after the Wednesday that I was in the hospital speaking to my brother, and he was saying…he says, I had a similar sort of pain when I was on the Simvastatin, and he said that the doctor took me off it, and so…I never read the leaflets that come with tablets, so I took the leaflet out of the Simvastatin box and I read it, and it described the symptoms that I was having, so I stopped the Simvastatin, went to my own doctor, um, yesterday, and, um, she was unsure if it was the Simvastatin that's causing it.

(participant 15, >65 male)

P: I was walking up the road with my neighbour the next day and…and he said he had seen the ambulance. I said, oh that was for me. Oh right, okay. So I was telling him the story. Ah, says [name]. Um, his son has had the same thing about…a couple of weeks previous. And he had got wheeked off to the hospital as well and they diagnosed it as a…you know, you've got muscles across your…

I: Uhm-hmm.

P: …your chest area…as a virus in…in…in the muscles…

I: Yeah. Yeah.

P: …which apparently is doing the rounds. Or has been doing the rounds. And what I described to [name] was exactly the same as what his laddie had been describing, all the rest of it. So…

I: Right.

P: …um, by that time I was actually starting to feel okay, you know. So personally I…I put it down to the same virus that's obviously birring around the area here in and around Edinburgh and all the rest of it…

I: Okay.

P: Um, but that was the odd thing. I thought about it about afterwards…

I: Yeah.

P: …I was discharged without anybody actually saying…I mean, they all said,

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oh you're fine, but there wasn't a conclusion about, er, why I'd been having chest pains and palpitations and…

I: *Uhm-hmm.*

P: *…sweatiness for four or five days.*

(participant 40, >65 male)

Where participants had unanswered questions as to the cause of their pain, seeking further input from primary care was a method employed to determine a cause of symptoms.

P: *Well, you know, I'm perfectly adept at using Google.*

I: *Okay.*

P: *And I am, I had googled the symptoms of diabetes.*

I: *Right.*

P: *And things like, erm, you know, being very tired, erm, your age, your weight, you know, were risk factors. So then I went onto the Diabetes UK website...*

I: *Okay.*

P: *...and they've got a questionnaire that you can do. And, erm, then they tell you, give you advice on how to, you know, improve things. Well, I'm at risk because of my age - over sixty five - when you become at risk of everything [laughing]. According to what you get told on the news [laughing].*

I: *Uh-huh.*

P: *Dramatically, as they showed me people with Zimmers and gnarled hands [laughing]. Erm, so yeah, I, I took note of that advice, and I thought, you know, if you, even if you're at risk of diabetes, you can decrease your risk.*

I: *Yeah.*

P: *And, you know, they asked you to give your waist measurement, and I took my waist measurement for the first time in years, and I thought, oh god [laughing].*

I: *[Laughing].*

P: *No wonder I'm a sixteen, and not a fourteen anymore [laughing]. So I thought, I'm getting back down to a size fourteen, and I'm gonna lose about a stone, a stone and a half, and I will be happy, and I'm going to maintain it, so.*

I: *And is that a fairly usual thing for you to do, to look at the internet for health advice?*

P: *Oh, yeah, I've been on and looked at angina.*

I: *Yeah.*

P: So I know there's stable angina, and unstable angina. Stable angina, you know, the pain doesn't last very long. Well they reckon mine lasted for something...oh my god, I've got unstable angina [laughing], which is much more dangerous. See, a little knowledge can be a dangerous thing.

I: Yeah, yeah.

P: But I do have an appointment with my GP, on Friday morning...

I: Okay.

P: ...to discuss that blood test, which I'd asked for before, which he'd suggested before. So I will talk to him...

I: Hmm.

P: ...about that, as well.

(participant 2, >65 female)

P: To be honest, I actually felt they maybe, like, you know…they could of maybe ex…investigated the…the…the gut thing. So I went to the doctor actually and asked, and he gave…examined me and he said, it's possibly…er, it sounds like a stomach spasm…

I: Okay.

P: …and there…there's no need to do any follow up tests for that…that have…you know, so…

I: But you felt a need to go to your GP…

P: Yeah, I did.

(Participant 7, ≤65 male)

The next participant firstly uses the internet to gain information, then uses this

information to guide a consultation with his GP.

P: It's when I came home, that's when I felt, it's just not going away. And I felt when I went to see the GP that week, I said, it could be oesophageal spasms. Er, acid reflux, that sort of stuff, which again we found on the Internet, myself and my wife is a…a reason for that pain. And when I asked him, he put me on Rinotab or something.

(Participant 37, >65 male)

One lady described using an on-line support group after her chest pain

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experience. She had previously suffered chest pain due to a coronary artery dissection, a relatively uncommon occurrence. She therefore had little confidence that assessing clinicians would have encountered cases such as hers previously, and often felt frustrated at their attempts to convey their uniformed (in her point of view), clinical opinion.

P: I felt this time he kind of narrated the dismissive thing and said, it's probably not cardiac related and I'm there thinking I know I've got a pain in my chest, a squeezing pain in my chest, because he, because I said it was the left side, and he said, erm, normally in women it…there would be another symptom there.

So, I just turned my head and thought to myself, yes, okay. I know it's cardiac. [Laughs]. But, I'm now at that stage where…and I think, well I'm going down to this consultant in Leicester to do the research, I'll ask her because she has, she has seen nearly, well how many, I don't know, maybe 50 or 60 at this stage, so she'll have maybe a bit more experience…

I: Right, yes.

P: …than maybe your normal cardiologist who is only maybe getting one of me every few years.

I: Yes, yes.

P: So, erm, yes.

I: So, you left hospital with, erm…

P: A bit frustrated like I went on the group.

I: Did you, okay, yes.

P: I went on the Facebook group and said, I'm sitting in cardiology ward feeling really frustrated cardio…my own cardiologist has just told me it's probably not cardiac related, [laughs], and I got loads of replies saying, been there, done that, you know it's cardiac, we know it's cardiac, we've experienced exact same symptoms as you, you know, before your period, chest pains.

(Participant 13, ≤65 female)

On-line support groups have been shown to be empowering for those suffering illness through the mechanisms of finding recognition, sharing experiences, emotional support, and information exchange (Bruce et al, 2014, Uden-Kraan et al., 2008). On-line health tools to identify personal risk of illness, were also

mentioned during interviews and are a further example of how the internet is used in a health-related capacity post hospital assessment.

5a.5 Self-monitoring and the quantified self

The potential meaning of biomarkers, and how this may differ for patients and clinicians in the assessment of chest pain, emerged as a prominent theme in a few patient interviews. Even though this was not present in the majority of interviews, the quantification of physiological parameters dominated two accounts in particular. The meaning that biomarkers have to a clinician, often differs from the significance placed on these indictors of disease by patients, which can contribute to the continued construction of meaning attributed to the chest pain post discharge. How a person's life course is influenced by biomarkers as an indicator of disease has been studied in relation to cancer surveillance with prostate-specific antigen (PSA) and cancer antigen 125 (CA125) monitoring for prostate and ovarian cancer respectively, and human papillomavirus (HPV) testing forming part of cervical cancer screening (Bell, 2013). Whereas a clinician is able to interpret a numerical value with an objective biomedical lens, it is less likely that this information can be reduced to such a detached standpoint for the patient. Previous illness experience influences the meaning that patients may place on such results. This was particularly prominent in two patient interviews, both in men over 65 years of age who had a history of previous myocardial infarction and multiple emergency department presentations for chest pain assessment.

In the first example, the participant revealed that he had previous experience

of monitoring enzyme levels as a marker of disease progression due to his previous alcoholism, and his daughter also had cancer which he described as being monitored through various blood levels. His previous involvement with illness monitoring gave him great confidence in the objective blood test results. He then started to consider his episode of chest pain in the context of his previous, and recent, heart attack and the initial meaning afforded by the biomarker concentration appeared to change.

P: But five is, it's...what is it meant to be, is it the zero?

An interesting exchange then occurs, revealing how he constructs ideas about risk and normalcy based on his troponin concentration. For this participant, he is using his knowledge of how his previous illness experience was monitored as a model on which to base his cardiology care. Initially very confident in his blood test result, he then seems to want to use biomarker numerical values to dictate subsequent clinical decisions and treatment options. What is not possible to portray in an interview extract is the very direct, almost aggressive tone, used by the participant, as he appeared to want me to commit to a troponin level which would escalate his care to the next level.

P: So, what I'm saying is, when it goes to ten, say it goes to twenty...
I: Uh-huh.
P: ...when these, when do you give the angiogram, to find out?
I: That, that wouldn't be based on a definite number. It would based on what the numbers are doing. So if we see that they are rising, if that, in conjunction with the patient's clinical condition, tells us, oh, this person looks like something might be happening, they've got relevant risk factors, a history of what's been going on. So you'll have been asked lots of questions about the nature of your pain, and things. So it's like pieces of a jigsaw. The ECG does form one part of that, erm, so that's why they, they're keen

to look at that. So we look for signs and symptoms, the clinical condition of the patient, the ECG, and the number of the blood test, as well.

P: No, what I'm saying is, where does it, what level would it be critical for to say, right, there is something happening.

I: Yeah.

P: And I, and the only way you could find out is to put an angiogram in there.

(participant 25, >65 male)

This interview represented an instance where it was necessary to step out of the role of pure researcher and discuss clinical information. While it was the intention to keep the discussion general, the participant clearly intended to use me to discuss clinical information. This line of conversation was pursued due to the aggressive tone of the participant.

The patient is attempting to use the numerical biomarker value as a trigger to initiate more invasive testing. This visualisation of life at a technoscientific level rather than a symptom level has been termed the 'molecular gaze' (Rose, 2007). It has again been witnessed in cancer biomarker literature in relation to the development of the technoscientific identity (Sulik, 2009). This describes a phenomenon where the sense of self and therefore illness identity is firmly situated in biomedical knowledge. Rather than objectively recognising laboratory results as a piece of information, this numerical marker becomes incorporated as part of the patient identity.

This phenomenon was also seen with a second participant. He brought up the subject of troponin within the first minute of his interview, stating he suggested to the clinician: *"I presume it'll be the troponin test"*. He then stated how he interpreted the result according to his previous knowledge of normal troponin

concentrations. He goes on to talk about how he would like to be able to self-monitor his troponin at home in the same way that he monitors his blood pressure and oxygen levels. Using these numerical values, he is able to conceptualise his health status in a new way (Lupton, 2013). The monitoring equipment was used by the participant to reassure himself that any symptoms he may be suffering are not due to a 'cardiac cause'. In reality, these measures will not provide him with the diagnostic information he is searching for.

P: I try and maintain a…as healthy a lifestyle as I can, but I do check myself. I've got, um, a blood pressure machine, I use it to check weekly. Well, my wife does use it as well, and I've got an oximeter, is it an oximeter?

I: Mm-hmm.

P: For your finger, to check my oxygen levels and so on, when I feel, you know, if I feel a bit…you know, a wee bit, um, breathless or a bit tired or…and sometimes I get palpitations and I check it, and nine times out of ten it's fine. You know, I've got a ninety eight or ninety nine per cent, um, blood, um, sorry, oxygen level in the blood, and again, that's a reassurance thing.

I: Okay.

P: You know.

I: Yeah.

P: That's…it's my…my teddy bear, you know, comforter.

I: Yeah.

P: I know that sounds…it doesn't sound strange, but I…and when I'm really feeling down or…or depressed or feeling ill, I'm prone to check it two or three times a day, and I'm saying, what am I doing that for, it's fine, just…you know, and the more you worry about it, it can increase your heart rate or, you know, you get…'cos I check my…'cos it feels as if I've got my heart racing, and I'll check it and my pulse is seventy four or seventy five, nothing wrong with that, and my, um, oxygen levels, as I say, it's normally ninety eight per cent, which for my history is fine, you know.

I: Mm.

P: Um, and the blood pressure again sometimes, it can be up a wee bit, but I take medication for it, and the doctors have told me I'm within normal, um, parameters, um, for my age and my previous history, but again that's…these are maybe just something I go to for reassurance. Oh, feeling a bit down today, I'm feeling a bit sore or I'm a bit breathless or I've overdone it, I'd better check, you know.

(participant 29, >65 male)

This is a further example of how the single rule-out of myocardial infarction by a clinician is not interpreted as an isolated event by the patient. In the face of uncertainty, the influence of information gained from biomarkers and other numerical sources may be intensified. Tracking numbers may be employed as a method to manage uncertainty (Gillespie, 2012). Development of a technoscientific identity (Lupton, 2013), is a method used by some patients to take control of their lives in the face of biomedical uncertainty. Amongst the complexity of information offered to a patient during a medical consultation, the basic language of numbers may help provide clarity to an uncertain situation. Other tests results, such as ECGs, X-rays or scans require specialist interpretation, but numeric data can be broadly categorised as higher numbers being more risky than low numbers. This represents concrete information that a patient can relate to. The accounts of the two participants discussed were particularly striking in the relevance that numerical information had in relation to their health. While others also made reference to blood pressure monitoring, the salience that these monitoring activities held for other participants appeared less pronounced.

5a.6 Limitations

As is always the case with research studies, the data collected can only represent the views of those participants consenting to take part in the study. It has previously been highlighted that the interview data analysed as part of this study is likely to reflect the views of participants with on-going care needs.

From the 143 patients screened, 40 either declined to participate, did not return phone calls, or were not available at the scheduled interview time. It is possible that these patients had no on-going concerns so saw little value in being involved with the study, though the potential reasons for non-participation can only be speculated upon. While acknowledging that the study population may represent those that are more concerned about their heart, it is these very patients that require our continued support.

5a.7 Summary and discussion

The diagram below summarises the range of responses appearing in interviews that emerged as significant surrounding the chest pain assessment process.
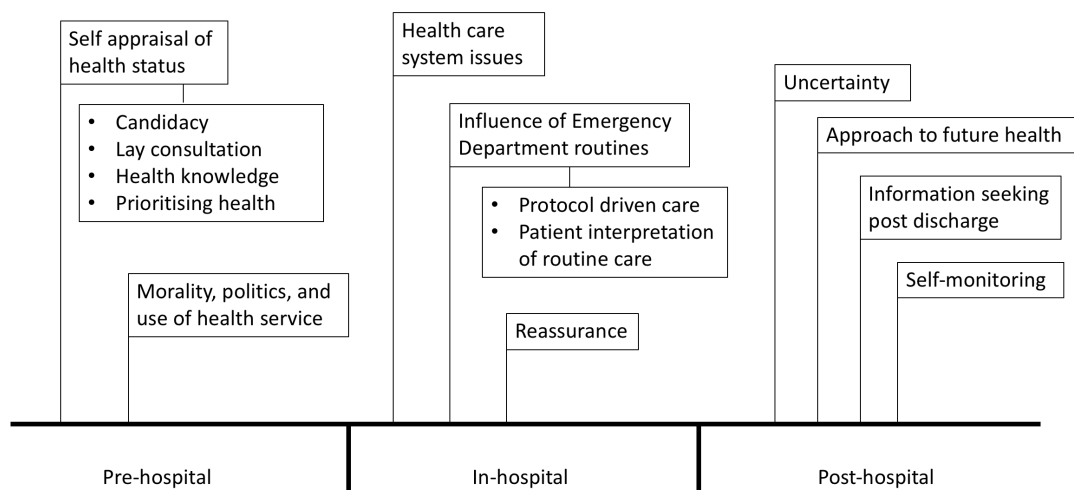
Figure 9 Phased illness episode

This chapter has shown how consideration of personal illness accounts can challenge the privileged status of medical narratives. Objective medical narratives may fail to realise the wider impact that assessment practices may have on a patient population. In order to deliver individualised patient care when assessing a patient with suspected acute coronary syndrome, it is necessary for clinicians to be aware of how patients experience and interpret this ill health episode.

5a.7.1 Designing care pathways to meet patient need

The early rule-out pathway is aiming to achieve a difficult goal; to marry an evidence-based guideline approach to chest pain assessment, incorporating

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rapid through put of patients, with the complexities of individualised patient care. The underlying fundamentals of the pathway facilitate rapid assessment of chest pain patients. There is also potential for this process to be accelerated even more with the advent of 'point of care' testing in the clinic. Current assays involve a blood draw, transfer to central laboratories, and centrifugation to prepare the sample for testing. In our centre the mean time from blood draw to result is 76 minutes. Point of care technology will remove laboratory sample transfer and processing time from the assessment process by using whole blood tested in the clinical setting (Pickering et al., 2018). Regardless of the speed of assessment process, the root cause of the patient presentation remains the same, and patients must process the same illness experience despite advances in assay technology.

The early rule-out of myocardial infarction must therefore be performed with an appreciation of the lay and professional work that has contributed to the patient's presentation at the Emergency Department. Considering the pathway as exterior to the context in which patients experience their symptoms does not allow for such an understanding. Interview participants explained the differing pathways that led them to seek assessment in the Emergency Department. Firstly, these included contact with NHS 24. Determining the most appropriate course of action requires an individual to be able to interpret their symptoms, a personal assessment which is heavily influenced by previous illness episodes. NHS 24 was introduced as a gateway to the NHS to help people negotiate the healthcare system and determine the most appropriate

course of action in how to seek care or manage symptoms. During the triage process not only does the patient have to make that assessment and make the call, the call handler and any clinician involved has to follow clear protocols. In the case of chest pain this involves the use of algorithms assessing the pain description given by the patient, precipitating and relieving factors, and duration of symptoms aiming to determine if the cause could be a serious medical event such as myocardial infarction. Due to the potentially serious nature of a chest pain presentation, for many patients the algorithm results in a directive to attend the Emergency Department for assessment either independently, or by an ambulance. These actions may have an impact on how the patients perceives their symptoms.

An alternative avenue for assessment of symptoms is the GP – either through a phone call or face to face appointment. This chapter has already detailed how GP algorithms for chest pain assessment direct a patient towards attendance at the Emergency Department, often with the GP receptionist as the point of contact. If assessment is performed by a GP, then following the 'Chest pain of recent onset' guideline (NICE, 2010) again promotes referral to hospital with chest pain lasting longer than 15 minutes. The evaluation of acute chest pain is challenging. No clinical feature in isolation is useful in ruling in or excluding an acute coronary syndrome, therefore if a GP suspects an acute coronary syndrome, then Emergency Department assessment is justified (Mant et al., 2004). It appears that within a community setting, once a patient has engaged with the NHS, all roads lead to the Emergency Department for

further assessment.

Patients with known coronary disease may experience chest pain as part of a stable angina presentation, or as an acute coronary event (or indeed from an unrelated non-cardiac cause). Aiming to differentiate between these different presentations was a challenging task for some participants in this study. After being diagnosed with angina or suffering a previous myocardial infarction, patients receive instructions on how to manage future episodes of chest pain. Some participants described how they made reference to this material and followed the guidelines on experiencing their chest pain. The British Heart Foundation issue self-management advice detailing a three step process; 1) stop what you are doing and rest, 2) take glycerine trinitrate medication; if pain does not ease within a few minutes take a second dose, 3) if pain does not ease within a few minutes of the second dose, call 999 immediately (BHF, 2017). Again, the patient is directed to the Emergency Department. A final source of self-assessment information discussed by participants was on-line information, with the NHS symptom checker considered to be a reputable source of information. While the information reiterates that chest pain can have many causes, it states that if a patient has severe pain, the pain feels heavy, pressing, or tight, or it lasts longer then 15 minutes, then the course of action should be to phone 999 immediately. From the work carried out as part of this thesis investigating chest pain characteristics of men and women with myocardial infraction (chapter 6), specific descriptors of chest pain did not provide prognostic information. This has also been confirmed by other studies

(Rubini Gimenez et al., 2014, Swap and Nagurney, 2005, Goodacre et al., 2009). Additionally, pain descriptors of heavy and tight as suggested by the symptom checker, were the most common descriptors used by patients to describe chest pain, whether or not that pain was caused by myocardial infarction.

Determining the appropriate course of action in response to an episode of chest pain is a complex and skilled activity. Engagement with the NHS appears to direct the patient to attend the Emergency Department for further assessment, as does self-help information. Layered on top of that is advice from lay referral networks which participants also described as a point of consultation, supporting the patient to make the decision to attend the Emergency Department. Using the early rule-out pathway, a clinician is able to quickly label a patient as low risk of a cardiovascular event and suitable for discharge. For the patient, this may appear at odds with the consultation up to this point, which has deemed their symptoms as potentially serious requiring assessment by qualified personnel in an Emergency Department setting. When the rule-out of myocardial infarction has been confirmed, clinicians must be aware of the work of symptom appraisal that the patient has performed prior to attendance at hospital, and recognise how this may impact the on-going personal interpretation of the illness episode.

A perception exists in the Emergency Department that some patients could be appropriately assessed and cared for in a primary care environment (Cook et

al., 2010). A clinical episode may appear to be minor in nature when looking at it from a single angle, but when considered in its entirety, the degree of 'appropriateness' may alter. Depending on the condition being managed (for example a single episode of chest pain, versus chest pain following a previous myocardial infarction and cardiac arrest), the patient's understanding of their condition and needs, along with the pairing of required resources and availability in primary care versus the Emergency Department, the meaning attached to the illness episode by all parties may change (Bezzina et al., 2005). Regardless of the clinical acuity of the presentation, patient perception and individual circumstances determine whether Emergency Department services are accessed (Bezzina et al., 2005) as well as how they are experienced.

Redesigning aspects of emergency care requires an understanding of the presenting patterns and clinical needs of patients using the service. Drivers for the comprehensive delivery of emergency care include a focus on quality and patient experience (Bell and Mason, 2010). Therefore, in developing new diagnostic technologies, an opportunity exists to develop a pathway that satisfies the demands of the healthcare system, and has a true patient focus. As the demand for assessment in the Emergency Department continues to rise, the challenge of meeting this demand in a patient centred way grows. It has previously been suggested, that rather than labelling patients as inappropriate attenders to the Emergency Department, it is more helpful to understand why patients are attending, and adapt the service to the needs identified (Salisbury and Coulter, 2010). The rule-out of myocardial infarction

becomes more challenging when patients have been encouraged to attend the Emergency Department, or for some, perceive their symptoms to be sufficiently worrying to make the decision to attend independently. The early rule-out pathway is in an ideal position to use novel technologies in a patient centred way, to allow the rapid, comprehensive assessment of patients with chest pain.

This study has highlighted that for some patients, their chest pain experience extends beyond the hospital episode therefore need for an intervention to support patients post discharge has been identified. Prior attempts at designing an intervention may be improved by the results of this research. A previous group devised an information sheet that was tested against verbal information received from clinicians responsible for chest pain assessment in the Emergency Department (Arnold et al., 2009). The information sheet was associated with decreased anxiety and depression scores when compared to the control group but did not have any effect on satisfaction of care, prevalence or severity of subsequent episodes of chest pain, the number of patients attempting lifestyle change, information seeking from other sources post discharge, or planned action in the event of recurrent chest pain. Crucially, this intervention was delivered after diagnostic assessment was complete. This thesis has highlighted the importance of pre-test information therefore such an intervention may be improved with more appropriate timing of delivery. Another group created an anxiety reduction intervention for patients attending the Emergency Department with non-cardiac chest pain and elevated levels of

anxiety (Webster et al., 2017). A study exploring acceptability of this self-help intervention was largely positive but the intervention was limited to those with a diagnosis of non-cardiac chest pain, elevated anxiety levels and no known coronary artery disease. Patients with known coronary artery disease may of course experience an episode of non-cardiac chest pain therefore the application of this intervention is limited. Rather than a chest pain information leaflet given at the point of discharge, this research points to a more appropriate intervention being a 'chest pain journey' leaflet given to patients on admission providing an outline of diagnostic testing that is likely to be performed, the meaning attached to these results, and the likely subsequent action based on these results. Provision of a leaflet does not of course replace interaction with a clinician and all the associated benefits of that communication.

Chapter 5b

Findings: The development of reassurance

5b.1 Introduction

This chapter offers an analysis of the theme '*reassurance'* that suffused the interviews. Along with receiving a diagnosis, feeling reassured has previously been reported as one of the most common ways Emergency Department clinicians can make a patient feel better (Body et al., 2015). Before the main analysis of this theme, the concept of reassurance will be explored.

In an attempt to conceptualise reassurance in the context of a medical consultation, reassurance has been described as an interaction between a concerned patient and a care giver, with the intention to reduce worry. The aim of this interaction is to change the understanding, thoughts, and behaviour of the patient (Linton et al., 2008). Current models of medical reassurance have stemmed from the work of Coia and Morely (Coia and Morley, 1998). According to this model, reassurance is categorised into affective (creating rapport and showing empathy), and cognitive (information giving and educational) components. The provision of affective reassurance aims to show the patient they are understood and cared for, while the cognitive element aims to change patient knowledge and understanding through education. Reassurance is a central part of the consultation in the Emergency Department, signified by the common entry on the patient record stating "reassurance given". The very term reassurance given implies that reassurance can be packaged and delivered to the patient. In practice, the reassurance provided by clinicians is often ineffective in reducing patients' concern about their symptoms (Petrie et al., 2007). The data arising from participant interviews in this thesis suggests that reassurance is more of a

process that has to be built atop certain foundations laid during the clinical assessment.

Affective and cognitive domains remain significant components of reassurance in more recent models (Pincus et al., 2013). A 'data gathering' phase has also been recognised as important. This phase describes how clinicians explore symptoms, and elicit concerns and feelings, along with illness perceptions and expectations jointly with the patient. When developing a measure of medical consultation-based reassurance, Holt and Pincus (Holt and Pincus, 2016) were also able to map on to the fundamental components identified by Coia and Morely of affective and cognitive reassurance, but recognised four domains central to the process: data gathering, relationship building, generic reassurance, and cognitive reassurance.
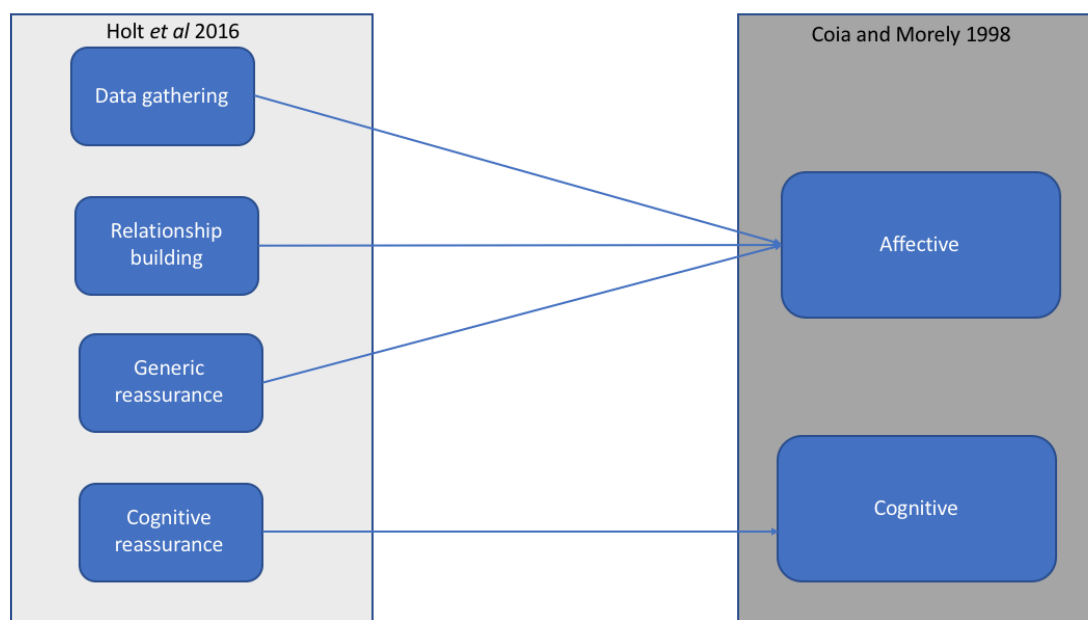
Figure 10   Relationship between two models of reassurance

In an attempt to reliably measure the process of reassurance, a numerical scale has been developed demonstrated in figure 10 (Holt and Pincus, 2016).

The questions below are posed to the patient in order to numerically evaluate reassurance as percieved by the patient.

Data gathering subscale To what extent did the clinician…	Encourage you to voice your concerns regarding your symptoms?
	Listen attentively while you were talking?
	Summarise what you had told them?
Relationship building subscale To what extent did the clinician…	Show a genuine interest in your problem?
	Put you at ease?
	Show that he/she understood your concerns?
Generic reassurance subscale To what extent did the clinician…	Tell you that you should not be worried?
	Tell you that everything will be fine?
	Reassure you that he/she has no serious concerns about your back?
Cognitive reassurance subscale To what extent did the clinician…	Explain how the treatment offered would help your problem?
	Make sure you understood what your treatment plan involves?
	Check that you understood the explanation he/she gave you for your symptoms?

(Holt and Pincus, 2016)

Figure 11   Reassurance questionnaire

This scale was developed for particular use during primary care consultations for lower back pain. Analysis of the concept of reassurance uncovered from participant accounts from within this thesis can also be matched to these four domains. In addition, the factor of 'timing of information giving' was identified as important in the process of reassurance development.

5b.2 Implicit and explicit reassurance

The patient search for reassurance was first uncovered as a tacit theme. As the interviews were of a semi-structured nature it was unusual for participants to talk in explicit terms such as "I felt reassured because…", therefore, it was necessary to mine the patient accounts with a lens specifically focusing on factors contributing to reassurance. As the theme of reassurance became apparent, participants were asked to talk more about how reassurance develops. Where it was mentioned explicitly, participants were probed further with comments such as: "*It's interesting you mentioned the word reassurance there, can you tell me a bit more about that.*" Since reassurance was not always an explicit concept, the data had to be put to work in order to characterise it. Below are examples of narratives that do not contain explicit references to reassurance, but where it was interpreted as implicitly displayed.

P: The most important thing to know was there wasn't a heart issue, and that was made very clear to me.

P: I feel quite confident about my heart now because of the tests. I've no concerns about my heart.

P: I got it checked out and it wasn't a heart attack so that was good. That's fine. That's dealt with.

P: Once I was discharged with a clean bill, I parked it.

P: There was absolutely no damage to my heart.

When aiming to characterise reassurance, the code of 'completed interaction' was applied to these segments of text. The healthcare encounter had come to an end, and participants were talking in positive ways about their heart. This

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aligns with the definition of reassurance given earlier, with the aim being to 'change understanding, thoughts and behaviour' of the patient (Linton et al., 2008). Interestingly, when attempting to find common elements between the accounts of patients who did display such reassurance, common categories among patient demographics or past medical history were not evident. Evidence of both patient and healthcare system factors which contributed to the development of reassurance however were found. Accounts indicating reassurance showed evidence of the some of the following factors:

1) The patient had a very low level of concern that their symptoms were cardiac in nature.

2) An alternative diagnosis was offered (with the caveat that this diagnosis had to seem plausible to the patient).

3) Outpatient follow up investigations were arranged therefore the patient would receive on-going care.

In this case the care episode has not been completed, but the patient was still actively under consultation until discharged from outpatient investigations. Whether reassurance was achieved on completion of these investigations is unknown as interviews occurred before this time point.

5b.3 The role of diagnosis

Receiving a diagnosis, or gaining an understanding of the cause of symptoms, are principal expectations of patients attending the Emergency Department for assessment (Body et al., 2015, Vaillancourt et al., 2017). The reality appears to be that many patients are simply informed that no serious cause to their pain

episode has been found. This non-committal categorisation can leave patients feeling discarded.

P: I felt as though nobody had done anything to help. I was right, you can go out, you can go home. Nobody had helped me because I felt the same as how I felt when I went in.
(participant 39, >65 female)

P: I suppose, my situation there isn't…you know, when I read the discharge letter the information is there but there's nothing saying what was wrong.
I: Yeah.
P: So it's just that frustration again of, there's not actually been, I suppose, a diagnosis as such, just apart from the fact I had chest pain [laughs]…
I: Yeah.
P: …um, and that my troponin came back negative, which is good. Um [pause] but, yeah, that's just part and parcel of the condition, I suppose. So…
I: Mm hmm.
P: …yeah.
(participant 13, ≤65 female)

P: The consultant explained that, from the blood tests, that it, you know, they could confirm that it wasn't any form of heart attack. They thought that it possibly was something called esophageal, erm...
I: Yeah, esophageal spasm.
P: ...spasm.
I: Yeah.
P: Erm, but they couldn't confirm that for sure. And I suppose, that was the only thing that I...I think everybody wants some...something to grab onto. Erm, even though they'd said it wasn't a heart attack. And then I asked them, what if I had a similar attack, what should I do?
(participant 33, ≤65 female)

P: I think maybe they've missed something because the hospitals are that busy an, er, one of the machines wasnae working right, the ECG machine… They were nae really sure as I say, they said the ECG come back clear, the blood came back clear, but they think it's this spasm, but it, they never really said it is, it's definitely not a heart attack and it is definitely the spasm, so, I don't know where I am."
(participant 44, ≤65 female)

Data from participant interviews concords with previous findings that patients felt they left hospital in the same way as they arrived and so were concerned about inadequate testing or a missed diagnosis (Agard et al., 2005). When dealing with medical symptoms, closure and certainty and sought. The absence of these factors due to not receiving a diagnosis renders the 'uncertain' situation difficult to manage (Nettleton, 2006). In addition, perhaps more relevant to those with repeated attendances for chest pain, issues regarding legitimacy of symptoms both within the medical community and in wider society is also evident (Nettleton, 2006).

P: There's been once or twice where again in ward, I've had…see a consultant or a cardiac doctor and registrar whatever, and they're very blasé, or very, doesn't sound cardiac. But, then when I see my own consultant…there, there's an awful lot of times I've felt like I've been doubting myself, am I imagining all this?
(participant 16, ≤65 female)

Much of the literature on the sociology of diagnosis has focused on contested conditions for groups of medically unexplained symptoms (Rhodes et al., 1999, Cooper, 1997, Hyden and Sachs, 1998). Sufferers of such conditions are aiming to legitimise them with a named diagnosis. Society does not readily tolerate illness in the absence of a recognised disease (Nettleton, 2006). The patient group in the study population of this thesis may fall into this category of experiencing symptoms not attributed to a named disease state, but an additional category also exists. Uncertainty not only arises due to living with a possible unnamed condition, but also results when the focus of medical assessment is aimed at the rule-out of a serious condition such as myocardial infarction without identification of a specific cause of symptoms. With the lack

of a named diagnosis, some patients are unable to assess their current health status and how this may relate to their future health.

P: There's all those sort of unfinished bits so it'll be interesting. So what I want to say is, right, I'm gonnae go back exercising; is that okay.

I: Yeah.

P: Because I…I…I know that I don't exercise enough so…

I: Right.

P: …yeah, I think I've dealt with that but I want to…I'm gonnae…I'm now going to put my GP under more pressure to find out, what's the underlying cause, what's the other cause…

I: Yes, okay.

P: …because it's…it's, um, it's…it's…it's…whatever it is isn't going away, you know. It's…I'm just waiting. It's just gonnae build up and happen again at some point would be my mind-set just now, um, but instead of coming this way I think I would go that way towards the GP…

I: Right.

P: …and get a…get an urgent appointment with the GP the next time…

I: Okay, yeah.

P: …as opposed to coming…coming here, because I don't think it's something that's gonnae…it's gonnae knock me out so to speak. I think it's something that just [pause] needs to be understood, eh, and explained.

(participant 41, ≤65 male)

Providing a diagnosis allows the patient to name the source of discomfort and validate what they are feeling (Nettleton, 2013). This also enables patients to plan a trajectory of their illness, and develop a plan for self-care or further medical care if necessary (Jutel and Nettleton, 2011). The lingering uncertainty evident in the examples given above (*"I don't know where I am, what if I had a similar attack, what should I do?"*) shows how the absence of diagnosis may act as a barrier to being able to determine an appropriate course of action in the future. As medicine has become more technologically advanced, diagnostic certainty from a patient point of view may seem more achievable.

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The resulting uncertainty that is felt when a diagnosis is unable to be offered maybe more difficult to tolerate in an era of advanced medical practice (Crawford, 2004).

Where an alternative explanation of the pain was offered, but did not seem plausible to the patient, reassurance was not demonstrated. The patient was left with an ongoing unresolved illness experience. One participant was informed his arm pain was likely due to a trapped nerve. As the patient was not aware of any investigations having been carried out to confirm this suspicion, he thought this diagnosis was unlikely. Through lay communication and consultation, he concluded that the source of his symptoms was related to statin medication. His resulting action was to independently stop this medication without medical advice.

5b.4 Discord

Patient accounts revealed that a medical consultation may conclude for the clinician with the negative evaluation for acute coronary syndrome and a perception that reassurance had been given (signified by the decision to discharge a patient). Conversely, for some patients, their illness episode was still very much ongoing at the time of subsequent interview. A discord was found to exist between the objective interpretation of a troponin value by the clinician, and the significance that result holds with the patient in the context of their illness experience. Where the pathway, driven by the high negative predictive value of a low troponin concentration reassured the clinician that the

patient did not warrant further investigation, for some patients, this reassurance was not felt, despite clinical notes stating that reassurance had been given. Here, the concept of reassurance appears to rely solely on the cognitive domain of providing education and information about the absence of a diagnosis of myocardial infarction. It could be argued that this information is serving to reassure the clinician that the patient is not having a myocardial infarction. The idea of discord was evident in both arms of the study, and so was not determined by the pathway itself. Neither was it present in all participants. Previous examples have been provided of participants relaying in very definite terms that their presenting symptoms were not due to a heart attack. Where discord was evident, reassurance appeared much more difficult to achieve. This is displayed by the following extract of interview transcript detailing the conversation about why this participant had not felt able to go out in the period between hospital discharge and the interview taking place.

I: So you were saying you've not been out.
P: No.
I: Now what…I'm…I'm not saying you should…
P: No.
I: …but I just want to explore the reason why you don't feel you can go out.
P: I just thought…I think…I just thought I got such a fright, really…
I: Okay.
P: …you know. 'Cause I'm no usually like that, although…but I just felt…and I think 'cause it was a nice week, well I was sitting in the garden and that…
I: Lovely. Yeah.
P: …so, um…
I: Uhm-hmm.
P: But I just, um…I don't…I think I really got such a fright.
I: Okay.
P: 'Cause I've never had anything like that before and I think it was, kind of,

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frightening, like, you know.

I: And what were you worried about? What was frightening you?

P: I don't know if I still thought I could see me having a heart attack…

I: Right.

P: …I really don't know, like, you know, but you do hear people saying, oh it was just indigestion…

I: Uhm-hmm.

P: …you know, and [laugh]…then they're no here anymore, like…

I: Yeah.

P: …you know.

I: Yeah.

P: So, um, I just…I think with my parents having…

I: Yeah.

P: …both heart trouble and all that, you know. 'Cause well my dad, he got the…well he'd got the triple bypass which…well he was really ill, but he…he got through that and then, um, he got, um, the balloon up…

I: Yes. Yeah.

P: …and, um, it was a success, but he died two days later because the balloon…the dye that they put in to thingmy went in to all his system…

I: [Yeah 16:50].

P: …and he died.

I: Oh gosh.

P: And then…and…and when he came out the ward…he was quite happy, he says, oh they've done it. I says, oh that's great. And then he died.

I: Mm.

P: Got a phone call two days' later that he'd died.

(participant 5, >65 female)

This lady is unable to objectively evaluate her low troponin level in the same way that the clinician can. She was aware that this test result would determine if a heart attack was the cause of her symptoms, but the above extract reveals that she still has concerns that she could go on to suffer a heart attack. The low troponin test result has not reassured her.

I: So they told you in hospital that you hadn't had a heart attack…

P: Uhm-hmm.

I: Do you know how they came to that conclusion at all?

P: The final blood test that I waited for. They said that…that's the final one that we tell them if it'd had been a heart attack. She says, that's…we have to give you that one and that was the one I was…it was supposed to be half nine, but as I says, she came about ten past nine…

I: Yeah.

P: …'cause there's supposed to be 12 hours…

I: That's right, yeah.

P: …'cause of my age, it was 12 hours difference.

(participant 5, >65 female)

Additional accounts also gave clues as to other processes that may also be occurring in relation to reassurance. As this theme was emerging as significant, participants were asked to talk more about how reassurance develops. This line of conversation revealed that reassurance was gained from the biochemical testing that patients received as part of their assessment in the Emergency Department, and also from the clinician assessing the patient. The following section will go on the describe the role of test results in promoting reassurance as experienced by the participants, followed by the role of the clinician in that process.

5b.5 Role of test results in reassurance

The provision of test results can be viewed as an example of cognitive reassurance and can be mapped onto the models previously proposed (Coia and Morely, 1998, Pincus et al., 2013). Below are extracts from participant interviews provided as evidence for patients finding reassurance in biochemical test results.

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P: When, when they took...things amaze you in, in life. And to be able to take something from a blood sample to determine that your heart's not affected..

I: Hmm.

P: ...is, I sometimes cannae get my head round things like that. But that's amazing, you know. So to be able to take a blood sample, take something out of the blood sample, and tell you that your heart has not been affected, is, is amazing."

(participant 11, ≤65 male)

P: I suppose I know that if there's…I know the troponin will show up if there's any…if there's been any damage to my heart, erm, since I started getting those pains. Erm, so yes, that's my understanding of the test and that's, I kind of think okay, I'm fine, I haven't had another heart attack

(participant 13, ≤65 female)

P: The troponin was, was clear. And so that meant I…there was no damage, and I hadn't had a heart attack, which was…that, that in itself was quite reassuring.

(participant 3, >65 female)

Taken as direct extracts of dialogue, these patients appear reassured by their troponin result. Deeper analysis of the transcripts reveals slightly different stories. The first participant goes on to state *"It wasn't a heart attack this time, will there be a next time?"* and further on *"I was happy I didn't suffer a heart attack, but I knew there was something wrong. There's still something there."* This participant is articulating that the chest pain pathway only assesses the patient in the context of this one acute episode of chest pain. It does not inform the patient of their future risk of myocardial infarction. A phenomenon explored in the next chapter is the patient's desire to site this episode of chest pain in the context of their longer-term health. In the second example below, the participant confirms her trust that an elevated troponin will signify if there has

been any damage to her heart, and uses this result to affirm to herself that her symptoms were not due to another heart attack.

P: That's my understanding of the test and that's, I kind of think okay, I'm fine, I haven't had another heart attack.
(participant 13, ≤65 female)

Due to a previous undiagnosed heart attack with unusual aetiology, she now feels better equipped than the clinicians to appraise her symptoms and her troponin result. She first evaluates her symptoms against her previous knowledge and interprets the troponin test accordingly. This participant does have confidence that a heart attack has been ruled out but still believes her pain has a cardiac origin.

P: I'm the one who's had a heart attack, I know when there's something cardiac wrong with me.
(participant 13, ≤65 female)

The potential reassuring value of diagnostic tests has been the subject of previous research. Studies scoring reassurance with objective outcome measures (illness concern, anxiety, change in original symptoms and subsequent hospital visits) found normal test results did not reduce patient worry about their symptoms when compared to patients who did not undergo diagnostic testing (Petrie and Sherrif, 2014). Systematic reviews of randomised controlled trials studying the efficacy of diagnostic test results in promoting reassurance (including ECG's and laboratory tests as are

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appropriate to the focus of this research) also concluded that reassurance was not achieved by the provision of normal test results (van Ravesteijn et al., 2012, Rolfe and Burton, 2013). The perception among clinical practitioners that patients will simply be reassured by diagnostic testing is therefore inconsistent with the patients' experience. This is demonstrated in the following extracts.

P: And as the day went on, I think when I got more tests, and things done, and they were coming back saying, the ECG was fine, I could feel myself coming back down again. But from then, until now, I still feel, I can't expand my lungs properly. And I can take a deep breath in, but it just doesn't feel like my lungs are full capacity. I still have this kind of heaviness. But I've now felt some palpitations.

I: Right.

P: So, I don't know. As I said, everything's come back from the hospital, fine. I don't know if it's a stress, anxiety, panic attack, or not. But yes, at the back of your mind, you're always thinking, is this my heart, am I gonna have a heart attack.

I: Yeah, yeah

P: And I work, erm, well I have two jobs. My second job is a trainee funeral director. So, in the past wee while, I've seen a lot of younger people, even younger than me...

I: I see.

P: ...coming in, and died of a heart attack.

(participant 48, ≤65 female)

I: So what about the use of blood tests to help guide our clinical decisions, how do you feel about those?

P: Well, if they work, brilliant.

I: Right.

P: If they don't work, then…if, if they…okay, if you're having a heart attack or a, or have had a heart attack or about to have a heart attack, I assume that, that that blood test that we're talking about, that will show up as a…it'll show whatever enzyme, whatever it is is released, um, so that's good.

I: Mm-hm.

P: But if, if, if it doesn't show up the other things, then [pause] it's, it's not, it's not, it's not, it's not good.

I: What do you mean, the other things?

P: If, if, if there's something else going on…

I: Right.

P: …if there's something else going on with your heart, clearly it doesn't show up…

I: Right.

P: …that there was a blockage…

I: Okay.

P: …um…

I: Yeah.

P: …but I don't suppose there's an awful lot you can do that without taking the next step, and I, I would imagine an angiogram is, is expensive to do and all the rest of it.

(Participant 38, ≤65 male)

The role of cognitive reassurance is to change patient knowledge through education and understanding. This domain has been argued to be the main component of reassurance demonstrating improved outcomes immediately following consultation and at follow up (Pincus et al., 2013). When educational information is delivered in a stand-alone format, evidence from participant accounts reveals that cognitive reassurance in isolation does not correlate with patient perception of feeling reassured. This may be because the elements that form cognitive reassurance are difficult to achieve in the Emergency Department setting. Cognitive reassurance is assessed by patient responses to the three questions (Holt and Pincus, 2016):

To what extent did the physician….

1) Explain how the treatment offered could help with your problem?

2) Make sure you understood what your treatment plan involved?

3) Check you understood the explanations he/she gave for your symptoms?

In the assessment of acute chest pain, emphasis is currently focused on rule-out or rule-in of myocardial infarction. Where myocardial infarction is ruled-out, many patients are left in a state of uncertainty as to the cause of their symptoms therefore cognitive reassurance is unlikely to be achieved.

P: And I just feel that, erm, possibly they didn't investigate what the cause could have been.
I: Yes.
P: Once they'd established that it wasn't a heart attack, there was no…they didn't seem to be, well, why are you having this pain?
I: Mmhmm, yeah.
P: It was almost as if the Royal, I suppose, saying, well, the Western will find out tomorrow why you're having pain, sort of thing.
I: Okay.
P: Because they didn't and I now suspect that I was cooking something.
(participant 34, >65 female)

The state of reassurance felt by patients goes beyond the cognitive understanding of the explanation of symptoms. Where care is focused on rule-out of a serious condition, the continuing presence of symptoms makes it harder to manage patient concern (Vaillancourt et al., 2017). In addition, many patients do not experience their chest pain as an encapsulated episode, but as part of a bigger health and illness experience. Their cognitive understanding of test results is therefore shaped by previous illness experience. For these patients, the dominance of the cognitive element may not facilitate the development of reassurance as it does not acknowledge the personal background against which these results are being interpreted by the patient.

P: Erm, I was in, erm, the Royal last week.

I: Uh-huh.

P: Because I thought I was having a heart attack.

I: Yeah.

P: And I demanded to get a blood test.

I: Okay.

P: I demanded. They kept saying, no, we'll give you an ECG, I says, I'm not wanting them.

I: Okay.

P: I demanded, I wanted, I wanted them to...so it was at five, that's how I got the...

I: Yeah, yeah.

P: ...the, it was just last week. It was at five, and, erm, they says, right, we'll leave you a couple of hours, and we'll take another test. And if it goes above five...

I: Yeah.

P: ...we'll keep you in. They done another test, come back, they says, no, you're still at five. So, I'm reassured with the blood test.

I: Okay, that's interesting, then. So tell me about that, then, what, what makes you feel happier with that blood test?

P: Because when they...it was the Irish doctor, the cardiac, he came in and spoke to me. And erm, the, the Chinese lassie...

I: Uh-huh.

P: ...she says, your blood test was in the two thousands, [referring to previous heart attack] the, erm, what do you call it, the, the enzymes, and all that.

I: Yeah, yeah.

P: She says it was in, that's high, she says, but five is, you're way, way, way low. So that reassures me. Because with your blood, she explained to me, if it goes that high, we know you're having a heart attack.

I: Uh-huh.

P: But five is, it's...what is it meant to be, is it the zero?

(participant 25, ≤65 male)

This man clearly sites this episode of chest pain within the context of his previous heart attack, where signs of ischaemia were not evident on the ECG. He therefore refused to have any form of ECG monitoring in the Emergency Department claiming not to put any faith in an ECG machine. Conversely, he relates monitoring of enzyme levels and blood components to previous

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healthcare encounters for both himself and his daughter. He is interpreting the educational information given to him about this episode against the background of his own personal experience.

P: Well, all the, see, all the reason I know about the blood is, my daughter had cancer.
I: Oh, okay.
P: And she, erm, with her platelets, and the enzymes, and all that, because of the chemotherapy.
I: Right.
P: That's how I know about that. And my liver, with me being, like, a drinker. And they would tell me my enzyme, my enzymes are high, because of drinking, and I need to stop drinking. That's why I can trust the, when somebody says, your blood, it's, they're knowing what's in your blood. It tells you everything...
I: Yeah.
P: ...if your plates...platelets are low, and your, erm, your white blood cells, your haemoglobin, and all that. That's why I trust a, a blood test.
(participant 25, ≤65 male)

Interestingly, while he explicitly states he is reassured by the blood test, this extract finishes with him questioning the meaning of his test results. The numerical value attributed to his troponin test suffused this interview, culminating in him asking what value his troponin would have to reach in order to receive an angiogram. The explicit reference he made to cognitive reassurance is again not displayed implicitly in the account. This man experiences his chest pain as an on-going situation, not achieving the 'completed interaction' status necessary for reassurance to develop.

5b.6 Timing

5b.6.1 Timing of test results

The main patient-related change following introduction of the early rule-out pathway was the length of time between presentation to the emergency department and delivery of confirmatory diagnostic test results. This may have significance, as the time spent waiting for results has been seen as a time when concerns for health may increase. This may be relevant to how some patients felt when they were admitted to a ward to wait for further troponin testing at 12 hours post-symptom onset, as was required with previous pathways for troponin testing. This is demonstrated by the following extract:

P: When, when I got moved out of the A&E, I was slightly concerned. Because I thought, if I'm having to go onto a ward, why am I, why am I here longer?
(participant 11, ≤65 male)

During this waiting period, patients may develop more firm beliefs about their illness (Nijher et al., 2001). A further extract shows how one participant felt he had benefitted from the prompt delivery of results from the early rule-out pathway.

I: So I think it's building up that sort of knowledge and…and confidence, but I also think contemporaneous to the event, whereas you go and you have…you have a…you've had the scan and you wait several weeks…
I: Yeah.
P: …to get their letter, and the letter was a little bit vague, whereas the doctor said, we've done the test, it's zero, brilliant. Oh, we need to do it again. We done it again, it's zero, it's brilliant. And it…it…it's a build-up of that.
(participant 41, ≤65 male)

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It is possible that the direct relationship between development of reassurance and being admitted to a ward for further troponin testing, could be evaluated using objective numerical scales in addition to qualitative enquiry. This would have provided an interesting correlation, though it is questionable whether objective scales can reliably measure reassurance, given that it is part of a process and not a one-off measure. The fact that lack of reassurance was observed both in patients admitted for repeat testing with the previous pathway and those discharge directly from the Emergency Department with the new pathway, suggests there are other factors than prompt delivery of results involved.

5b.6.2 Timing of information giving

Having established implicit references to reassurance implied by the notion of a completed healthcare interaction, these references were then used to search for commonalities between accounts. In addition to the actions of data gathering, relationship building, providing generic reassurance and cognitive reassurance (Holt and Pincus, 2016), the timing of information giving about the meaning of normal test results may be important in facilitating the development of reassurance. Interrogation of the accounts of patients that were interpreted as displaying reassurance, revealed that these participants made reference to receiving pre-test information about troponin testing.

P: Erm, went into hospital, and the, they...obviously, they were constantly taking my blood pressure, and blood tests, and everything. Erm, explained,

doctor came along and he explained that, you know, there were many things it could be, because there's lots of things that mimic the symptoms of a heart attack. Erm, but they can't rule out, obviously until they've had the tests back.

I: Yeah.

P: Erm, and I found that helpful, because I felt, I felt he was being honest, he wasn't sort of...

I: Okay.

P: ...you know, hiding behind anything. So that was useful.

(participant 16, ≤65 female)

P: This time I've got to say I think the doctor in particular – whose name I can't recall – um…with all… The…the first nurse I met, um, was very reassuring, um [pause], then the doctor I was involved with, eh, came and explained stuff very well. In fact I had to have…I had to have a second blood test because the first blood test had been taken inside the three hour window, you know…

I: Oh, okay, yeah, yeah.

P: …so I had to wait around a bit, and the…the nurse made sure that the doctor was aware when my second result came back. It just felt…and the unit was heaving that day as well. So I think, um [pause], the multi-faceted element is, was somebody had bothered to explain that, and I've never heard from [hospital name] that actually they did this test and it was clear, or not."

(participant 41, ≤65 male)

The benefit of pre-test information is supported by several randomised controlled studies (Hicks et al., 2014, Petrie et al., 2007, Serinken et al., 2009). Reassurance (measured using a two question Likert scale approach) was increased in groups receiving written information compared to the control group (verbally informed of test results prior to discharge) with the most positive results seen when information was given prior to testing (Serinken et al., 2009). This study did not assess whether that reassurance was sustained post-discharge. It has been clear from patient interviews that it is sometimes only after discharge that patients are able to fully digest information.

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P: Um, they decided there was…[laugh] everything about my…my heart and everything was…was okay, which is good. Um, but it wasn't 'til we were coming away…my sister came and picked me up and it wasn't 'til we got back in the house and I says to [name], you know, they've said everything's okay but nobody said why I might have a sore chest and [laugh]…

I: Right…

P: …and palpitations.

I: …yeah.

P: I'm thinking, mm, that's a bit odd.

(participant 40, >65 male)

The extract below demonstrates how a lack of communication was a causal factor in not being able to disregard the concern associated with the participants' symptoms.

P: So eventually I got out into the corridor again and somebody else was going to take the blood, a really, really nice young man who took me into another cubicle and he took the blood out the hand. And, and he managed to get it, and he was really nice. And then they did the ECG and I just floated and went to get an x-ray, came back, I…nobody said anything about what was wrong or what…how, how did I really feel…

…It would be nice if they explained things. I like to understand. If I understand then I can dismiss it."

(participant 39, >65 female)

Another participant who does not make any reference to the blood test used to rule out a myocardial infarction, even when directly asked if she is aware of what tests we are able to use, explicitly states she felt a "*great relief*" that everything had come back "*normal*". However, the content of her account suggests otherwise, with statements such as:

P: I still have at the back of my mind, is it my heart?

or,

P: I haven't done as much, I do a lot of walking, I haven't been out, because I take my friend's dog out, and I can sometimes be out, for maybe two or three hours. I haven't done that, just in case I was to pass out, or something like that. So that is kind of in the back of my mind. So I certainly haven't been out on my own, with the dog.

(participant 48, ≤65 female)

Evidence of receiving pre-test information was not in apparent in her illness account. This possibly denies her the opportunity to understand that a myocardial infarction can be excluded using troponin, or it is possible that the patient was not receptive to the information when it was given. In diagnostic testing, patients must cope with a sudden transition from preparing themselves to deal with the consequences of coronary artery disease (for which they may already be taking medication or have previous experience), to a more benign cause of symptoms. When providing a test result, the result itself, the timing of information giving, and how the information was provided all seem to have relevance in how reassurance develops. The next section will detail how the interaction between the clinician and the patient may also affect the cultivation of reassurance.

5b.7 Validation of symptoms

The validation of symptoms and development of negative illness perceptions may have been further exacerbated by the routine care procedures for patients with symptoms of suspected acute coronary syndrome. It was rare for patients to make the decision to attend hospital for assessment independently, with

only seven participants in the sample doing so. A 'moral discourse' was prominent in many accounts and was discussed fully in chapter 5a. This resulted in patients seeking confirmation that their symptoms warranted professional healthcare assessment before presentation to the Emergency Department. Many patients (30/49) had sought advice from a GP or NHS 24 with the recommendation to attend hospital for assessment, or the even stronger message of "*phone 999*". The remainder sought advice from lay networks. Prompts by a medical professional, or even from a lay person, allow the patient to negotiate access to care, and construct attendance at the Emergency Department as an appropriate action.

P: *So I thought right, I'll phone the doctor and ask just for a telephone appointment and see what they say. And they immediately said dial nine nine nine.*
I: *Right.*
P: *Which put me into panic*
(participant 39, >65 female)

These actions may contribute to the development of more fixed ideas about the cause of symptoms resulting from healthcare professionals advising patients to seek assessment at the Emergency Department. This validation of the potentially serious nature of symptoms, may make reassurance more difficult to achieve.

P: *I said to the reception lady that I had chest pains...and to be very fair to the staff, er, I was seen very, very quickly. Very, very quickly, er, put on the machines, and very, very quickly assessed. Which, for a wee bit was a bit concerning...*
I: *Right.*

P: ...how quickly they were not really talking, and getting me on stuff.
(participant 11, ≤65 male)

Being transferred to a ward environment for repeat troponin testing occurred after the normal assessment processes of the Emergency Department and was part of standard care for the old pathway. The act of admitting a patient to a ward may have further validated the patient's symptoms.

P: And, eh, then a lady came back and then she said I needed to take an aspirin and I would need to stay in till after 12:00 to get another blood test, because it...she said if it was the heart and any damage had been done, this test showed up something that's released into the blood. Em, and then I thought, oh, no. Then it was...slight panic set in, because I thought, it's not as straight forward as I thought.
I: Mm.
P: Em...what if they have found something? And then...and then, because she said, then depending on what they find you might get home. And I thought, oh, dear, might get home?
(participant 14, ≤65 male)

P: It made me think, oh, dear, could this be more serious than I thought?
(participant 14, ≤65 male)

Only one patient stated directly that having the repeat troponin blood test made him feel reassured. It was more common for patients to interpret the repeating of a test as something requiring further attention. This quote refers to repeating an ECG trace.

P: Er, the second…the second time they did it, I was a bit more concerned that they'd actually found something on the first trace…
I: Ah okay.
P: …and they said…they didn't explain it then. That was a concern…

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I: Right.

P: …because in health…if you have a test result that you're not sure of or abnormal…

I: Okay.

P: …you confirm that that's the case.

I: Yeah. Yeah.

P: You don't confirm normal tests.

(participant 37, >65 male)

Another patient interpreted the routine procedure of sequential troponin testing as confirmation that he was at higher risk of heart disease.

P: The reason I, the reason, I think, I was asked about the sec...the second blood, was because of a history in my family, just to double check. So, erm, my father died of a heart attack when he was forty nine.

I: Right, okay.

P: So they asked us previously, did I have any history, and I says, yes I do. So I think that's why they possibly wanted to take another, another test. (participant 11, ≤65 male)

The literature also supports more testing in patients leading to poorer outcomes in terms of reassurance. Patients who had continuous cardiac rhythm monitoring, or repeat ECGs had lower reassurance scores than those who were less intensely monitored, suggesting that these activities, when taken in isolation, are serving the interests of the clinician rather than the patient (Serinken et al., 2009). The bridge between diagnostic testing and the outcome of reassurance appears to be provided by the communication that occurs between the clinician and patient and is discussed in the next section.

5b.8 Quality of the clinician-patient interaction

In the scale proposed by Holt and Pincus (2016), 'data gathering' and

'relationship building' formed two of the subscales contributing to an overall measure of reassurance. Participant accounts revealed evidence contributing to the development of reassurance which can be mapped onto these domains. The following quote details both the gap and the bridge in the form of communication, between the biochemical result, the clinician, and the patient. The patient gains confidence due to the clinician's response to the troponin result.

P: I mean, it seemed to make them confident I hadn't had a heart attack, and I was quite willing then, to be relieved, and to feel confident I hadn't, as well. I mean, I don't know if there's anything else that can be done, 'cause I don't have the medical knowledge.
(participant 6, >65 female)

After much of the evidence suggesting that a troponin result ruling out myocardial infarction is itself not reassuring for patients, this provided a further avenue for exploration in to how some patients were able to have confidence in the assessment process and feel reassured.

5b.8.1 Active listening

The absence of active listening was common in accounts of patients who were not reassured by the chest pain assessment process. In the following example, the patient demonstrates a lack of effective communication where the clinician has failed to give adequate consideration to the patient's perception of the cause of his symptoms.

P: I think not being listened to is critical.

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I: And did you feel that way?

P: Yes, I felt…

I: Yeah.

P: …I was kind of poo-pooed.

He goes on to state…

P: I just know there's something going on. There's a chest pain, whether or not it's my heart I don't know. That's the thing that makes me anxious".

This patient was provided with a possible cause of his chest pain as a 'strained chest', though this does not seem at all plausible to him. Subsequently, he clearly demonstrates that he has not been reassured by his low troponin, by suggesting further investigations.

P: I would have thought that they would, um, have to ask a question, well, is, is this a similar thing…

I: Yeah.

P: …has the stent moved, is there another blockage in that area, I don't know…

I: Yeah.

P: …perhaps, perhaps I should have been booked in for an angiogram, don't know.

I: Is that what you feel?

P: Perhaps that would have been…if, if I'm having symptoms like that, I…yeah, perhaps.

I: Right.

P: But clearly they don't think there's…

I: Yeah, yeah.

P: …a problem there. So, I mean, I don't, I don't know where you go with that

(patient 38, ≤65 male)

As discussed previously, reassurance based on the rule-out of a serious condition is difficult to achieve in the presence of on-going symptoms (Vaillancourt et al., 2017) as is the case with this participant. This patient also

had previous experience of a prolonged referral process due to similar symptoms, which he described as having to "*persevere through*" due to diagnostic tests returning normal results. The conclusion of his previous episode eventually resulted in referral for angiogram during which received stents to a chronic occlusion of his right coronary artery. Had the clinician given him the time to tell his story of his previous chest pain experience, and acknowledged his concerns, this patient may have been able to interpret his current clinical encounter more positively.

A further example of a clinician failing to give due attention to patient perception of the cause of chest pain and resulting concern regarding her symptoms, is a young woman who had previously suffered a myocardial infarction due to a dissection of her coronary artery. In the example, the patient appears dismissive of the clinician's opinion. Instead of accepting his opinion, she turned to a social media forum for women who had experienced the same cause of coronary artery dissection for advice.

P: I felt this time he kind of narrated the dismissive thing and said, it's probably not cardiac related and I'm there thinking I know I've got a pain in my chest, a squeezing pain in my chest, because he, because I said it was the left side, and he said, erm, normally in women it…there would be another symptom there. So, I just turned my head and thought to myself, yes, okay. I know it's cardiac. [Laughs]."
(participant 13, ≤65 female)

Other research has found that a shared perspective on the cause of symptoms and course of action, between the patient and clinician, is positively correlated

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with resolution of symptoms, trust in the clinician's recommendations, and the patients' ability to self-manage symptoms. Issues acknowledged by both patient and clinician are more likely to be reported as improved by the patient at a later follow up (Lucock at al., 1997). This requires effective communication and recognition of the problem – as expressed by the patient. Without this, a patient may feel ill equipped to manage on-going symptoms. Where there is failure to give credence to the patient's perspective, or the clinician's view contradicts the patient's view, reassurance is difficult to achieve (Donovan and Blake, 2000). Accomplishing a shared understanding, particularly within the time constraints of an Emergency Department visit, can be difficult as clinicians and patients often understand health and illness through different lenses (Street et al., 2009). This is clearly demonstrated by the clinician's ability to interpret a low troponin concentration and subsequent rule-out of myocardial infarction as a conclusion to the illness episode, which can remain very current to the patient.

P: I didn't think there was any communication at all. They were only interested in getting this blood out, sending the blood away, then out the door. You weren't treated as a person. You've got a pain in your chest, right, get that blood out, do that test, and out. I felt as though nobody had done anything to help. I was right, you can go out, you can go home. Nobody had helped me because I felt the same as how I felt when I went in.
(Participant 39, >65 female)

5b.8.2 Trust and confidence

The clinician-patient relationship can be strengthened when patients have the opportunity to express their concerns, and the clinician shows empathy with individual circumstances. This can be mapped to the 'relationship building'

domain of reassurance. In the following extract, the patient brought up the topic

of reassurance.

P: It was generated by conversations over that period of time, once I'd been referred through to the acute medical centre…

I: Yeah.

P: Um, I think the nurse that took the first test, she was very calm, very reassuring, very professional, you know, not…not chatty and, er, giving me nonsense about the weather or anything like that sort of nonsense…

I: Okay. Yeah.

P: And the registrar who was…who gave me the impression she knew exactly what she was talking about. She had a good idea what my symptoms were, how I felt about them. She allowed me to describe them in my own words, but helped me along the way, you know, and that was really quite well done…

(participant 37, >65 male)

Through the act of relationship building, the above patient was able to develop

trust and confidence in the clinician. The following extract also details how the

affective component of the clinical interaction aided this participant in forming

confidence in her clinician.

P: You know, he just sort of said, I'm so and so and he introduced the American who was a student over from the States and he asked if I minded if he took a history as well as him.

I: Uh-hmm.

P: And I said, not at all and that was really who he was but he…he…he was…had a very nice manner so I think that made me feel more relaxed and he…

I: Yeah.

P: …he was very sort of…although he wasn't like buddy, buddy, he was friendly but you know, you have to have a certain type of…you can't have sort of pally, pally.

I: Uh-hmm.

P: Erm, and he spoke clearly and he asked me questions and he explained everything so I…I had…yeah, I had confidence in him…my husband did

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too.
(participant 46, ≤65 female)

The formation of trust due to a pre-existing bond, or building rapport during consultations, has been highlighted in a General Practice environment (Holt et al., 2015). It is unlikely that patients in the Emergency Department will have a pre-existing bond with their assessing clinician, but the opportunity for rapport building and trust development does exist through meaningful communication. When these critical points in communication breakdown, trust is lost and dealing with the uncertainty of a situation becomes difficult.

P1: I can't fault the nurses or the doctors…
I: Yeah.
P1: …or…but it's just one was telling you one thing and…
P2: It was just the inconsistency.
P1: …one was telling you something else, you know, and it's…um, so…but…
I: Yeah.
P1: …at least it wasn't a heart attack, thank goodness, like, you know, but… but I just felt…I just, sort of, left and I wasn't…I was…I didn't really know what…I don't…I don't think they really knew, and they just, sort of, left me hanging, sort of style, you know.
(participant 5, >65 female).

This extract comes from the same participant that stated she did not have the confidence to resume her normal life activities after discharge from hospital, as she was unsure of whether she may go on to have a heart attack. A further example demonstrates how a patient was left with the feeling of unmanageable uncertainty due to conflicting advice, and a lack of effective communication regarding a reason for a change in the advice offered.

P: That...that elevated bit I...that was...I just didn't have a clue what that meant. The fact that they said that they were coming to do something about...first of all the consultant said about changing medication, and then the other ECG saying no...don't...and then she said no it doesn't matter. The student came and said that you're not...it's no...nothing is changing, but...eh...he never explained why. And as soon as I went...and I said to him well what's that eh? something happened and he was away, so.

I: Right.

P: So I was a wee bit...unexplained aye...I didn't have...I didn't know what was happening there.

(participant 10, ≤65 male)

Both of these extracts are strong examples of patients experiencing their episode of chest pain as an on-going situation. The simple rule-out of myocardial infarction does not help this participant plan for his future management of angina, or help him understand how this episode of chest pain correlates with his chronic illness.

P: When's the next attack going to come? Is it going to last as long? Will it be as sore?

P: It's like I'm waiting for it to happen again

5b.9 Summary and discussion

Patients interpret an illness episode in the context of their own views, perceptions and experiences. Participant interview data have uncovered several elements which appear essential for the desired outcome of a patient feeling reassured by the assessment process for acute coronary syndrome. Firstly, reassurance is a process that develops through an interaction, it cannot be packaged and 'given' as the entry in clinical notes implies. The term 'reassurance given' relates to the domain of 'generic reassurance' (Holt and Pincus, 2016) focusing on dialogue such as telling a patient not to be worried,

that everything will be fine, that the troponin test has ruled out myocardial infarction in this instance, and that the clinician has no serious concerns about their heart. In its isolated form, generic reassurance is unlikely to be effective. Secondly, patients must have a sense of a completed interaction regarding their illness episode. Drawing on a conceptual model of outcomes of Emergency Department care valued by patients at discharge (Vaillancourt et al., 2017), reassurance is identified as a stand-alone outcome. Within this model three other outcomes were identified. An interplay between the concept of 'reassurance' and the other outcomes can be observed and is described below. The remaining outcomes valued by patients discharged from the Emergency Department were:

1) Understanding the cause and expected trajectory of symptoms. This can be achieved as part of cognitive reassurance.

2) Symptom relief. Reassurance is difficult to achieve in the presence of unresolved symptoms.

3) Having a plan to manage symptoms, resolve their issue, or pursue further medical care. The management of uncertainty is necessary for the development of reassurance.

The implementation of an early rule-out pathway for myocardial infarction has removed the negatively validating step of the assessment process of admitting patients to hospital for repeat troponin testing. This analysis has uncovered specific aspects of communication around the timing of information giving, and the clinician's ability to acknowledge the patient's perspectives of their

symptoms, that can contribute to the development of reassurance. Ensuring these aspects of communication are integrated into the assessment process aids patients in viewing their acute illness experience as completed and provides the foundation for reassurance to develop.

The lack of reassuring value attained by normal results of diagnostic tests is well documented (Rolfe and Burton, 2013, Petrieand Sherriff, 2014, Petrie et al., 2007). Mining the participant interviews for implicit and explicit references to reassurance has highlighted steps centred around communication which appear to be important in the development of reassurance. This is demonstrated in the figure below.
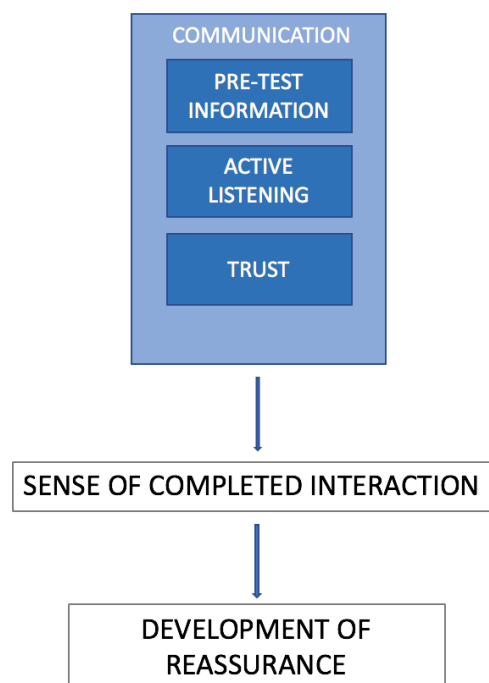
Figure 12 Aspects of communication aiding the development of reassurance

5b.9.1 Communication in the Emergency Department

This study has provided interview data from patients presenting to the Emergency Department with chest pain, with the diagnosis of myocardial infarction excluded. Analysis of data revealed that the rule-out of myocardial infarction by a low troponin concentration alone was often insufficient in providing participants with the reassurance they desired. It was the communication of this result, that occurred within the intricacies of the clinician-patient relationship, that emerged as important.

Communication between clinicians and patients has been the subject of social science research over several decades (Ong et al., 1995). Resulting from this, several models of medical communication have been suggested, but are largely based around six domains: 1) relationship building, 2) gathering information, 3) providing information, 4) decision making, 5) enabling self-management/promoting health related behaviour, 6) responding to emotions (de Haes and Bensing, 2009). The aims of communication in a medical consultation can therefore be consolidated to a threefold focus: establishing a therapeutic relationship, the exchange of information, and establishing an appropriate treatment and management plan for the symptoms the patient is describing. Effective treatment for myocardial infarction is time dependent, therefore initial patient assessment in the Emergency Department is competing against two forms of time pressure. Firstly, to deliver treatment as quickly as possible if the diagnosis is indeed myocardial infarction, and secondly, to meet the demands of Emergency Department targets to discharge

the patient home, or transfer to another care setting, within four hours of presentation. The initial exchange of information therefore occurs within this time pressured environment and is often fragmented and interrupted due to the competing needs of other patients (Pun et al., 2015). Understandably, clinicians may choose to use this time to focus on specific medical needs and establish a treatment plan. The development of empathy and rapport in this environment, have been shown to be viewed as secondary aspects of communication by clinicians, rather than being integral to successful communication within this nuanced healthcare setting (Pun et al., 2015).

The Emergency Department is a particularly niche environment, characterised by multiple interactions with different practitioners over a short period of time (Graham and Smith, 2016). A review of communication in the Emergency Department environment revealed three overarching themes of 'team', 'interpersonal', and 'situational' factors contributing to a framework to guide communication in this unique environment (Graham and Smith, 2016). Within this framework, barriers and facilitators to effective communication were highlighted which were recognisable within the accounts of participants concerning the rule-out of myocardial infarction. Facilitating factors included establishing empathy, identification of unanswered questions, prompt diagnosis, reassurance and explanation, and diagnosis specific discharge instructions. These factors were evident in implicit demonstrations of reassurance of participants in this study enabling patients to view a care experience as complete. Of the barriers exposed by Graham and Smith,

several also resonated with the data and analysis of my own study and are detailed below.

Failure of clinical staff to accommodate questions or anticipate the need for information was apparent in the uncertainty that participants expressed over their health status after their chest pain presentation. Communication dominated by the clinician focusing on the needs of the care provider (facilitating the rapid rule-out of myocardial infarction) over the needs as perceived by the patient was also seen to contribute to the perception of an unfinished illness episode. Allowing patients to frame the episode of chest pain in their life context enables clinicians to gain an understanding of the salience this particular episode of chest pain holds for the patient. Some participants expressed that they did not feel that their particular medical history was given sufficient priority within the structure of the early rule-out pathway. A further similarity was noted regarding the mismatched expectations in the perceived role of the Emergency Department in serving the individual. Some participants expressed that they would have appreciated health education advice in how to reduce their risk of heart disease rather than the focus of the communication being the definitive rule-out of myocardial infarction.

5b.9.2 The role of communication in reassurance

When aiming to conceptualise how reassurance may develop in the setting of a medical consultation, the provision of pre-test information, and evidence of active listening aided the formation of trust in the clinician by the patient. There

appeared to be a relationship between illustration of these factors within patient accounts and expressions of reassurance. The exchange of information has been stated as a principal aim of medical communication; results from this study demonstrate the importance of this action as a two-way process. The patient exchanges a symptom history with the assessing clinician in order for differential diagnoses to be considered, but the patient also requires information to be returned. Reassurance was evidenced among patients who had been informed that troponin is a marker of heart muscle injury which can be quantified in a blood test. Patients were then aware that absence of elevated troponin levels meant that their symptoms were not due to a heart attack, and that in the absence of any other serious findings they could be discharged home. The model of reassurance described in this chapter aligns closely with the six domains deemed necessary for effective communication to occur. This reinforces the importance of effective communication in the process of reassurance and is represented in the diagram below.

COMMUNICATION   REASSURANCE

RELATIONSHIP BUILDING

GATHERING INFORMTION

PROVIDING INFORMATION

DECISION MAKING

ENABLING SELF-MANAGEMENT

RESPONDING TO EMOTIONS

DATA GATHERING

RELATIONSHIP BUILDING

GENERIC REASSURANCE

COGNITIVE REASSURANCE

De Haes and Bensing 2009   Holt and Pincus 2016
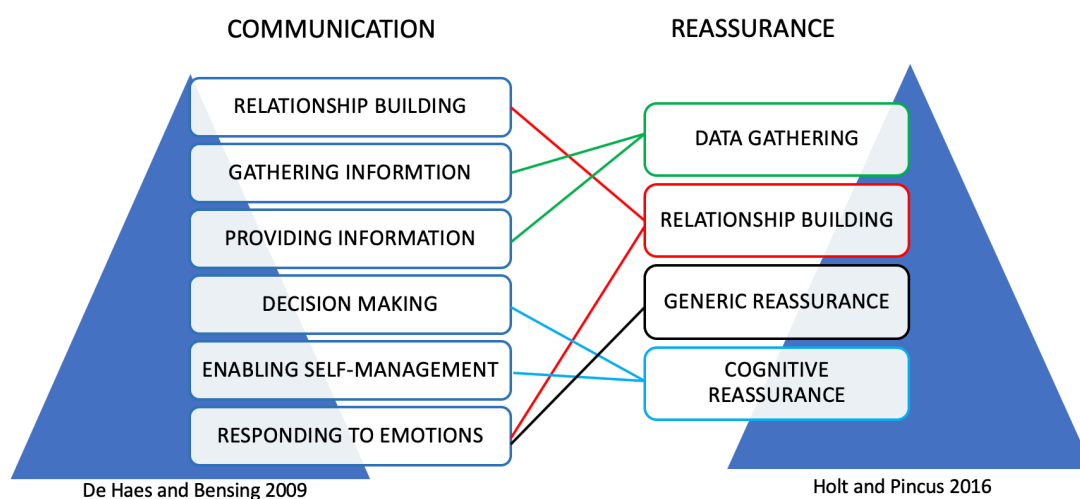
Figure 13   Relationship between a model of communication and a model of reassurance

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The inclusion of empathy within a clinical consultation is key to the idea of patient centred care (Ong et al., 1995). While clinical consultations cannot take place without emphasis on the medical component, as this is required to elicit a diagnosis, empathy places the patient at the centre of their own experience (Derksen et al., 2016). Communication directed only at ascertaining medical information decontextualises the patient from their personal situation. For the patient, their illness experience has occurred at the centre of their lifeworld and is contextually grounded by their previous illness experiences, significant events occurring in their life, and their personal interpretations of events (Barry et al., 2001). After discharge from hospital, a patient must re-negotiate their lifeworld and aim to connect the hospital episode with their personal illness experience. As was discussed in chapter 5a, the construction of meaning regarding the illness episode does not end at the completion of the hospital episode. Not only does a patient need to know and understand the cause of their symptoms, but they also need to feel 'known and understood' (Ong et al., 1995). Using empathy – putting the patient at the centre of their experience – maintains the social context and meaning required to adequately understand the impact an illness episode holds for a particular patient. Traditionally, evidence of this nature (personal illness experience) has been given very low status in the hierarchy of evidence (Greenhalgh et al., 2015), but by considering such evidence, it is easy to see why care focusing on the single rule-out of myocardial infarction, may lead to the on-going experience of illness for a patient with multiple episodes of chest pain over many years. Enhancing evidence-based medicine guidelines with a trustful and personal clinician-

patient relationship could produce better outcomes if quality of care is not simply regarded as adherence to guidelines (Derksen et al., 2016). The benefit of effective communication is further supported by a brief review of the use of shared decision making tools in the assessment of chest pain patients in the Emergency Department (Ward and Body, 2017). The very nature of shared decision making promotes further communication between patient and clinician and was found to increase patient knowledge and satisfaction, while decreasing decision conflict and resource use.

It has also been suggested that the personality of clinicians attracted to working in an Emergency Department environment may view the role of empathy in communication as a less important aspect of the assessment process (Pun et al., 2015). By definition, the care of patients in the Emergency Department is an episodic encounter. Emergency Department clinicians class themselves as acute problem solvers, with a main role of diagnosing, stabilising, or ruling out serious conditions (Dainty et al., 2017). The interaction they have with patients is time limited, with no need to maintain relationships due to follow-up or monitoring requirements being performed by community or other speciality colleagues. These context specific issues were noted when aiming to introduce the use of Patient Reported Outcome Measures into the Emergency Department. In order for clinicians to view these patient specific measures as valid, a shift in how they viewed their role in the specialist environment of the Emergency Department was necessary (Dainty et al., 2017). In order to provide a patient centred application of the early rule-out

pathway, Emergency Department clinicians must understand the implications of their assessment practices in the on-going illness episode as experienced by the patient post discharge from the Emergency Department.

Qualitative data in this thesis have not only augmented the biochemical data on which the early rule-out pathway is based, but have revealed key factors centring around the concepts of communication and reassurance that can facilitate the translation of biochemical data into practical patient care.

Chapter 5c

Findings: Approaches to future health

5c.1 Introduction

The way in which participants made use of their acute chest pain presentation to hospital, as an opportunity to consider their future heart health, was identified as an unelicited theme within interview transcripts. Participants demonstrating an awareness of future heart health did so in three main ways. Firstly, they discussed their incentive to modify their lifestyle as a result of an acute chest pain admission. Secondly, some participants suggested their acute chest pain presentation and assessment was an appropriate opportunity for health promotion activities. Thirdly, some participants discussed how the rule-out of myocardial infarction related to their overall heart health, and their future susceptibility to heart disease. Some patients made no reference to their future health at all during the course of the interview. This chapter will begin with a descriptive analysis of how the unelicited theme of 'future health' emerged from the interviews. Using the concepts of abductive analysis, research findings were located in key existing sociological work. Analysis was performed keeping in mind the key question of "What is this data a case of?" (Timmermans and Tavory, 2012). Moving back and forth between interview data and existing sociological work facilitated the ongoing construction of meaning. Through identifying the relevance of the differing approaches to future *heart* health in particular, the transcripts were returned to in order to explore the possible meanings of the thematic absence of this concept for some participants. This analysis has consequently revealed three possible perspectives by which participants may relate to their future health status. For some, continuing good health was taken for granted, therefore did not have

particular salience in their everyday lives. For others, the way in which they reacted to the chest pain episode, varied in accordance with their position in the adult life course and their current health status (Lawton, 2002). Some of these participants used the chest pain presentation, and therefore the recognition of a physical manifestation of ill health, as a trigger to appraise health behaviours. For others, their current health status appeared to have dominance over the acute chest pain episode, leading to discourses of fatalism and certainty of future ill health. Frank's work on illness narratives (Frank, 1995) could be identified in the transcripts. He described three types of illness narratives; restitution, quest and chaos. The concept of restitution is where an ill person finds out what is wrong, seeks help, and the condition is brought under control. This was evident in transcripts of participants not referencing their future health. The idea of a quest narrative, where something is gained from the illness experience such as increased self-awareness, is seen in those acting on their chest pain experience to improve their future cardiovascular health. The chaos narrative, typified by a lack of structure with no clear beginning and no actual or imagined end, was resembled most closely in the accounts of participants detailing the certainty of future ill health. Participant accounts did differ from this model in that they did state a beginning to their illness experience. While Frank's work could have been used as a framework to analyse transcripts, this may have limited the scope of findings afforded by a more abductive approach. Each of the approaches to future health will be discussed in detail and exemplified by interview data.

5c.2 Characterising participant attitudes to future heart health

5c.2.1 Absence of ill health

For some participants, the concept of future ill health was not apparent in the interviews. One of the main reasons for this was the chest pain episode being attributed to an alternative diagnosis. For many patients, providing an alternative diagnosis seemed to redirect the focus of the health concern away from the heart. The value of receiving a diagnosis, and its contribution to bringing closure to the illness episode, is discussed in more detail in the previous chapter in relation to the development of reassurance. One such example of this is a participant receiving a possible diagnosis of gall bladder pain. She had been referred for an out-patient abdominal ultra sound scan which was due to take place the week following interview. The content of her interview was predominantly situated around the time of the chest pain episode. She did not situate her illness story within the context of a previous ill health experience as many participants have done following the opening question of "*Could you tell me what happened to take you in to hospital last week?*" For this participant, her ill health encounter appeared to be a temporary moment in her life course. A second example is a man who was given a vague diagnosis of possible gastric symptoms. Even though he was not given a definite diagnosis, he still chose to situate his illness experience solely around the few days surrounding his episode of chest pain. This man did go on to visit his GP due to on-going symptoms, but was satisfied with the conclusion of gastric irritation.

P: Like I said, the only thing was the…they never really pinpointed what the

problem was. That was the only thing.

I: Yeah.

P: They just ruled out the most serious things.

I: Yeah.

P: So I mean, that's…I think that's the only…really thing I would probably [inaudible 16:57], they may have…they could have done a wee bit more to tell me what it was. But then if it wasn't serious, you know, they've got…you know, they've got resources they need…

I: Mm.

P: You know, they have to balance things out, you know.

(participant 7, ≤65 male)

His interview then turned to returning to work and his normal everyday activities. For these participants, it appears that the continuing absence of ill health is taken for granted. As such, disease prevention activities may not have salience, as the construct of future ill health does not appear to be a dominant feature in their life course at this time.

5c.2.2 Trigger to appraise health status

As part of the process of constant comparison, transcripts were re-read aiming to characterise the types of participants making reference to their future heart health. A second category of participants was revealed who appeared to use their presentation at hospital as an opportunity to appraise their current health status. Two sociological constructs appeared to be necessary foundations in order for a chest pain presentation to elicit this response in participants. These were the embodied experience of ill health, and coronary candidacy which are defined and discussed below.

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Embodied experience of ill health

This analysis has drawn on the work of Lawton (Lawton, 2002) who explored the extent to which people actively considered ill health and death, and how these perceptions influenced current health behaviours. Lawton states that long term health goals are reactive rather than proactive, with the presence of the 'embodied experience of ill health' a prerequisite for considering a future in which further ill health could be imagined. Similar perceptions of health are evident in data of this thesis.

Defining embodiment

The use of the term 'embodiment' in the context of the experience of ill health will first be defined. This analysis has been guided by the phenomenological perspective encompassing the view that the body is a combination of the objective biological body and the lived body that is subjectively experienced (Carel, 2007). Illness was viewed to reflect the entire person and their relationship with the physical and social environment. A subjective, reflexive awareness of the body can occur in illness, meaning the individual experiences oneself from within in order to recognise one's needs (Gyllensten et al., 2010). This is a state which may not have been encountered previously. Illness therefore can represent a disruption to fundamental beliefs about the world, the future and self (Reeve et al., 2010). Embodiment of ill health can therefore be seen as threat to the concept of self through a growing, reflexive, self-awareness. The next section details how the experiences perceived and 'felt' by the lived body provide the foundation for the way in which participants acted

upon their chest pain experience.

5c.2.2.1 Candidacy

Data also revealed that for the chest pain experience to have salience for their future health, participants must first recognise themselves as susceptible to heart disease. Participants leading discussion about future heart health, appeared to view themselves as a candidate for developing coronary heart disease. The concept of 'candidacy' is a way in which general knowledge about illness causation, aids individuals to assess personal risk (Davison et al., 1991). Individuals interpret information from multiple sources (media, official bodies, reports from family and friends) to produce an image of a 'coronary candidate'. The process by which information is interpreted from these multiple sources of knowledge is referred to as 'lay epidemiology' (Davison et al., 1991). The construct of candidacy has particular importance when used for predictive purposes as proposed here. Evidence of participants performing this assessment by cross-checking factors present within themselves to provide an appraisal of candidacy (Morden et al., 2015) can be seen in the interview data.

P: It's one thing to say, you haven't had a heart attack, but it doesn't necessarily say, you haven't got an underlying heart problem…
I: Right.
P: …or you've got the potential to have a heart attack. And I think that's one thing that I would say; because I mean, they then concluded, it's a frozen shoulder, probably, and I think if you read in my notes it says something like, if not improved in two weeks, go and see your GP. Now, for me, I would have said, I'm 53, history of…aged myself prematurely here…
I: [laugh].

P: …erm, you know, cardiac problem history of the family, overweight, don't smoke and things, so those are the risk factors, aren't they? But I would have probably seen that as an opportunity to say, okay, you've maybe had a bit of a scare here; these are the things you should look out for if this happens again. Because there was none of that advice, in terms of, right, if…this is what you…so if this pain happens again, that's okay, 'cos that's just your frozen shoulder, but these are the, the warning signs you should maybe look after, or these are the things you should be doing to reducing your risk of heart…

I: Hmm.

P: …problems, or even go and see your GP for a general check-up…

I: Hmm.

P: …and chat. Those things probably would have…I mean, I know I should do, do those things…

I: Yeah.

P: …but maybe not everybody would…

I: Yeah, so there's an attitude…

P: …do those things, and I haven't done those things…

I: Right.

P: …so I haven't come out and booked an appointment to go and see my GP, which I probably should do.

(participant 20, ≤65 female)

P: One of my colleagues, previously, not long ago, er, suffered a stroke. And I didn't know...we're quite similar, he's a couple of years, he was...unfortunately, he passed away because of it.

I: Oh dear.

P: Erm, he had a stroke, and then was in hospital for a while, but he didn't make it out of the hospital. But, and all they things were on my mind too.

(participant 11, ≤65 male)

The existence of heart disease in the social world also contributes to the picture of candidacy. All participants expressing an interest in their future heart health, had a cardiovascular illness experience to relate to. This could either be in the form of a personal illness experience, or that of a close friend or relative. Two participants did not have a personal illness experience to relate

to, but their professional work brought them in to contact with heart disease. One participant was a practice nurse running coronary heart disease clinics as part of her role, and the other participant was a trainee funeral director who had come in to contact with young people dying as a result of myocardial infarction.

The extracts of dialogue below, demonstrate how participants situate their acute episode of chest pain in the context of a related illness experience (in self and in others), and how they use this to attest their own vulnerability to coronary heart disease. A family history of heart disease resulting in his father dying from a myocardial infarction was relevant to this man's illness experience. Later in the interview, he clearly states his intention to safeguard his future health.

P: Well, it wasn't a heart attack this time.
I: Okay.
P: Will there be a heart attack next time.
I: Yeah.
P: You know, that, that's my concern. Erm, I need to change some lifestyle things, which I know about, and I will, I am. Erm, but I need to also get to the, the root cause of the stress, and anxiety bit, which is work, work related.
I: Yeah, yeah.
P: I need to decide, is this job the right job for me anymore, after 18 years being with the company, on a decent salary. But the salary ain't gonna do me any good if, if I keel over on the M8.
I: Uh-huh.
P: So, erm, that's what I need to try and, that's what I need to think about, speak to my GP, and get to the root cause.
I: Okay.
P: And it's funny, 'cause our business is all about root cause, finding the root cause of stuff that...
I: Yeah.

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P: ...fails.

I: Yeah.

P: [Laughing].   And, and, we, we actually do a service called condition monitoring. And, erm, the, the, one of the gentleman that runs it says, have you ever condition monitored your body. Have you ever looked at your body, or do you condition monitor your car, you know?

I: Hmm.

P: Do you just get in your car, turn it, and away you go, and expect everything to be fine. Do you ever check the tyres, the oil, the water, do you ever do that? Do you ever do that to your body, do you know, do you feel aches and pains, or...

I: Yeah.

P: ...you know, like wee checks, wee health checks.

I: Yeah.

P: And that's part of our business, we do health checks on big machinery.

I: Uh-huh.

P: And, and what we try and do is, we try and say, right okay, this part of the motor's not working well, not running well, let's change part of that before it goes to the main part of the machine, and have a fatal catastrophe.

I: Yeah, yeah.

P: That's what, so obviously...so it's funny, it's funny. I just thought of that there, just now. Erm, I've probably not been condition monitoring my own body.

(participant 11, ≤65 male)

He also stated that the hospital doctor he saw after being admitted for repeat

troponin testing, offered to provide website information he could refer to

regarding stress management, but he was happy to make an appointment with

his GP to discuss this aspect. This second example is from a young woman.

P: As I said, everything's come back from the hospital, fine. I don't know if it's a stress, anxiety, panic attack, or not. But yes, at the back of your mind, you're always thinking, is this my heart, am I gonna have a heart attack.

I: Yeah, yeah.

P: And I work, erm, well I have two jobs. My second job is a trainee funeral director. So, in the past wee while, I've seen a lot of younger people, even younger than me...

I: I see.

P: ...coming in, and died of a heart attack.
(participant 48, ≤65 female)

After a probing question ("*Has it left you thinking anything since you came*

home last week?"), the lady goes on to reveal her future plans.

P: It's left, I suppose, it's really left me thinking that it could happen, a, a heart attack could happen to anybody, at any age.
I: Right.
P: And I think if you're, obviously, if you're so stressed about things, it's gonna increase your risk, a lot. So that's, yeah, I've definitely thought about that since I've come home.
I: Have you?
P: Yeah.
I: Yeah.
P: Trying to think of, like, de-stressing myself, and you know, you only live once, kind of thing.
I: Yeah.
P: And trying to take...I haven't, as I say, I haven't actually been at my work up there, it's just round the corner. Erm, I haven't been up there, but just trying to think of ways, when I do go back, to try and take a step back, for my own, my own health.
(participant 48, ≤65 female)

While the notion of coronary candidacy was strongly evident in transcripts, also

apparent was the idea that coronary heart disease has the reputation of being

a random killer. There is a troublesome situation therefore, where lay notions

of preventability of heart disease may be at odds with the concept of

inevitability of heart disease (Davison et al., 1991). The following extract

follows a conversation around why the participant was in denial about why she

may be having a heart attack.

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P: But then I also know several people that have had heart attacks, one that was 27 and had a heart attack, you know. So, yeah, I think a lot of it was the age but, you know, it's just like, no, it's never going to happen to me.

I: Mm.

P: Total denial.

I: So what kind of person do you think has a heart attack?

P: Um, someone like myself who is overweight, has smoked for years, was a heavy drinker, um, doesn't eat healthily. But then my neighbour upstairs died of a heart attack at 48 and she dropped dead in the gym.

I: Oh, gosh.

P: Never smoked…well, actually, she did smoke but not very much, but didn't drink and, you know, as I say, she was healthy. A healthy 48 year old and she [laughs] dropped dead of a heart attack.

I: Mm hmm.

P: And another neighbour who was 67 dropped dead in the house of a heart attack. So of course I told the paramedics that, you know, my building has to be cursed because I'm the third heart attack in four years. [Laughs]

(participant 9, ≤65 female)

The lady in the extract above concretely states that she views herself as a candidate for a heart attack, but then refers to the idea of luck. When expressing the random nature of heart disease, she simultaneously acknowledges that the lady who suffered a heart attack was a smoker. This could possibly be a case or normalising a health damaging behaviour which will be discussed later in this chapter. The notion of luck could be seen to over-ride the image of a coronary candidate with the realisation that;

P: I suppose, it's really left me thinking that it could happen, a, a heart attack could happen to anybody, at any age.

(participant 48, ≤65 female).

5c.2.2.2 Appraisal of health status

Once participants had assessed themselves as possible candidates for

developing heart disease, further suggestions that the chest pain assessment process has left questions regarding overall health status were evident in the data. The extract below shows how a lady questioned how her low troponin result, and subsequent rule-out of myocardial infarction related to an assessment of her future heart health.

P: I suppose…I suppose you've still got that niggling thing, as I say, there, but okay, this wasn't a heart attack as such, but it doesn't mean that there's not, that I'm totally fit and healthy and not at risk of it; so I think it's also that slight niggle is under there, is thinking, well, is there something? Even though that wasn't, was there any, were any of those signs actually something to do with the heart, even though they said that it wasn't a heart attack? And I…that's what I don't know, I suppose, is, you know, by looking at that ECG, are they saying I've got a healthy heart, or are they just saying, you haven't had a heart attack?

I: Right.

P: And those are two totally different things, I guess.

I: Yeah, hmm.

P: And that's what I didn't know. I mean, erm, and even things like, they didn't give me information about my blood pressure. I'd asked somebody; at one point I said, what's my blood pressure looking like? I said, is it okay? And they said, yeah, it's not bad; a bit high.

I: Okay.

P: So again, that might have been an opportunity to say, well actually, yes, it's slightly high, you need to go and get it checked. So I came away thinking, well, am I at risk, or am I actually not too bad?

(participant 20, ≤65 female)

This is also demonstrated by another participant who received an alternative diagnosis of gastro-oesophageal reflux disease, but who clearly thinks in terms of her future susceptibility to heart disease.

P: Erm, and I think now, you know, I, I do - not in an obsessive way - but I do carry aspirin around now.

I: Right.
P: Erm, and now, I know that if, you know, to chew three hundred...
I: Uh-huh.
P: ...milligrammes of aspirin, and that can potentially give you some more time.
(participant 16, ≤65 female)

This idea brings into question whether some patients may inappropriately view their heart as healthy due to the rule-out of myocardial infarction. With pure grounded theory methodology, this question would have been explored further with theoretical sampling. This point was demonstrated in an interesting way by one participant who led the conversation, demonstrating her perceived susceptibility to diabetes. She independently searched for an online diabetes risk calculator after making a lay assessment of the physical symptoms she was experiencing. She definitively states she has a future health orientation in relation to diabetes.

P: I lost a couple of pounds 'cause I thought [name], this is within your control, get a grip. Even if you are at risk you can decrease your risk.
(participant 2, >65 female)

She also demonstrates this future health orientation with respect to reducing her risk of developing dementia or Alzheimer's disease. Interestingly she does not refer to heart disease during this discussion, but states at an earlier point in the interview that she does not believe she has angina due to the absence of exertional pain when doing heavy gardening. She also states "*there was absolutely no heart damage, and all my heart tracings were normal, no proteins in the blood or anything.*" It is questionable whether her interpretation

of the troponin result, and lack of coronary candidacy has led her to believe her heart is healthy and not be oriented towards future health with regards to heart disease.

The way in which individuals may assess how relevant a particular risk is to them depends on how health and illness are embedded into their daily lives (Zinn, 2005). An individual's past experience is particularly important in how a patient constructs and responds to an illness (Lau-Walker, 2006). This correlates with Lawton's notion of the embodied experience of ill health being a prerequisite for consideration of future health. This analysis will now focus on explanation of where the embodied experience of ill health leads to discourses of certainty of future ill health and fatalism.

5c.2.3 The certainty of future ill health

This category had initially been interpreted as participants not making reference to their future health. This was due to the data being read with an analytical focus looking for evidence of making plans to improve health status. Through further reading of transcripts, data is now interpreted as participants referencing their future health, but in terms of the certainty of ill health. Common to many participants in this category, illness stories were situated against a background of past ill health. This in direct contrast to those detailed earlier in this chapter, who treated their chest pain experience as an isolated episode, and a temporary divergence from their presumed healthy status. Examples of how participants began their illness stories in response to the

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opening question are given below.

P: Well, a year or so ago…oh, actually it was five years ago. [laughs] Sounds like…feel like a year or so ago. I was, um, told I had angina.

(participant 17, >65 male)

P: Erm, just there, well what happened just there, I woke up in the morning, erm, done my natural thing, like make a cup of tea and breakfast, that kind of stuff. Erm, and then I started getting niggles like just like muscles were getting like pulled up there.

I: Right.

P: That's what it felt like to start with, er, I just maybe thought sometimes like, like wee tiny twitches sort of thing, so I just never thought nothing of it and then it started to get to the point where it felt like it was just pulling against it and it was really uncomfortable and that's when I knew, that's like the process, that's what usually happens, erm, when I start to feel really, really, ill.

(participant 28, ≤65 male)

P: Er, three years ago this month I had a heart attack…

I: Right.

P: …and pneumonia.

I: Okay.

P: Er, after that…I ended up in intensive care I think it was four days which I know nothing about.

I: Hmm mmm.

P: I lost those four days. Er, I woke up in intensive care not knowing where I was. Er, family wasn't there so I was very confused and whatever but then after…after that I ended up on the ward.

I think I was in for ten days. I got home the week before my birthday, that was it.

Er, they said that, er, I didn't need stents or anything like that. That the damage done, er, would repair itself.

I: Okay, yes.

P: Er, and a year ago this month I ended up back in hospital again and I ended up getting stents…

I: Right.

P: …put in. Er, three stents put in that time.

(participant 36, >65 female)

These participants are all interpreting the acute chest pain episode against the background of prior ill health. For all of the examples above, a myocardial infarction as a cause of their chest pain was excluded, but chest pain continued to be interpreted as a further endorsement of the chronic illness. The chronic illness status appeared dominant over the acute episode. Similarities to Bury's concept of 'biographical disruption' can be made here (Bury, 1982). This describes chronic illness as a major disruptive experience. The planned focus of the interview was the acute chest pain experience, though for many participants the topic of discussion most relevant to them, was their chronic illness experience.

5c.2.3.1 Biographical disruption

Biographical disruption leads to a fundamental rethinking of a personal life story and self-concept. Evidence of this remodelling of self-concept in relation to illness is present in participant accounts.

P: I'm reluctant to drive any great distance, oh gosh, you know, I'm going down to so and so, what if I take ill? You know, that thing's always at the back of your mind, but it…it's…with the neck and the back issue, even driving any…you know, an hour or two in the car, it's uncomfortable because of sitting…
I: Oh, okay.
P: …for as long.
I: Yeah.
P: You know, it's uncomfortable…
I: Yeah.
P: …um, with my neck and obviously driving, you're turning your head and so

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on. Um…so…

I: So when you…when you talk about taking ill, what is it that you're worried might happen?

P: Oh, well, I suppose basically just in case I have…I take ill when I'm…when I'm out somewhere, um, you know, a heart issue…

I: Right.

P: …that…that's my worry.

(participant 29, >65 male)

P: It took me two days or three days to get my feeling back slowly and it sca...it does it scares me, it really, really, scares me.

I: Mmh, yes.

P: Like I cannae, like even the small things like, erm, on my bad days like, erm, I can't even take my son to the shop or even to the park, just, and that's, that's just, that's due to no being feeling well, like in terms of my jelly legs and just no feeling well, I dinnae have the energy to go and do it. Erm, I just tend to be tired and sleep all the time.

(participant 28, ≤65 male)

The concept of biographical disruption has received criticism over recent years arguing that it is adult centred, and it does not acknowledge the impact of life crises *not* related to illness (Williams, 2000). It is also argued that the timing, context, norms and expectations of events, alongside an individual's commitment to events themselves, is crucial to the experience of our lives, whether healthy or sick (Williams, 2000). Newer work focuses on how people manage, mitigate or adapt to illness, and has shown how illness particularly later in life, has less of a disruptive effect, with ill health being viewed as more 'normal' or 'inevitable' (Williams, 2000). Bury himself recognises that a process exists where initial disruption leads on to processes of explanation, and legitimation of illness, before adaptation to a new norm (Bury, 1991). Also arguing against biographical disruption are Reeve *et al* (Reeve et al., 2010)

stating that 'individual capacity' is more relevant. Individuals differ in how life events enhance or deplete capacity to continue living their everyday lives, with some people becoming exhausted by the impact of cumulative stressors. Whilst acknowledging these criticisms, and agreeing with the comments of Reeve and colleagues, the concept of biographical disruption has relevance in this thesis. It can be seen in the examples given above, by the negative and re-shaping effects of repeated episodes of chest pain. The adult centred nature is relevant to this patient population, and the onset of their illness in young adulthood is synonymous with the idea of illness constituting a major disruptive experience.

Also part of Bury's theory is the notion of a new consciousness of the body developing (Lawton, 2003). This is demonstrated by the following participant who has begun the process of adaptation to a life with illness.

P: *To be honest with you, [laughs], my life now is kind of, its normal, but I think forevermore there will always be a part of me that thinks the minute I feel something in my body or I'm getting, like coming down with something, I think, oh, could that be a symptom of a heart attack?*

I: *Mmh.*

P: *Erm, be from a sore wrist to anything.*

I: *Okay.*

P: *So, like since I've come from hospital I've had chest pain, erm, but it's normal and maybe, yes…[interruption]. So, if the chest pain is like a really severe dart, I do, my brain automatically triggers, it takes ten seconds to kind of analyse it and then I just carry on. So, that's kind of just life for me. But, when I came out of the hospital, there was no chest pain, you know, I was confident that the troponin levels had come back. I was a bit frustrated with Doctor [name] comments about the spasms, but I knew as I had said to him, I felt the same Friday as I do any other day.*

(participant 13, ≤65 female)

5c.2.3.2 Certainty of illness

These accounts also reveal how future ill health is seen as a reality, with participants using language that suggests certainty over possibility.

P: When's the next attack going to come. Is it going to last as long? Will it be as sore? It's like I'm waiting for it to happen again.
(participant 10, >65 male)

P: Well my three siblings have had bother with their heart. My oldest brother has had a triple bypass, my young brother has angina [cough] and my sister has had a heart attack, er, my young sister and she's got a stent in. But she had this pain and I had her in here one day and she thought it was trapped wind and she was like how I go with the pain and the sweats. Um, and my brother in law brought her in wind settlers and that seemed to be, to soothe it, but she had that for 20 year and then the next time it was a heart attack.
I: Oh gosh.
P: So, so when I had seen her like that and when I take this…
I: Oh right.
P: I think this is it, but every time I'm checked out…
I: Mm hm.
P: …it comes back fine.
(participant 29, ≤65 female)

Due to the manifestation of cardiac illness in all of her siblings, this lady viewed the development of heart disease as a relative certainty. Lawton (Lawton, 2002) also describes the concept of further morbidity as a certainty in her interviews. She goes on to detail how such conceptualisations lead to conscious efforts to follow the advice of health promotors. Interviews from this thesis reveal almost opposing conceptualisations, with participants not actively following health promoting behaviours due to their current appraisal of chronic

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health status.

5c.2.3.3 Fatalism and short termism

Preventative actions (or lack of) can be explained in terms of an individual's expectations of the future. Constructs of 'fatalism' and 'short-termism' can be seen in the data to explain barriers to health enhancement. An explicit example of fatalism is give in the extract below.

P: *It's not got me, you know, worrying constantly about having a heart attack or…*

I: *Okay.*

P: *…whatever, not any more than normal anyway but I think…I think I've had a…a slight sorta touch of cardiophobia if there's such a word [laugh]...*

I: *Okay.*

P: *…er, most of my life.*

I: *Right, okay.*

P: *Er, but no, no more than normal. I've [pause]…I've still got the same sense of humour, still the same philosophical a…approach to life. I'm a fatalist and…*

I: *Uh-hmm.*

P: *…always have been. Er, I don't particularly believe in sorta God, religion or anything like that [pause]. Er, nah, as I say, no, it's not changed me in that respect, mmm. I'm still the same as I was before.*

(participant 26, >65 male)

A preliminary analysis of this data using a behaviour change model, had identified several factors as being limiting factors, preventing participants actively addressing their future health. Caring for a long-term sick family member, having the commitment of a young family and work, and co-morbid illness were all identified in the data as possible limiting factors for performing health beneficial behaviours. Similar findings have been reported when

exploring social mechanisms underpinning lifestyles and health practices of men undertaking cardiac rehabilitation (Savage et al., 2013). Living conditions and disease were seen as significant barriers to adopting a healthy lifestyle. While Savage and colleagues have a strong focus on the low socioeconomic status of their participants, the concepts of fatalism and short-termism may also be applicable to the data in this thesis (though socioeconomic status did not form part of the data collection). Individuals illustrating fatalism, display low control over health improvement and lifestyle change. This can be due to biological disposition, work and family obligations, a defeatist attitude towards maintaining a healthy lifestyle, and physical limitations preventing uptake of physical activity (Savage et al., 2013).

Accompanying fatalism is a sense of a lack of control over health and even an acceptance of that. Previous examples have portrayed how the construct of chance is evident in lay epidemiology when accounting for risk of the development of heart disease. An attitude exists where health is determined by forces external to the individual, and therefore not amenable to personal control (Davison et al., 1992).

Short-termism can be characterised by reluctance to plan for the future and a strong present time orientation. This has also been evident in transcripts.

P: So, the…the girls are…are very protective.
I: Yeah.
P: The least it's how are you today? How are you feeling? But then I have a high threshold for pain…

I: Right.
P: …as well seemingly. So…but, I mean, I just take one…one day at a time…
I: Hmm.
P: …and see how I'm feeling.
(participant 36, >65 female)

In the example below, the young man is struggling to deal with the present which inhibits his ability to focus on the future.

P: So, it does, it, it does, it, it is hard to have a normal life in a, in a, in a sense.
I: Mmh, uh-huh.
P: Because I used to be outgoing and, erm, everything, play football four times a week.
I: Right.
P: Erm, I was doing PE teaching.
I: Oh, really.
P: And, everything just the click of a finger just stopped, I couldn't dae they things any more.
I: Right.
P: And, even now if I wanted to it's like, it's a whole, that would be a whole new level because I'm anx...I'm like a nervous wreck...
(participant 28, ≤65 male)

A further explanation for an absence of reference to future health can been seen with the concept of 'foregrounding.' Here, the current consequences of a co-morbid illness gain dominance over a temporary change in health status (Cheraghi-Sohi et al., 2013). For participants living in the shadow of a previous illness, the episode of chest pain that took them in to hospital loses significance against the backdrop of a more pressing illness concern (which may still have a cardiac component). This concept is also demonstrated in the extract from the young man above (participant 28) preoccupied by his vasovagal syndrome.

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A further example is derived from an interview with a man who located his chest pain experience firmly in the context of his chronic coronary heart disease, which was a daily presence in his life. He illustrates the dominance this illness has in his life in a number of ways. He firstly makes suggestions for more regular health checks in order to identify a future cardiac event prior to it occurring. He then reveals he self-monitors his blood pressure, heart rate and oxygen saturations, and jokes at an earlier part of the interview that it may be possible to monitor troponin at home in the future – something he would welcome. Any monitoring equipment he owned was not provided by, or suggested by a health professional, but was used by the participant to reassure himself that any symptoms he may be suffering are not due to a "*cardiac cause*". In reality, these measures will not provide him with the diagnostic information he is searching for.

P: *I try and maintain a…as healthy a lifestyle as I can, but I do check myself. I've got, um, a blood pressure machine, I use it to check weekly. Well, my wife does use it as well, and I've got an oximeter, is it an oximeter?*

I: *Mm-hmm.*

P: *For your finger, to check my oxygen levels and so on, when I feel, you know, if I feel a bit…you know, a wee bit, um, breathless or a bit tired or…and sometimes I get palpitations and I check it, and nine times out of ten it's fine. You know, I've got a ninety eight or ninety nine per cent, um, blood, um, sorry, oxygen level in the blood, and again, that's a reassurance thing.*

I: *Okay.*

P: *You know.*

I: *Yeah.*

P: *That's…it's my…my teddy bear, you know, comforter.*

I: *Yeah.*

P: *I know that sounds…it doesn't sound strange, but I…and when I'm really feeling down or…or depressed or feeling ill, I'm prone to check it two or three times a day, and I'm saying, what am I doing that for, it's fine, just…you know, and the more you worry about it, it can increase your heart rate or,*

you know, you get…'cos I check my…'cos it feels as if I've got my heart racing, and I'll check it and my pulse is seventy four or seventy five, nothing wrong with that, and my, um, oxygen levels, as I say, it's normally ninety eight per cent, which for my history is fine, you know.

I: Mm.

P: Um, and the blood pressure again sometimes, it can be up a wee bit, but I take medication for it, and the doctors have told me I'm within normal, um, parameters, um, for my age and my previous history, but again that's…these are maybe just something I go to for reassurance. Oh, feeling a bit down today, I'm feeling a bit sore or I'm a bit breathless or I've overdone it, I'd better check, you know.

(participant 29, >65 male)

In addition to self-monitoring, this man also clearly expresses his expectation

of a future ill health event occurring which he aims to protect himself against.

P: I always, um…again, I think I'm paranoid, but I mean, I…obviously I carry my inhaler for my asthma, and I carry my spray…

I: Yeah.

P: …for angina, but in my wallet I always have…I renew them every six month or something, always have four aspirin, in a…a…a small container in my wallet.

I: Mm-hmm.

P: And again I think that's just a…I think the issue, well, if I'm out somewhere, well, anywhere, I suppose, you know, you don't get your distance, but, you know, the first time they give you, if they think you've had a heart attack, I think it's…is it so many milligrams of aspirin?

I: Yeah.

P: Obviously blood thinner, and I carry them.

I: Yeah.

P: So what am I doing that for? [laughs] But again, it's, um, I think the issue if I'm out and I do feel as if it is something like that, and the spray's no' helping, at least I can…I've got aspirin there to take for as a thingummy. Now, that might seem very weird and strange to outsiders, but that's just…that's just me, be prepared.

(participant 29, >65 male)

5c.2.4 The role of age

Analysis of the prevalence of this theme, revealed that age appeared to influence how participants oriented themselves towards future health, with only one participant expressing active steps towards improving future health over the age of 65. Chronic conditions and multi-morbidities are more common in older compared to younger people (Marengoni et al., 2011). Additionally, older age is associated with anticipation of worse future health (Tasdemir-Ozdes et al., 2016), less focus on improvement of health, and the perception that health related fears are more uncontrollable (McGinty et al., 2013). As a consequence, older patients may be less likely to adopt preventative health behaviours when the end outcome is viewed as predetermined and independent of any individual action. In conjunction with the lack of control over health with increasing age, an acceptance of the passive role that some participants play in their life course with respect to health, also appeared relevant.

P: My general health hasn't been very good for a long time, and yet at one time I was more fit than most people.
I: Mm.
P: You know, and it's a bit…maybe slowing down just sort of slows you down.
I: Mm-hmm.
P: That's the situation. I don't know what to do about that. Well, I don't think there's anything you can do. Maybe somebody come along with a wee tablet, maybe a wee magic tablet, you know. [laughs]
(participant 17, >65 male)

P: Um, so I'm getting to the age now that friends…friends and relatives are…
I: Yeah, yeah.
P: …beginning to…to suffer things.

I: Yeah.
P: So I'm a wee bit more concerned.
(participant 49, >65 male)

This passive role was also demonstrated in other accounts where care procedures appeared to be viewed as prescriptive, and determined by the clinician, with no reference being made to personal interpretation of the interaction. The participant below was talking about test results information.

P: You get told, you know, whether it's a pass or a fail, and, you know, and, and that's it. And if there was different medication to take, they will then, you know, prescribe it for you.
I: Uh-huh.
P: Or if they think that you're doing too much, and they think you should, you know, just take things easier, they're gonna obviously say that as well.
(participant 22, >65 male)

When re-reading the accounts of participants over 65 years of age with a deductive lens searching for references to lack of control and fatalism, age did not appear to be the main participant characteristic determining the focus of these accounts. While references to these elements were present in the interview transcripts, when attempting to answer the fundamental question of abductive analysis of "what is this data a case of?", there were other more prominent thematic concepts. The ideas previously discussed of foregrounding other illnesses or the care of family members, restrict the ability of people to have a future health orientation. Also evident in the accounts of participants over 65 were both the absence of the embodiment of ill health, and the certainty of future ill health. These concepts appear to have greater

analytical significance rather that the arbitrary measurement of age.

5c.3 Lifestyle justification

Models of health promotion have historically suggested that there was a lack of knowledge among the general public, about the harmful effects of health damaging behaviours, and if that knowledge were increased, people would opt to modify their lifestyle (Davison et al., 1992). Previous studies have revealed that people are able to cite risk factors for heart disease and that there is an awkward interplay between the influence on health status, and the ease of voluntary participation in a healthy lifestyle. This interplay is evident in transcripts with several participants talking about smoking and justifying their choice to do so. The participant below constructs his smoking as an appropriate activity, and even places the activity as a positive, healthier choice above vaping.

P: *I mean, I smoke, I know I shouldn't smoke, um, well, I dinnae even class it as smoking, it's Silk Cut, it's the lowest [laughs] tar, lowest everything on the, um…and to be honest, I don't even…I mean, I smoke maybe ten, twelve a day, but half the time I'm not even smoking it, if you know what I mean, it's just like hands, something to do with your hands, sort of thing, eh? Um, I've tried the vaper thing, I've had that, but then I was like a bit wary of that 'cos there's not been enough tests on that.*

I: *Right*

P: *So I'm like, that could be just as harmful or more…*

I: *Oh, okay.*

P: *…than a cigarette.*

I: *Yeah.*

P: *Um, so I stay away from it. I've still got it, but, um, I stay away from that, um, but yeah, I mean, I've never…never…as I say, never had anything other than a cold or chest infection…*

(participant 42, ≤65 male)

The following participant is a nurse who is fully aware of the consequences of smoking and again justifies her actions. She has also used the chest pain assessment as evidence that her heart is healthy, stating she has been concerned about her smoking previously, but appears less so now.

P: *It made me think about my smoking status.*

I: *Right.*

P: *Erm, and I think right, I really need to stop. I haven't actually completely stopped, but I probably…I don't smoke a lot anyway, so. I think… It's made me feel better that I know there's nothing wrong with my heart, and I'm not, I'm not… Like before this happened there have been times when I've thought oh, you know, this smoking's going to take its toll at some point in my life, or you know, having this wine's going to take its toll. And you know that when you get older you don't change things, things are gonna happen, you know, and not for the better. But erm, it's not radically changed my lifestyle. But I'm still stopped drinking Monday to Friday.*

I: *H'mmm.*

P: *Friday night is when…I get…*

I: *H'mmm.*

P: *…a bottle of wine on a Friday. That does me all weekend.*

I: *Yeah, yeah.*

P: *So. But I don't go out to pubs and things. I'm not a pubby kind of person. So I think I have quite a healthy lifestyle, so. But I, I would like to stop the smoking.*

I: *H'mmm*

P: *I will do.*

I: *Yeah*

P: *And my friend, she's a nurse as well, she doesn't smoke. She says, 'oh, [name], I don't know why you have these cigarettes.' I said, 'because I actually quite enjoy them.' She laughs and I do.*

(participant 30, ≤65 female)

The next extract details how a participant had attempted to stop smoking on several occasions (and had done so successfully for varying degrees of time),

but based the conversation around the positive benefits he received from smoking.

P: I told the consultant, you know, about this stopping, sorta, all the time. She actually put it on her, sorta, discharge letter. Erm, he's stopped several times for long periods in the past, er, and is going to have a try at it again, sorta thing, er, and I told her that. I said, I…I'll probably have a bash at stopping again. Well, I actually stopped for five days, erm, a fortnight ago...

I: Right.

P: …as well, er, because I was getting these twinges and everything like.

I: Oh, right.

P: And I thought, och, I'll have another bash at stopping smoking again, sorta thing like. Er, so I stopped for five days and I…I sorta cracked. I succumbed. I was actually o…over the craving and everything in the five days but, er, and this is an excuse but I feel it's a valid excuse. I went away on a wee fishing trip with my brother to Aberfoyle…

I: Uh-hmm.

P: …and tried to fish the river the first night and got back to the hotel room. Cut a long story short, I was in agony and I cracked and just purely psychologically I thought, I…I've…I've got to have a fag…

I: Right.

P: …and do something with this pain and unfortunately it worked...

I: Mmm.

P: …psychologically 'cause as soon as I had a cigarette I was like, oh, that feels better. It's not sore now [laugh].

I: Yeah, okay.

P: And I know it's all psychological but unfortunately, as I say, it…it worked psychologically. I didn't feel as…in as much pain, er, with the cigarette.

I: Mmm.

P: It's like the war films you see, you know, the guys in the trenches and everything lying puffing on a fag…

I: Yeah.

P: …dying…

I: Yeah, uh-huh.

P: …sorta thing…

I: Yeah.

P: …like. It's a psychological thing because there's nothing in a cigarette [laugh] that helps with the pain.

I: No.

P: [Laugh]. Or maybe there is [laugh].

I: [Laugh].
P: [Laugh]. You know, maybe all the different chemicals…
I: Yeah.
P: …they keep on about…
I: Yeah.
P: …[laugh] working something or other. They should do research into that.
(participant 26, ⩽65 male)

As well as constructing smoking as a positive action in their personal lives, these extracts may also be displaying evidence of 'logic of practice' (Williams, 1995). This describes when behaviours become an unthinking part of daily life. Unhealthy behaviours may continue to exist in those who appear sympathetic to the messages of health promotion. All of the examples given above were in response to probing questions as to whether the chest pain episode had led them to consider their lifestyle at all. As smoking was offered by participants as a subject for discussion, it suggests that participants are aware of the negative effects of smoking.

5c.4 Healthism

Other responses to this probing question revealed the concept of healthism. 'Healthism' denotes that, to acknowledge and display personal responsibility for health, is considered a necessary condition to be perceived as a good citizen (Crawford, 2006). In the following extract, the participant directly stated his acute chest pain admission has made him think about that fact that two family members had died from heart attacks, and then constructs himself as someone acting in a healthy manner.

P: Aye, yeah, it's definitely…it's bringing it to the…um, more to the front, so I'll obviously going to…I mean, I am fit, I keep myself fit. I don't…my wife says I dinnae eat well, but I do, I think I do. Everything's always fresh [laugh], I dinnae eat frozen food, I don't use microwave stuff, and it's always bought and cooked that day.

I: Uh-huh.

P: Whether it be chops, loin pork steaks, whatever, anything like that, I mean, um, it's always bought, and touch wood, I've never had any major problems health wise.

(participant 46, ≤65 male)

Some participants directly stated that their chest pain admission had not led them to consider their future heart health, but displayed the concept of healthism.

P: I'd already decided to stop the high intensity training before this episode. Because I just felt it was a bit too intense for me, at my age, you know.

I: Okay.

P: I wanted to do something more, erm, like Pilates, and some sort of kinder to the body, sort of thing [laughing]. You know, I've no desires to be an athlete, so, yeah.

I: Yeah.

P: So it hasn't, no. I mean, I, I'm still, you know, I'm planning to, I've started a Pilates course, and I'm planning to sign up at a, a gym again, to do things like Aquafit, and, you know...

I: Uh-huh.

P: ...sort of regular exercise. So, no, and I still walk my dog, and, you know, I still run, or try and run up 160 steps, you know. So, erm, I think...yeah, sorry, going back to...again, it, it's, it occurred to me when I was actually having the first attack, is this angina.

I: Uh-huh.

P: Erm, and then I remembered that a friend of mine who has been diagnosed with angina, it's, it's when she's sort of exerting herself.

I: Uh-huh.

P: So I thought, well it's unlikely to be. And I hadn't ever really experienced any chest pain, after exertion. Erm, out of breath, but not chest pain.

(participant 16, ≤65 female)

She is painting a picture of herself as a 'healthy' and 'responsible' citizen with regards to her lifestyle.

5c.5 The effect of early rule-out pathways on perception of future health

This data has shown that in order for the prospect of future ill health to manifest itself, it is necessary for it to be perceived in concrete terms before people are motivated to address their lifestyle (Lawton, 2002). Preliminary coding of the data revealed participants referencing their future health by questioning how the troponin results related to their overall heart health, discussing the possibility of addressing certain health behaviours, and stating that the chest pain assessment process was an appropriate time to discuss health promotion activities. Such references were evident in 10 out of 23 accounts prior to implementation of the early rule-out pathway, and 5 out of 26 accounts post implementation of the early rule-out pathway. It can therefore be stated that an orientation to actively address future heart health was more prevalent among patients who were admitted to hospital for serial troponin testing. There were also differences according to patient pathway in how the theme arose. The ideas contributing to the theme were raised independently by participants admitted to hospital for repeat troponin testing and opened an avenue to be explored. It was noted that participants were not choosing to focus on this area as much during interviews post implementation of the early rule-out pathway. This indicated that actively pursuing future health appeared less salient for these participants. The conversation was led by what was relevant to the participant, though the topic was introduced if something relevant was alluded

to such as diet or exercise. These opportunities did not produce such in depth discussions as for participants prior to implementation of the early rule-out pathway.

5c.5.1 Experience of ill health as an opportunity for health promotion

It has been evident from some accounts that some participants viewed their chest pain presentation as an appropriate opportunity for health promotion activities. These extracts of transcripts have previously been used to evidence how this participant used her acute pain episode to consider her future risk of heart disease. It is clear that she would have appreciated more health promotion education at this point.

P: I mean, erm, and even things like, they didn't give me information about my blood pressure. I'd asked somebody; at one point I said, what's my blood pressure looking like? I said, is it okay? And they said, yeah, it's not bad; a bit high.

I: Okay.

P: So again, that might have been an opportunity to say, well actually, yes, it's slightly high, you need to go and get it checked. So I came away thinking, well, am I at risk, or am I actually not too bad?

(participant 20, ≤65 female)

She picks up this point again later in the interview.

P: I've…my blood pressure has always actually been quite low, erm, and my cholesterol was, kind of, okay-ish, verging on, verging to go high…er, again, this, this, this kind of, ah no, that's fine…

I: Hmm.

P: …sort of attitude from the GP, sort of thing, so…I think, sometimes, you could give a harder message to people, that…

I: Yeah.

P: …are at risk to…'cos if you say fine to me, I'll think, oh, that's fine.

(participant 20, ≤65 female)

A similar was scenario was described by another participant.

P: And I think that's another thing that I, perhaps, don't feel fully, erm, explained, is why did my blood pressure go up like that. And, you know, if it was just something like the oesophageal spasm, or whatever, well why, why did my blood pressure...you know, was that just because of the anxiety.
I: Uh-huh.
P: Can anxiety push your blood pressure up like that, and not your pulse. My pulse was less than fifty.
I: Right.
P: You know, so that makes me think, oh gosh, you know, have I got a blood pressure problem now. Erm, so yeah, I, I don't know whether I still feel I should go to my doctor, and even though a letter has gone to them.
(participant 16, ≤65 female)

These patients were trying to harness information from the assessment process regarding their future health. This is an example of how the system, within which healthcare is received, may impact health outcomes. The assessment process in use fails to provide an opportunity for these participants to gain health knowledge, and therefore utilise that knowledge in self-management primary prevention strategies.

Emergency medicine is perfectly positioned to assess cardiac health risk, and to intervene to support health. Brief interventions (typically counselling and information giving lasting less than ten minutes) that reduce risk behaviours and promote healthy lifestyles have been successful (Rondeau et al., 2006). Events, or sets of circumstances which can lead individuals to adopt positive behaviours, or discourage unhleathy behaviours, resulting in overall positive behaviour change have been termed 'teachable moments'. Several successes

have been seen when using teachable moments in the Emergency Department. Counseling for smoking cessation, was as effective when performed in the Emergency Department, as in an out-patient setting with 15% of patients quitting from the Emergency Department group and 8% from the outpatient clinic at one month follow up (Ersela et al., 2010). Patients attending the Emergency Department for non-cardiac chest pain were more likely to be motivated towards behaviour change for stress reduction when advice was given at a time when the patient was focusing on their own health (Esler and Bock, 2004). A unique opportunity therefore exists, where illness assessment procedures can be linked with promoting healthy behaviour. Patients are more than twice as likely to recall health behaviour advice in the presence of a behaviour realted illness (Flocke et al., 2014). A presentation to the Emergency Department with acute chest pain, therefore represents an ideal opportunity of offer health advice.

Representing more than the simple merging of situational factors, a teachable moment is created through clinician-patient interaction (Lawson and Flocke, 2009). The lower prevalence of the 'future heart health' theme post implementation of the early rule-out pathway, may imply that the accelerated assessment process affords less of an opportunity for this interaction to take place. Whether an illness event is significant enough to create the foundations for a teachable moment depends on the extent to which 1) the event increases perceptions of personal risk, 2) promotes a strong emotional response, and 3) redefines self-concept or social role (McBride and Ostroff, 2003). As indicated

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earlier in this analysis, those participants making a connection between their illness episode and their future heart health, all had illness experiences to realte to. These participants gave explicit statements about their susceptibility to heart disease.

P: It left me thinking it could happen, a heart attack could happen to anyone at any age. And I think if you're obviously, if you're so stressed about things, it's gonna increase your risk a lot.
(participant 48, ≤65 female)

P: What still worries me is why I'm still getting this. I do my exercise and my walking. Is the heart gonna be alright, or is it going to come back?
(participant 18, ≤65 male)

A relatable illness experience could be viewed to satisfy the first two conditions of an illness event providing a cue to action for a teachable moment. The third element, of redefining self-concept or social role, is demonstrated by participants reflecting on whether they should continue in their current job due to the stress it entails; or evaluating how they could manage their role in the workplace more effectively to reduce stress.

This construct of a teachable moment draws heavily on the Health Belief Model which places emphasis on a cue to action to prompt a change in behaviour. The Health Belief Model is based around two aspects of an individuals' health and health behaviour: 1) the perceived threat and 2) the behavioural evaluation (Abraham and Sheeran, 2015). Additionally, this model proposes that a 'cue to action' may trigger certain health behaviours if particular beliefs are held. The data in this thesis suggests that an episode of acute chest pain may serve as the cue to action for this patient population. It is acknowledged that interview

participants only reveal an intent to act, and there is no evidence to demonstrate that intent is translated into action.
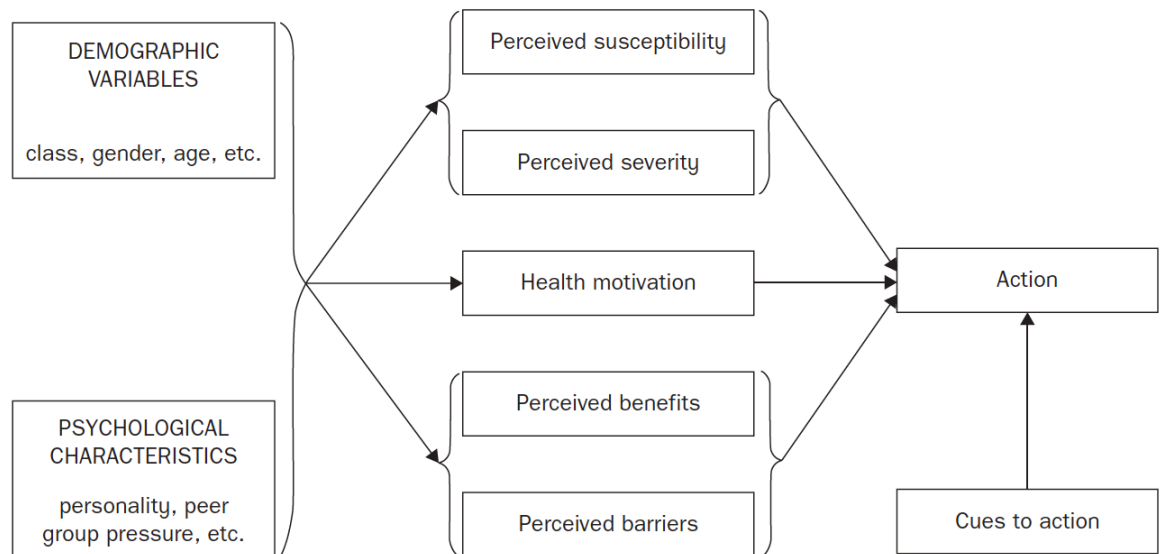
(Abraham and Sheeran, 2015)
Figure 14 Health belief model

If taking the view, that a teachable moment is not a mere meeting of circumstantial factors, but a moment that can be created, then the clinician-patient interaction during this process gains more dominance (Lawson and Flocke, 2009). The addition of a dynamic interaction between the patient and clinician to the Health Belief Model, can prompt not only the patient, but also prompt action from the clinician. This action may shape the perceived threat of disease, or belief in the benefit of behaviour change for the patient. The early rule-out pathway, with its focus on the rule-out of myocardial infarction, may not afford the opportunity for this interaction to develop. This is demonstrated in the extract below.

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P: There wasn't any…I didn't think there was any erm, communication at all. They were only…

I: Right okay.

P: …interested in, in getting this blood out and sending this blood away and out the door. There wasn't any…there wasn't any… As, as a person you weren't kind of treated like a person, you were more treated like oh well, let's see what's going on. You've got a pain in your chest, right, get that blood out, do that test and out.

(participant 39, >65 female)

It has been previously argued that admitting patients to hospital for repeat troponin testing may have led patients to interpret this part of routine care as confirmation that their symptoms could be serious.

P: And, eh, then a lady came back and then she said I needed to take an aspirin and I would need to stay in till after 12:00 to get another blood test, because it...she said if it was the heart and any damage had been done, this test showed up something that's released into the blood. Em, and then I thought, oh, no. Then it was...slight panic set in, because I thought, it's not as straight forward as I thought.

I: Mm.

P: Em...what if they have found something? And then...and then, because she said, then depending on what they find you might get home. And I thought, oh, dear, might get home?"

(participant 14, ≤65 male)

P: It made me think, oh, dear, could this be more serious than I thought?
(participant 14, ≤65 male)

It is possible, that the cue to action in the early rule-out pathway is less persuasive as symptoms are dismissed by the Emergency Department clinician much more quickly. In addition to validating the potential serious nature of symptoms, admitting to a ward in the previous chest pain pathway,

gave a further two opportunities for health promotion advice to be given. The admission process with a junior doctor provides the opportunity for a one to one discussion, and the final review prior to discharge is a second occasion where a more senior doctor may take the opportunity to focus on primary prevention health messages. It is of course not the case that clinician-patient interaction occurs disassociated from the environment within which the interaction takes place. Other than the personal factors that the two participants bring to the conversation, systemic factors of the healthcare setting will have a profound effect on the content of the interaction (Lawson and Flocke, 2009).

Care in the Emergency Department is shaped by, and is measured by, process targets as the primary indicator of quality of care (Body et al., 2015). This analysis has identified that while early discharge may benefit the healthcare provider in terms of improved patient flow, this may be at the consequence of primary prevention endeavours.

5c.6 Summary and discussion

In summary, three approaches to future health could be seen within the transcripts. Drawing on the work of Lawton (Lawton, 2002), the experience of embodied ill health was an important prerequisite for consideration of future health and is therefore important in health promotion. For those not experiencing ill health as a 'felt', reflexive awareness, the absence of future ill health was taken for granted therefore discussion of future health did not have

particular relevance in interview transcripts. For those with the presence of embodied ill health, participants were either able to use their chest pain presentation to react to a health situation, or future health was viewed as certain ill health due to other illness factors. A similar interpretation of approaches to viewing the future and possible risks has also been highlighted through the analysis of narrative accounts of stroke survivors. Participants either did not consider the future, considered it but accepted a future that was inevitable, or accepted a future and employed strategies to manage future risk of ill health (Alaszewski et al., 2006).

5c.6.1 Chest pain assessment and risk stratification

This chapter concluded with an explanation of how early discharge may be at the consequence of primary prevention endeavours. Using the Health Belief Model as a guide, a mechanism for how the assessment process in the Emergency Department may be enriched to provide a teachable moment in the form of a dynamic interaction between clinician and patient has been offered.

Employing the early rule-out pathway in a risk stratification mode for future cardiac events rather than sole management of the acute presentation may provide further diagnostic clarity for clinicians which patients can in turn benefit from. Contrary to the previous generation of assays, the high sensitivity assay is able to provide more diagnostic certainty by identifying a population of patients at low risk of myocardial infarction (<5ng/L). One in three patients

have high sensitivity troponins between 5ng/L and the 99th percentile upper reference limit. This group are 10 fold more likely to have a major cardiac event at one year than those with a concentration of <5ng/L (Shah et al., 2015b, Chapman et al., 2017b). Incorporating this risk stratification information into patient information may aid the <5ng/L group to feel more reassured about the nature of their chest pain and may identify another group who could benefit from further investigation, treatment, or lifestyle modification. This chapter therefore utilises the concepts from the previous two chapters in that 1) designing a care pathway around the rule-out of myocardial infarction may not satisfy patient need regarding their future health, and 2) communication between the patient and clinician is key in helping a patient realise their risk of future cardiovascular events. Communication during the assessment process was seen as a key medium through which a patient may utilise chest pain as a 'cue to action' to address risk to future health (Lawson and Flocke, 2009). It is suggested that such a teachable moment represents more than an opportune occasion but is the product of a social interaction between a clinician and patient. The salience of the chest pain episode is therefore co-created through interaction modulated by the actions of both the clinician and the patient. It is possible that the accelerated early rule-out pathway, with its obvious focus on the rule-out of myocardial infarction, does not allow for the development for the type of interaction required to produce a teachable moment. When considering design of interventions, it must be remembered that this thesis has highlighted the importance of communication incorporating active listening and development of trust. Any intervention must occur against

the background of these fundamental factors. Adopting a co-design approach to uncover how best to use cardiovascular risk information in the Emergency Department, and in turn create an intervention to aid patients in understanding their cardiovascular risk may be an additional way in which the chest pain assessment process could be enhanced.

Chapter 6

Presenting symptoms in men and women diagnosed with myocardial infarction using sex-specific criteria

Including adaptations from:

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6.1 Introduction

An evaluation of clinical symptoms is a major part of the risk stratification of patients presenting to the Emergency Department with suspected acute coronary syndrome. The accurate interpretation of these clinical symptoms therefore has major implications for patient triage, treatment and subsequent management.

The last two revisions of the universal definition of myocardial infarction (Thygessen et al., 2012, Thygessen et al., 2018) recommend the use of sex-specific troponin thresholds for the diagnosis of myocardial infarction. Use of sex-specific thresholds has identified a population of patients with previously unrecognised myocardial infarction (Shah et al., 2018). These patients would not have been included in previous study populations investigating sex differences in symptom presentation. Atypical symptom presentations associated with myocardial infarction in women are thought to contribute to lower rates of diagnosis and treatment, and worse outcomes compared to men with myocardial infarction (Wenger, 2012, Mehta et al., 2016, Madonis et al., 2017, Lichtman et al., 2018). International guidelines reinforce the view that women are more likely to present with atypical symptoms, such as epigastric pain, dyspepsia, or breathlessness (Mehta et al., 2016, Roffi et al., 2016). It is unknown how identification of these newly identified patients will impact the symptom profile of patients with myocardial infarction.

While studies reporting sex differences in symptom presentation can boast

large study populations (Dey et al., 2009, Canto et al., 2007, Canto et al., 2012), they are limited by the use of retrospective data collection from clinical records or registries of patients with confirmed myocardial infarction, and therefore are at risk of selection bias. In contrast, studies that evaluated patients with suspected acute coronary syndrome report there are more similarities than differences in symptom presentation between men and women (Rubini Gimenez et al., 2014, DeVon et al., 2014). Additionally, studies performed prior to the third universal definition of myocardial infarction may not be representative of current practice where the use of sex-specific diagnostic thresholds for cardiac troponin are recommended (Thygessen et al., 2012, Thygessen et al., 2018).

Women with myocardial infarction are at risk of under diagnosis and under treatment if correct symptom presentations are not recognised. Our aim was to prospectively evaluate the frequency and predictive value of patient reported symptoms in men and women with suspected acute coronary syndrome, and to determine whether symptoms differ when the diagnosis of myocardial infarction is based on sex-specific criteria.

6.2 Methods

6.2.1 Study population

Patients with suspected acute coronary syndrome were recruited from the Emergency Department of the Royal Infirmary of Edinburgh, a tertiary care hospital in Scotland, between 1st June 2013 and 3rd March 2017 into a sub-study of the *High-S*ensitivity *T*roponin in the *E*valuation of patients with *A*cute *C*oronary *S*yndrome (High-STEACS) trial (Shah et al., 2018). All patients over 18 years of age in whom the attending clinician requested cardiac troponin for suspected acute coronary syndrome were eligible for inclusion. Patients with ST-segment elevation myocardial infarction, those who were unable to provide consent, or those with previous involvement in the trial were not enrolled. This clinical trial was registered (ClinicalTrials.gov number NCT01852123), approved by the national research ethics committee, and conducted in accordance with the Declaration of Helsinki.

6.2.2 Baseline characteristics

Patient baseline characteristics, including prior medical history, cardiovascular risk factors, clinical observations, and 12-lead electrocardiography, were obtained from a case record form, and the electronic patient record. Hyperlipidaemia or hypertension were defined as a history of the condition, or by the use of lipid-lowering or anti-hypertensive therapies, respectively. Ischemic heart disease was defined as a history of angina, prior myocardial infarction or prior coronary revascularisation. The criteria used to define ST-segment elevation, ST-segment depression, left bundle branch block and T

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wave inversion were based on international guidelines (Thygesen et al., 2012). Myocardial ischaemia was based on a global assessment of the ECG and the presence of any dynamic changes on serial testing.

6.2.3 Symptom characterisation

Patients were interviewed in the Emergency Department, and the presenting symptoms as reported by the patient were documented using a standardised proforma (appendix 4). The research team consisted of research nurses who were guided to obtain a symptom characterisation with the use of structured questions. The patient interview occurred prior to either the patient or researcher being informed of a diagnostic decision. If patients reported more than one symptom (e.g. chest pain and dyspnoea) both symptoms were recorded as a presenting symptom. Presenting symptoms were then classified as typical or atypical as described by Greenslade and colleagues (Greenslade et al., 2012). Typical pain was classified in patients reporting the presence of chest, arm or jaw pain with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping. Atypical pain was classified in patients reporting epigastric or back pain, or pain that was burning, stabbing, indigestion like or any other pain description, or presentation (Greenslade et al., 2012). Guidelines also state radiation of pain and the presence of associated symptoms form part of a typical presentation (Roffi et al., 2016), therefore the presence of radiation (right arm, left arm, neck, jaw, back) and presence of any associated feature (nausea, vomiting, sweating, dyspnoea, palpitations) was also documented.

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6.2.4 High-sensitivity cardiac troponin I assay

The Abbott ARCHITECT$_{STAT}$ high-sensitive cardiac troponin I assay (Abbott Laboratories, Abbott Park, IL) is a two-step chemo-luminescent assay with a limit of detection of 1.2 ng/L and coefficient of variation of less than 10% at 6 ng/L (Chin et al., 2014). Assay performance has been independently validated under routine laboratory working conditions, with a reported inter-laboratory coefficient of variation of 12.6% at 3.5 ng/L across 33 instruments (Shah et al., 2015b). The upper reference limit 99th centiles were determined in 4,590 samples from healthy individuals as 16 ng/L for women and 34 ng/L in men (Shah et al., 2015a), and from 10th December 2013 onwards these thresholds were used in clinical practice.

6.2.5 Diagnostic adjudication

The final diagnosis was adjudicated independently by two physicians following review of all clinical information, both non-invasive and invasive investigations, and outcomes from presentation to 30 days. Where there was discrepancy, consensus from a third physician was sought. All patients with cardiac troponin I concentrations above the sex-specific 99th centile were adjudicated and classified as having type 1 myocardial infarction, type 2 myocardial infarction or myocardial injury in accordance with the third universal definition of myocardial infarction as previously reported (Roffi et al., 2016, Shah et al., 2015b). Type 1 myocardial infarction was defined as myocardial necrosis (any high-sensitivity cardiac troponin I concentration above the 99th centile with a

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rise and/or fall in concentration where serial testing was performed) in the context of a presentation with symptoms suggestive of acute coronary syndrome or evidence of myocardial ischemia on the electrocardiogram or subsequent invasive or non-invasive testing. Patients with myocardial necrosis and symptoms or signs of myocardial ischemia due to increased oxygen demand or decreased supply (e.g. tachyarrhythmia, hypotension or anaemia) secondary to an alternative pathology were classified as type 2 myocardial infarction. Myocardial injury was defined if high-sensitivity cardiac troponin I concentrations were above the 99th centile in the absence of any clinical features of myocardial ischaemia. Agreement for a diagnosis of type 1 myocardial infarction was very good (κ= 0·77, 95% CI 0·69-0·84).

Participants diagnosed with myocardial injury identified by the high sensitivity assay with sex-specific thresholds (>16ng/L for women and >34ng/L for men) who would have been unrecognised with the previous generation of contemporary cardiac troponin I assays (those with high-sensitivity troponin I concentrations of 17-49ng/L for women and 35-49ng/L for men) were said to be "reclassified". Identification of this group of patients permits exploration of a previously unstudied group of patients due to the limitations of previous assay technology.

6.2.6 Statistical analysis

Baseline characteristics are summarised as mean (standard deviation, SD) or median (inter-quartile range, IQR) as appropriate. Presenting chest pain

characteristics of men and women were compared for the whole population, for those with type 1 myocardial infarction, and for those with type 2 myocardial infarction, using χ^2 tests for categorical data. Likelihood ratios (LRs) with 95% confidence intervals (CI) were calculated to assess the predictive value of typical symptom characteristics (pain nature, pain location, radiation, additional features) for the diagnosis of type 1 myocardial infarction in men and women. A likelihood ratio summarises how many times more likely patients with a particular symptom feature are to have a diagnosis of type 1 myocardial infarction than those without the feature. A likelihood ratio of greater than 1 indicates the feature is associated with the presence of type 1 myocardial infarction and less than 1 indicates the feature is associated with the absence of type 1 myocardial infarction. Multivariate logistic regression modelling was then used to calculate odds ratios (ORs) with 95% CI for the number of typical features present based on the following categorisation. Symptom presentations were categorised as having between 0 and 4 typical features based on the pain nature (dull, heavy, tight, pressure, ache, squeezing, crushing or gripping), location (central, left, or right chest, arm or jaw), radiation (right arm, left arm, neck, jaw, back, other), and the presence of associated symptoms (nausea, vomiting, sweating, dyspnoea, palpitations, other). This model was adjusted for age, history of ischemic heart disease, diabetes mellitus, hypertension, smoking (current or ex-smoker) ischaemia on the presenting 12-lead electrocardiogram and an atypical feature variable (in either nature or location). All analyses were performed using R (Version 3·2·2).

6.3 Results

6.3.1 Baseline characteristics

A total study population of 1,941 patients (39% women) with suspected acute coronary syndrome (756 women, 62.8±14.0 years; 1,185 men, 60.7±14.3 years, *Table 9*) was recruited. A total of 388 (20%) patients (152/756 women and 236/1185 men) had a troponin concentration above the upper reference limit. The adjudicated diagnosis was type 1 myocardial infarction in 11.9% (90/756) of women and 15.5% (184/1185) of men. Men with suspected acute coronary syndrome had a higher burden of established cardiovascular risk factors than women, including higher rates of diabetes mellitus, hyperlipidaemia, known ischemic heart disease and cigarette smoking. A positive family history was more common among women. However, the frequency of cardiovascular risk factors was similar in men and women with a diagnosis of type 1 myocardial infarction, with only previous coronary artery bypass grafting and cigarette smoking more common in men than women (*Table 10*).

Table 9   Baseline characteristics of whole study population

| | Suspected acute coronary syndrome(n=1,941) | | |
	Men	Women	P value
No. of participants, n (%)	1,185 (61)	756 (39)	<0.001
Age (years), mean (SD)	60.7 (14.3)	62.8 (14.0)	0.002
Past medical history			
Smoking, n (%)	725 (61.2)	379 (50.1)	<0.001
Diabetes mellitus, n (%)	198 (16.7)	89 (11.8)	0.003
Hypertension, n (%)	472 (39.8)	301 (39.8)	1
Hyperlipidaemia, n (%)	510 (43.0)	258 (34.1)	<0.001
Family history, n (%)	534 (45.1)	393 (52.0)	0.003
Angina, n (%)	381 (32.2)	203 (26.9)	0.015
Myocardial infarction, n (%)	327 (27.6)	134 (17.7)	<0.001
Previous PCI, n (%)	265 (22.4)	101 (13.4)	<0.001
Ischemic heart disease, n (%)	500 (42.2)	259 (34.3)	0.001
Previous CABG, n (%)	103 (8.7)	14 (1.9)	<0.001
Heart failure, n (%)	43 (3.6)	23 (3.0)	0.571
Cerebrovascular disease, n (%)	81 (6.8)	39 (5.2)	0.162
Peripheral Vascular Disease, n (%)	28 (2.4)	11 (1.5)	0.221
Medications at presentation			
Aspirin, n (%)	440 (37.1)	215 (28.4)	<0.001
Clopidogrel, n (%)	171 (14.4)	79 (10.4)	0.013
Prasugrel, n (%)	9 (0.8)	2 (0.3)	0.269
Ticagrelor, n (%)	1 (0.1)	1 (0.1)	1
Warfarin, n (%)	71 (6.0)	35 (4.6)	0.236
Betablocker, n (%)	336 (28.4)	186 (24.6)	0.078
ACE inhibitor or ARB, n (%)	389 (32.8)	195 (25.8)	0.001
Ca-channel blocker, n (%)	158 (13.3)	84 (11.1)	0.169
Nitrate, n (%)	243 (20.5)	126 (16.7)	0.041
Nicorandil, n (%)	63 (5.3)	28 (3.7)	0.126
Diuretic, n (%)	168 (14.2)	128 (16.9)	0.114
PPI, n (%)	370 (31.2)	268 (35.4)	0.06
Statin, n (%)	555 (46.8)	270 (35.7)	<0.001
NOAC, n (%)	12 (1.0)	13 (1.7)	0.254
Electrocardiogram			

Myocardial ischaemia	143 (12.1)	74 (9.8)	0.139
ST-segment elevation	50 (4.2)	8 (1.1)	<0.001
ST-segment depression	74 (6.2)	38 (5.0)	0.306
Left bundle branch block	47 (4.0)	29 (3.8)	0.981
T-wave inversion	181 (15.3)	120 (15.9)	0.771
Physiological parameters			
Heart rate (bpm), mean (SD)	75 (20)	78 (20)	0.001
Systolic BP (mmHg), mean (SD)	137 (26)	140 (29)	0.04
High-sensitivity cTnI concentration			
At presentation, ng/L [median, IQR]	4 [2-13]	2 [1-7]	<0.001
At peak, ng/L [median, IQR]	5 [2-20]	3 [1-9]	<0.001
Adjudicated diagnosis			
Type 1 myocardial infarction, n (%)	184 (15.5)	90 (11.9)	0.03
Type 2 myocardial infarction, n (%)	38 (3.2)	39 (5.1)	
Myocardial injury, n (%)	13 (1.1)	18 (2.4)	
Unable to classify, n (%)	1 (0.1)	5 (0.7)	

Presented as mean (SD), median (inter-quartile range), or number (%). Abbreviations: ACE = angiotensin converting enzyme; ARB = angiotensin receptor blockers; CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; PPI = Proton Pump Inhibitor; NOAC = novel oral anti-coagulants; BP = blood pressure.

Table 10 Characteristics of type 1 myocardial infarction study population

	Type 1 myocardial infarction (n=274)	
	Men	Women
No. of participants, n (%)	184 (15.5)	90 (11.9)
Age (years), mean (SD)	66.1 (13.1)	72.1 (12.8)
Past medical history		
Smoking, n (%)	127 (69)	47 (52.2)
Diabetes mellitus, n (%)	39 (21.2)	18 (20.0)
Hypertension, n (%)	92 (50.0)	44 (48.9)
Hyperlipidaemia, n (%)	81 (44.0)	37 (41.1)
Family history, n (%)	85 (46.2)	47 (52.2)
Angina, n (%)	68 (37.0)	32 (35.6)
Myocardial infarction, n (%)	53 (28.8)	24 (26.7)
Previous PCI, n (%)	41 (22.3)	14 (15.6)
Ischemic heart disease, n (%)	82 (44.6)	42 (46.7)
Previous CABG, n (%)	22 (12.0)	1 (1.1)
Heart failure, n (%)	6 (3.3)	2 (2.2)
Cerebrovascular disease, n (%)	14 (7.6)	5 (5.6)
Peripheral Vascular Disease, n (%)	5 (2.7)	3 (3.3)
Medications at presentation		
Aspirin, n (%)	76 (41.3)	30 (33.3)
Clopidogrel, n (%)	25 (13.6)	11 (12.2)
Prasugrel, n (%)	2 (1.1)	0 (0.0)
Ticagrelor, n (%)	1 (0.5)	0 (0.0)
Warfarin, n (%)	11 (6.0)	3 (3.3)
Betablocker, n (%)	56 (30.4)	24 (26.7)
ACE inhibitor or ARB, n (%)	58 (31.5)	32 (35.6)
Ca-channel blocker, n (%)	27 (14.7)	17 (18.9)
Nitrate, n (%)	49 (26.6)	16 (17.8)
Nicorandil, n (%)	9 (4.9)	0 (0.0)
Diuretic, n (%)	31 (16.8)	20 (22.2)
PPI, n (%)	58 (31.5)	41 (45.6)
Statin, n (%)	85 (46.2)	37 (41.1)
NOAC, n (%)	0 (0.0)	1 (1.1)
Electrocardiogram		
Myocardial ischaemia	61 (33.2)	20 (22.2)
ST-segment elevation	11 (6.0)	2 (2.2)
ST-segment depression	34 (18.5)	8 (8.9)

Left bundle branch block	10 (5.4)	6 (6.7)
T-wave inversion	57 (31.0)	26 (28.9)
Physiological parameters		
Heart rate (bpm), mean (SD)	72 (20)	77 (18)
Systolic BP (mmHg), mean (SD)	137 (29)	141 (26)
High-sensitivity cTnI concentration		
At presentation, ng/L [median, IQR]	94 [3-421]	48 [18-273]
At peak, ng/L [median, IQR]	705 [148-3012]	164 [38-1178]

Presented as mean (SD), median (inter-quartile range), or number (%).
Abbreviations: ACE = angiotensin converting enzyme; ARB = angiotensin receptor blockers; CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; PPI = Proton Pump Inhibitor; NOAC = novel oral anti-coagulants; BP = blood pressure.

6.3.2 Symptom characteristics

Chest pain was the most common presenting symptom reported by 92% (698/756) of women and 91% (1,081/1185) of men with suspected acute coronary syndrome (P=0.439, *Table 11*). Pain with typical nature descriptors, the presence of radiation, and the presence of additional symptoms were all more common in women with suspected acute coronary syndrome (P<0.04 for all, *Table 11*). Women, compared to men, more often reported palpitations as a presenting symptom (11% *versus* 7%; *Table 12*). Women were also more likely to report that their chest pain radiated to the left arm (36% *versus* 31%), the back (31% *versus* 17%), or to the neck or jaw (28% *versus* 20%) than men, and were more likely to report associated nausea (34% *versus* 22%; *Table 12*).

Chest pain remained the most common presenting symptom for women and men with a diagnosis of type 1 myocardial infarction (93% and 93%, P=1.00; *Table 11*). The frequency of typical and atypical features of chest pain in women and men with and without an adjudicated diagnosis of type 1 myocardial infarction is illustrated in *Figure 15*. Women with type 1 myocardial infarction reported pain with more typical nature descriptors than men (81% *versus* 64%, P=0.005, *Table 11*), and pain was classified overall as typical more commonly in women (77% *versus* 59%, P=0.007, *Table 11*).

Table 11   Presenting symptom features of the study population

	Suspected acute coronary syndrome			Type 1 myocardial infarction		
	Men (n=1,185)	Women (n=756)	P value	Men (n=184)	Women (n=90)	P value
Presenting symptom						
Chest pain, n (%)	1081 (91.2)	698 (92.3)	0.439	171 (92.9)	84 (93.3)	1
Symptom feature						
Typical nature[a], n (%)	772 (65.1)	532 (70.4)	0.019	117 (63.6)	73 (81.1)	0.005
Typical location[b], n (%)	1068 (90.1)	683 (90.3)	0.937	165 (89.7)	84 (93.3)	0.445
Radiation (any), n (%)	586 (49.5)	491 (64.9)	<0.001	119 (64.7)	65 (72.2)	0.266
Additional symptoms, n (%)	657 (55.4)	456 (60.3)	0.038	94 (51.1)	56 (62.2)	0.107
Symptom classification						
Typical pain[c]	719 (61)	489 (65)	0.084	109 (59)	69 (77)	0.007
Atypical pain[d]	466 (39)	267 (35)	0.084	75 (41)	21 (23)	0.007

[a] Typical nature is pain with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping
[b] Typical location is chest, arm or jaw. Location data missing in 6.6% of patients with chest pain.
[c] Typical pain classified in any patient who described pain of chest, arm or jaw, with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping.
[d] Atypical pain classified in any patient who described epigastric or back pain, or pain that was burning, stabbing, indigestion like, or any other pain description, or presentation.

Symptoms compared between men and women using χ^2 tests for categorical data

Table 12   Presenting symptom characteristics stratified by diagnosis

	Suspected acute coronary syndrome		Type 1 myocardial infarction	
	Men (n=1,185)	Women (n=756)	Men (n=184)	Women (n=90)
Presenting symptom[a]				
Chest pain, n (%)	1081 (91.2)	698 (92.3)	171 (92.9)	84 (93.3)
Dyspnoea, n (%)	331 (27.9)	216 (28.6)	58 (31.5)	35 (38.9)
Palpitation, n (%)	86 (7.3)	81 (10.7)	3 (1.6)	8 (8.9)
Syncope, n (%)	22 (1.9)	8 (1.1)	1 (0.5)	1 (1.1)
Other, n (%)	123 (10.4)	65 (8.6)	15 (8.2)	6 (6.7)
Radiation				
Left arm, n (%)	368 (31.1)	271 (35.8)	89 (48.4)	44 (48.9)
Right arm, n (%)	138 (11.6)	87 (11.5)	50 (27.2)	21 (23.3)
Neck/jaw, n (%)	234 (19.7)	212 (28.0)	41 (22.3)	29 (32.2)
Back, n (%)	196 (16.5)	237 (31.3)	29 (15.8)	25 (27.8)
Other, n (%)	81 (6.8)	55 (7.3)	9 (4.9)	8 (8.9)
Additional symptoms				
Nausea, n (%)	262 (22.1)	257 (34.0)	35 (19.0)	30 (33.3)
Vomiting, n (%)	41 (3.5)	34 (4.5)	6 (3.3)	3 (3.3)
Sweating, n (%)	371 (31.3)	229 (30.3)	58 (31.5)	29 (32.2)
Shortness of breath, n (%)	225 (19.0)	126 (16.7)	28 (15.2)	21 (23.3)
Palpitations, n (%)	38 (3.2)	29 (3.8)	3 (1.6)	4 (4.4)
Other, n (%)	54 (4.6)	35 (4.6)	7 (3.8)	1 (1.1)
Symptom feature				
Typical nature[b], n (%)	772 (65.1)	532 (70.4)	117 (63.6)	73 (81.1)
Typical location[c], n (%)	1068 (90.1)	683 (90.3)	165 (89.7)	84 (93.3)
Radiation (any), n (%)	586 (49.5)	491 (64.9)	119 (64.7)	65 (72.2)
Additional symptoms, n (%)	657 (55.4)	456 (60.3)	94 (51.1)	56 (62.2)
Symptom classification				
Typical pain[d]	719 (61)	489 (65)	109 (59)	69 (77)
Atypical pain[e]	466 (39)	267 (35)	75 (41)	21 (23)

[a] Patient reporting more than one symptom were counted for all symptoms reported

[b] Typical nature is pain with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping

[c] Typical location is chest, arm or jaw

[d] Typical pain classified in any patient who described pain of chest, arm or jaw, with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping.

[e] Atypical pain classified in any patient who described epigastric or back pain, or pain that was burning, stabbing, indigestion like, or any other pain description, or presentation

Figure 15 Frequency distribution of typical and atypical descriptors of chest pain in men and women.

A
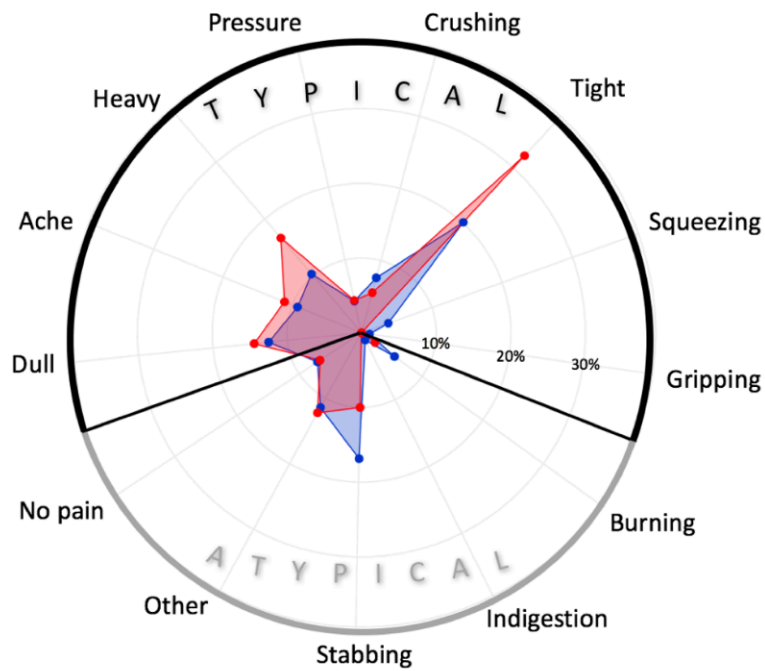
B
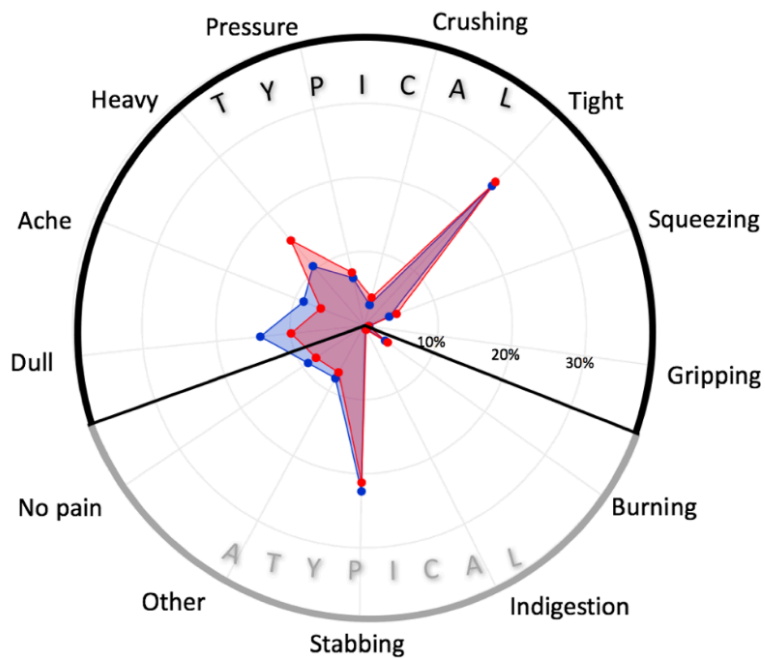
Frequency of typical and atypical descriptors of pain, stratified by sex, in those with myocardial infarction (panel A, n=274) and without myocardial infarction (panel B, n=1667). Males are represented in blue, females are represented in red.

The adjudicated diagnosis was type 2 myocardial infarction in 5.1% (39/756) of women and 3.2% (38/1185) of men (***Table 9***). Chest pain remained the most common presenting symptom for women and men with type 2 myocardial infarction (82% and 87% respectively), but was less common than in those with type 1 myocardial infarction (***Table 13)***. Overall, patients with type 2 myocardial infarction were less likely to have typical chest pain location (82% *versus* 91%, P=0.04), less likely to have radiating pain (49% *versus* 67%, P=0.006) and more likely to present with palpitations (19% *versus* 4%, P=<0.001) when compared to patients with type 1 myocardial infarction (***Table 13***). Consistent with the findings of patients with type 1 myocardial infarction, typical symptom features (pain with typical nature descriptors, the presence of radiation, and the presence of additional symptoms) were more frequently reported in women than men with type 2 myocardial infarction (***Table 13***).

Table 13 Comparison of symptom features in all men and women with a diagnosis of type 1 and type 2 myocardial infarction stratified by sex

	Type 1 myocardial infarction			Type 2 myocardial infarction			P value (All Type 1 vs Type 2)
	All patients (n=274)	Men (n=184)	Women (n=90)	All patients (n=77)	Men (n=38)	Women (n=39)	
Presenting symptom[a]							
Chest pain, n (%)	255 (93)	171 (93)	84 (93)	65 (84)	33 (87)	32 (82)	0.03
Dyspnoea, n (%)	93 (34)	58 (32)	35 (39)	30 (39)	16 (45)	14 (36)	0.50
Palpitation, n (%)	11 (4)	3 (2)	8 (9)	15 (19)	6 (16)	9 (23)	<0.001
Syncope, n (%)	2 (1)	1 (1)	1 (1)	6 (8)	4 (11)	2 (5)	0.001
Other, n (%)	21 (7)	15 (8)	6 (7)	4 (5)	1 (3)	3 (8)	0.62
Symptom feature							
Typical nature[b], n (%)	190 (69)	117 (64)	73 (81)	51 (66)	23 (61)	28 (72)	0.70
Typical location[c], n (%)	249 (91)	165 (90)	84 (93)	63 (82)	31 (82)	32 (82)	0.04
Radiation (any), n (%)	184 (67)	119 (65)	65 (72)	38 (49)	17 (45)	21 (54)	0.006
Associated symptoms, n (%)	150 (55)	94 (51)	56 (62)	44 (57)	21 (55)	23 (59)	0.81
Symptom classification							
Typical pain[d]	178 (65)	109 (59)	69 (77)	45 (58)	21 (55)	24 (62)	0.36
Atypical pain[e]	96 (35)	75 (41)	21 (23)	32 (42)	17 (45)	15 (38)	0.36

[a] Patient reporting more than one symptom were counted for all symptoms reported
[b] Typical nature is pain with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping
[c] Typical location is chest, arm or jaw
[d] Typical pain classified in any patient who described pain of chest, arm or jaw, with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping.
[e] Atypical pain classified in any patient who described epigastric or back pain, or pain that was burning, stabbing, indigestion like, or any other pain description, or presentation.

6.3.3 Diagnostic performance of chest pain characteristics

Typical pain nature symptoms were predictive of type 1 myocardial infarction in women (LR+ 1.18, 95% CI 1.04 to 1.31) but not men (LR+ 0.97, 95% CI 0.86 to 1.09; *Figure 16*). Conversely, radiation of pain was predictive of myocardial infarction in men (LR+ 1.39, 95% CI 1.22 to 1.56) but not women (LR+ 1.13, 95% CI 0.97 to 1.28). In women, the combination of three or more typical features (pain nature, pain location, radiation, associated symptoms) was associated with a significant positive likelihood ratio for the diagnosis of type 1 myocardial infarction (LR+1.18, 95% CI 1.03 to 1.31), but this relationship was not present in men (LR+ 1.09, 95% CI 0.96 to 1.24).

Using logistic regression modelling, odds ratios were calculated for combinations of typical features (pain nature, pain location, radiation, associated symptoms) to predict a diagnosis of type 1 myocardial infarction, compared to 0 or 1 features being present (0 and 1 were combined due to low numbers). Each subsequent addition of a typical feature increased the odds of type 1 myocardial infarction in women, but additional symptoms had no associated predictive value in men (*Table 14*). This association remained even after adjusting for baseline characteristics including age and comorbidity.

Figure 16   Positive likelihood ratios for the diagnosis of type 1 myocardial infarction of typical clinical features in men and women

		Prevalence (95% CI)	Specificity (95% CI)	Sensitivity (95% CI)	Positive LR (95% CI)
Typical Nature	Female	70.3 (67.1-73.6)	31.1 (27.6-34.6)	80.8 (72.6-88.5)	1.18 (1.04-1.31)
	Male	65.1 (62.4-67.8)	34.6 (31.6-37.5)	63.5 (56.6-70.4)	0.97 (0.86-1.08)
Typical Location	Female	90.3 (88.2-92.4)	10.1 (7.9-12.4)	92.9 (87.5-97.6)	1.04 (0.97-1.09)
	Male	90.1 (88.4-91.8)	9.8 (8.0-11.7)	89.5 (85.0-93.7)	1.00 (0.94-1.04)
Radiation	Female	64.9 (61.5-68.3)	36.1 (32.4-39.7)	72.0 (62.7-81.0)	1.13 (0.96-1.28)
	Male	49.5 (46.6-52.3)	53.3 (50.3-56.4)	64.6 (57.7-71.4)	1.39 (1.22-1.57)
Associated Symptoms	Female	60.3 (56.8-63.8)	40.0 (36.3-43.7)	62.1 (52.1-71.9)	1.04 (0.86-1.21)
	Male	55.4 (52.6-58.3)	43.8 (40.7-46.8)	51.1 (43.9-58.3)	0.91 (0.77-1.05)

Forest plot of the positive likelihood ratios and 95% confidence intervals of 4 clinical features (pain nature, pain location, radiation, associated symptoms) in predicting the diagnosis of myocardial infarction.

Table 14 Logistic regression model evaluating typicality of symptoms to predict the diagnosis of myocardial infarction

		OR in men (95% CI)	OR in women (95% CI)
Unadjusted			
Number of typical features	0 or 1	1.0 (reference)	1.0 (reference)
	2	1.1 (0.6–1.8)	3.6 (1.0–23.0)
	3	1.2 (0.7–2.1)	5.1 (1.5–31.6)
	4	1.4 (0.8–2.5)	5.3 (1.5–33.3)
Adjusted*			
Number of typical features	0 or 1	1.0 (reference)	1.0 (reference)
	2	1.1 (0.6–2.0)	4.0 (1.0–26.1)
	3	1.5 (0.9–2.7)	5.9 (1.6–38.0)
	4	1.8 (0.9–3.6)	6.9 (1.8–45.3)

Results are odds ratios (OR) and 95% confidence intervals. Typical features refer to the nature, location or radiation of pain and any associated features. Scores of 0 and 1 were combined due to low numbers.
* Model adjusted for age, history of ischemic heart disease, diabetes, hypertension, smoking (current or ex-smoker), ischaemia on presentation ECG and the presence of any atypical feature

6.3.4 Sex-specific diagnostic thresholds

The use of a high-sensitivity cTnI assay and sex-specific diagnostic thresholds increased the number of patients diagnosed with type 1 myocardial infarction by 30% (27/90) in women and 4.9% (9/184) in men (P<0.001). The symptoms reported by patients reclassified using this approach were similar to those identified by the contemporary assay with a uniform threshold (***Table 15***).

Table 15 Comparison of symptom features in all men and all women with type 1 myocardial infarction and those reclassified using a high-sensitivity cardiac troponin test and sex-specific diagnostic thresholds

	Patient reported symptoms in those with type 1 myocardial infarction					
	Men			Women		
	All	Reclassified by hs-cTnI assay[f]	Identified by c-TnI assay	All	Reclassified by hs-cTnI assay[f]	Identified by c-TnI assay
	(n=184)	(n=9)	(n=175)	(n=90)	(n=27)	(n=63)
Presenting symptom[a]						
Chest pain, n (%)	171 (93)	9 (100)	162 (93)	84 (93)	24 (89)	60 (95)
Dyspnoea, n (%)	58 (32)	5 (56)	53 (30)	35 (39)	8 (30)	27 (43)
Palpitation, n (%)	3 (2)	0 (0)	3 (2)	8 (9)	3 (11)	5 (8)
Syncope, n (%)	1 (1)	0 (0)	1 (1)	1 (1)	0 (0)	1 (2)
Other, n (%)	15 (8)	1 (11)	14 (8)	6 (7)	2 (7)	4 (6)
Symptom feature						
Typical nature[b], n (%)	117 (64)	4 (44)	113 (65)	73 (81)	21 (78)	52 (83)
Typical location,[c] n (%)	165 (90)	9 (100)	156 (89)	84 (93)	25 (93)	59 (94)
Radiation, n (%)	119 (65)	4 (44)	115 (66)	65 (72)	17 (63)	48 (76)
Additional symptoms, n (%)	94 (51)	4 (44)	90 (51)	56 (62)	17 (63)	39 (62)
Symptom classification						
Typical pain,[d] n (%)	109 (59)	4 (44)	105 (60)	69 (77)	20 (74)	49 (78)
Atypical pain,[e] n (%)	75 (41)	5 (56)	70 (40)	21 (23)	7 (26)	14 (22)

[a] Patient reporting more than one symptom were counted for all symptoms reported

[b] Typical nature is chest pain with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping

[c] Typical location is chest, arm or jaw

[d] Typical pain classified in any patient who described pain of chest, arm or jaw, with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping.

[e] Atypical pain classified in any patient who described epigastric or back pain, or pain that was burning, stabbing, indigestion like, or any other pain description, or presentation.

[f] Participants diagnosed with myocardial injury identified by the high sensitivity assay with sex-specific thresholds (>16ng/L for women and >34ng/L for men) who would have been unrecognised with the previous generation of contemporary cardiac troponin I assays (those with high-sensitivity troponin I concentrations of 17–49ng/L for women and 35–49ng/L for men) were "reclassified".

6.4 Discussion

Clinical symptoms are a major part of risk stratification for patients presenting to the Emergency Department with suspected acute coronary syndrome. The subject of sex differences in presenting symptoms of acute coronary syndromes has led to multiple review articles and research studies addressing this issue without resolution (Lichtman et al., 2018, Khan et al., 2013, Canto et al., 2007, Canto et al., 2012, Canto et al., 2014, Rubini Gimenez et al., 2014, Devon et al., 2014, Shin et al., 2010, Dey et al., 2009, Rosenfeld et al., 2015, Milner et al., 1999, Milner et al., 2002). International guidelines continue to state that atypical symptom presentations are more common in women than men (Mehta et al., 2016, Roffi et al., 2016).

This study aimed to establish the presenting symptoms of patients with myocardial infarction in an Emergency Department setting, using sex-specific diagnostic criteria and direct patient interview at the time of presentation. Two major findings are reported. First, women with type 1 myocardial infarction reported *more* typical symptoms than men. Second, whilst individual typical pain features had a similar likelihood for predicting type 1 myocardial infarction in women and men, the cumulative effect of between one and four typical pain features predicted a diagnosis of type 1 myocardial infarction more strongly in women than in men even after adjusting for baseline characteristics including age and comorbidity.

This study has several strengths. The study population consisted of a

prospective cohort of patients with diagnosis of myocardial infarction informed by the independent adjudication of two cardiologists. Diagnosis was based on a high-sensitivity troponin I assay with sex-specific diagnostic thresholds as recommended by the latest international guidelines (Thygesen et al., 2018). Data on the presenting symptoms was collected prospectively through direct patient interview, by an independent research team, at the time of presentation in the Emergency Department, and prior to the patient being informed of their diagnosis. Symptoms were classified using standardised definitions of typical and atypical pain (Greenslade et al., 2012).

The findings add to those from previous studies undertaken in an Emergency Department population (Rubini Gimenez et al., 2014, Devon et al., 2014, Rosenfeld et al., 2015, Milner et al., 1999, Milner et al., 2002). All disagree with the contention in clinical guidelines that atypical symptom presentations occur more commonly in women. Not only do these studies disagree with the ESC guideline for the management of acute coronary syndromes in patients without persistent ST-segment elevation (Roffi et al., 2016)., they are incorrectly used as supporting evidence within the guideline. The document states that atypical symptom presentations are more common among women and provides three citations as evidence. Review of these citations reveals that two of them state that no sex differences are evident in the presenting symptoms of men and women with myocardial infarction (Rubini Gimenez et al., 2014) (Mackay et al., 2011). The third does state atypical presentations are more common in women (Canto and Centor, 2002), though the authors have published more recent

work (prior to publication of the guideline) recognising the body of work yielding inconclusive results on the subject of sex differences (Canto et al., 2014). The evidence chosen to support the atypical symptom presentation in women claimed by the guideline appears to be commonly accepted, but unscientifically supported and therefore misrepresented. There appears to be a prevailing culture within medicine that women may present more commonly with atypical symptoms despite research evidence that may be counter to that claim. This study supports the findings of others in stating that atypical presentations are not more common in women. Milner and colleagues observed that typical symptoms were more common in women, and these symptoms were more predictive of myocardial infarction in women in a population of patients with suspected acute coronary syndrome in a US Emergency Department (Milner et al., 2002). By enrolling patients with suspected acute coronary syndrome prior to the initial diagnosis, the risk of selection bias that may compromise findings in cohorts enrolled once the diagnosis of myocardial infarction is confirmed is reduced. Studies that rely on patient registries or populations with confirmed myocardial infarction risk excluding many symptom presentations. Furthermore, studies performed prior to the third universal definition of myocardial infarction (Thygesen et al., 2012) may not be representative of current practice where the use of sex-specific diagnostic thresholds are recommended. In this study, all cases with troponin concentrations above the 99th centile were adjudicated for the diagnosis of myocardial infarction using sex-specific thresholds. 1 in 3 women with a diagnosis of type 1 myocardial infarction were only identified by using a high-

sensitivity cardiac troponin assay with sex-specific thresholds. This approach is now endorsed by the Fourth Universal Definition of Myocardial Infarction (Thygesen et al., 2018), and will substantially increase the number of women diagnosed with myocardial infarction. Interestingly women reclassified by this approach were as likely to present with typical chest pain as those identified using a conventional assay with a uniform diagnostic threshold for both men and women. These women would have previously remained undiagnosed using a uniform threshold, therefore their symptom profiles would have been disregarded.

This study used standardised definitions of typical and atypical symptoms offered by Greenslade and colleagues (Greenslade et al., 2012) in order to classify patient presentations into these categories. Many previous studies have not use standardised definitions, and have categorised the presenting symptom differently with terms such as chest discomfort or chest pressure considered to be distinct from chest pain. This may account for the high percentage of patients presenting with chest pain as all such terms were considered to indicate the presence of chest pain. This is in agreement with Kreatsoulas and colleagues (Kreatsoulas et al., 2013) stating that descriptive terms are a function of gendered language rather than differences in symptom presentation. Abstracting symptom presentation from medical records may further dilute these terms as they are translated into medical terminology at the discretion of the attending clinician. A term such as chest discomfort may be translated into the absence of chest pain rendering the presentation atypical.

The documentation of symptom presentation is unlikely to be a neutral process, but may be influenced by clinician interpretation of symptoms during the process of translating symptoms into medical terminology for documentation in medical records. A discordance between patient reported symptom and that documented in medical records has been previously reported (Barbara et al., 2012, Valikodath et al., 2017). The validity of data abstracted from electronic patient records for 'big data' research has therefore been questioned due to this discrepancy (Valikodath et al., 2017).

Patient reported data collection can therefore be viewed as superior to that gained from medical record review. Data was collected during the Emergency Department attendance. This minimises the risk of recall bias. It was also collected prior to clinical diagnosis, therefore reporting was not influenced by lay interpretation of the usual symptoms associated with myocardial infarction. Clinician-patient interactions as the focus of an observation study, revealed clinicians actively restructuring patient accounts until they fitted diagnostic criteria that the clinician felt applicable (Somerville et al., 2008). By using patient reported data, accounts of symptom presentation remain as intended by the source, and are not limited to predetermined answers prompting particular responses as in a questionnaire format.

The method of research data collection is also likely to be a gendered process. The data collection process for this study occurred as a 'guided conversation' between researcher and study participant. The research nurse team was predominantly female, and it is possible that patients gave a different version

of their symptom story to a female research nurse than to a clinical doctor (whether male or female). Characteristics of female gender (dedicated to others, emotional, kind, aware of others' feelings, understanding, warm), are likely to promote conversation between researcher and participant. The imbalance of power that exists between a doctor and patient (Koeck, 2014), is likely to be diminished when the interaction is between a female researcher and patient. It is also possible that participants felt more at ease taking time to talk to a researcher, due to the moral arguments of appropriate use of healthcare resources that patients confront during an encounter with the health service. It may seem more appropriate to spend time talking to a researcher than a clinician, and therefore a fuller picture of events may be revealed.

The increased reporting of associated symptoms in women has been widely documented (Lichtman et al., 2018, Canto et al., 2014, Dey et al., 2009, Rosenfeld et al., 2015, Milner et al., 2002), and confirmed in this patient population, with radiation to the back, nausea and palpitations described more commonly among women. As 93% of women with myocardial infarction presented with chest pain, these symptoms occurred as additional symptoms and not primary presenting symptoms. The presence of these additional symptoms in women may cloud their symptom presentation, influence clinician interpretation of symptoms (Lichtman et al., 2018) and provide the basis for the atypical symptom message to gain dominance.

The limited predictive value of chest pain characteristics in the absence of other diagnostic information such as electrocardiogram and has been

confirmed by several studies (Rubini Gimenez et al., 2014, Swap and Nagurney, 2005, Goodacre et al., 2009), and could be responsible for delays in diagnosis. In this cohort of patients, the predictive value of the combined presence of multiple typical pain features renders a typical pain presentation in women more diagnostically valuable than in men. The assessment of patients using symptom clusters may be more clinically relevant than focusing on symptoms in isolation as this is often how patients present. Typical symptom clusters in women should therefore provoke high suspicion of myocardial infarction. Recognition of the clinical significance of such symptom clusters may in part address the disparity in treatment and outcomes experienced by women (Rosenfeld et al., 2015).

The National Institute for Health and Care Excellence (NICE) guidelines in the UK state that men and women with suspected acute coronary syndrome should not be assessed differently (NICE, 2010). Data from this study suggest that this should be extended to international guidelines with a stronger message of the clinical value of typical symptoms in women. It may be time to reflect on the usefulness of the terms typical and atypical and acknowledge that both men and women with acute coronary syndrome present with an array of symptoms (Canto et al., 2014).

There are some limitations to this study that may affect the generalisability of findings. Patients were enrolled from a single tertiary care hospital in Scotland. However, the study population consists of patients who self-presented or were

referred from primary care practitioners to our institution, rather than those transferred from other acute care hospitals; therefore it is reasonable to believe the findings are generalisable to most acute secondary and tertiary care centres. Participants were identified at the time cardiac troponin was ordered in the Emergency Department. It is possible that physician bias may have influenced the selection of patients who underwent troponin testing and that those with less typical symptoms may not have been tested. However, it is widely accepted that troponin testing is over used in this setting, and that the approach taken will have ensured a broad spectrum of participants were identified. Recruitment was restricted to those patients presenting between 8am and 3pm, but it is not anticipated that patients presenting outwith this time period would be likely to present with different symptoms. Furthermore, this study was performed in consented patients and therefore only reflects the presenting symptoms of those who are able to provide informed consent. Patients presenting by ambulance with ST-segment elevation myocardial infarction (STEMI) bypass the Emergency Department to facilitate timely coronary revascularisation and therefore these patients were not recruited. A recent study has reported sex-differences in the presenting symptoms of STEMI patients though it should be noted that only 24% of the study population were women (Sederholm Lawesson et al., 2018). However, it can be argued that symptom differences in this subgroup are less important as the diagnosis here is based primarily on the electrocardiogram rather than on other features of the clinical presentation. Finally, the effect ethnicity may have on symptom presentation was not taken into account. In Scotland, 96% of the population

are classified as white (Scottish Government, 2011) and this may limit the generalisability of our findings to other more ethnically diverse populations.

6.5 Conclusion

This study concludes that women more frequently describe pain of a typical nature than men, and typical symptoms are more predictive of a diagnosis of myocardial infarction in women than in men. Guidelines and educational material should be updated to minimise the risk of under diagnosis and treatment of women with myocardial infarction. This is however an interpretation of the data with a purely objective lens. Throughout the discussion it has been highlighted where data may have been exposed to human factors during the clinical assessment process. The implications of this are considered in the final discussion chapter of this thesis.

Chapter 7

Discussion

This final chapter will begin with a discussion of how the inclusion of qualitative research has enhanced clinical trial data to reveal the practical application of the early rule-out pathway in a clinical setting. In addition, I propose possible explanations for the dominance of the discourse concerning atypical symptom presentation of myocardial infarction among women. This chapter will conclude with personal reflections on my growth as a researcher and the contribution of qualitative research to clinical trial findings. A final section suggests future directions for the research revealed by this thesis.

7.1 Summary of findings

This thesis explored how the implementation of an early rule-out pathway for myocardial infarction may shape patient experience of chest pain and the associated assessment process. Qualitative research has uncovered the differing priorities of the clinical pathway, versus the holistic patient view of chest pain assessment. Findings revealed that the patients' experience of chest pain extended both before and after the assessment episode in hospital. This experience incorporated self-appraisal of symptoms, encompassing the constructs of lay consultation, candidacy, and variable prioritisation of ill health over other aspects of day to day life. Morality, politics and use of the health service were potent factors in decision making in response to a threat to health. Wider societal issues regarding appropriate use of the health service, and also a concern about an over-stretched health service were evident in participant accounts of deciding when and where to seek care. The influence of assessment activities and hospital routines on patient interpretation of care

events is also discussed. A key finding was that a discord was found to exist between the objective interpretation of a troponin value by a clinician, and the significance that the result may hold with a patient. Where a discord was seen to exist, reassurance through the chest pain assessment process was more difficult to achieve. For many participants, their illness episode did not conclude with the rule-out of myocardial infarction as it may have done so for the assessing clinician signified by the decision to discharge the patient. After discharge from hospital following the rule-out of myocardial infarction, participants revealed how they continued to construct meaning from their chest pain experience. The way in which participants made use of their acute chest pain presentation to hospital as an opportunity to consider their future health was also revealed as an unelicited theme within interviews.

Qualitative research has provided a means to explore how the scientific, biochemical, evidence upon which the early rule-out pathway was based, may be effectively applied in a clinical environment. The evidence uncovered during this research reveals effective clinician-patient communication to be a key link in translating scientific data into meaningful patient centred care.

7.2 Bridging the gap between evidence-based medicine and patient centred care

The pressures of Emergency Department care have led to increased use of clinical guidelines and care pathways. By following guidelines, the complicated diagnostic decision-making process is facilitated, with the aim of ensuring a universally high standard of care. Guidelines are particularly suited to

conditions that pose the greatest demand on the health service – those that present with high frequency, high risk, or high cost (Agrawal and Kosowsky, 2009). Chest pain is a clear example of this, representing 6% of all Emergency Department attendances (Goodacre et al., 2005). While guidelines aim to standardise the quality of care provided to all patients, the concept of quality of care may be defined differently by different stakeholders in the health service (Grimshaw and Russell, 1993). A risk of providing guideline-based care is that as care becomes more standardised, it may become less patient centred. Clinical guidelines were never intended to dictate management, but as the name suggests, to *guide* care.

The early rule-out pathway was developed based on biochemical and clinical data though is not intended to view the patient as a set of objective variables. The clinical trial from which the early rule-out pathway for myocardial infarction was derived (NCT03005158) aimed to address this in two ways. Firstly, by using a 'real world' population from the Emergency Department incorporating all the complexities of patients with co-morbidities, and secondly, by recognising the need to use qualitative research to uncover patient experience of chest pain both before and after implementation of the early rule-out pathway.

7.3 Aligning evidence-based medicine and patient centred care with qualitative research

The two well accepted care models of evidence-based medicine and patient centred care can appear to be rooted in clearly different paradigms. Evidence-

based care is positivist in nature, based on objective, empirical, experimental data. Patient centred care, on the other hand, recognises an illness (or set of symptoms) in the context of an individual patient. It emphasises communication and partnership between doctor and patient, and aims to uncover the patient perspectives, needs and preferences. Patient centred care can be termed humanistic (Bensing, 2000). Practitioners aiming to provide person centred care describe a tension between the narrow disease-specific focus of guidelines, and the whole-person care they wish to provide (Hansen et al., 2016). Emergency medicine is a specialist field of medicine based on solving acute problems, with the principal aim being to minimise early mortality (West, 2001). Practitioners working in this heavily time pressured environment admit to performing consultations focusing on a patient's specific medical problem, due to the briefness of their interaction with the patient (Pun et al., 2015). It could be claimed that patients are receiving optimal care with the rule-out of myocardial infarction whether or not they are happy with the care they receive, due to the exclusion of a serious disease through validated measures. This is where the distinction between *care* and *treatment* becomes important. The goals of medicine must extend beyond administering appropriate treatments: caring for patients involves translating evidence into effective clinical practice. Qualitative research provides a means to explore how scientific evidence may be applied in a clinical environment resulting in patient centred care (Sale and Thielke, 2018). It provides the final point of the translational process.

The incorporation of the findings from the qualitative element of this trial will aid clinicians in applying the biochemical data in a clinical context. In doing so, patients will be recognised as complex beings with an illness experience that is not confined to that particular consultation or episode. Research findings from trial data cannot be detached from the unforeseen ways in which individuals may react to a deviation in health status (Barker, 2002). Use of a broader evidence base incorporating patient experience is therefore required to achieve the implementation of patient centred care (Rycroft-Malone et al., 2004), with the ultimate aim of achieving evidence-based, patient centred care.

The over-riding findings that have emerged from interview data regarding the implementation of the early rule-out pathway for myocardial infarction, are the differing needs of the clinician and the patient regarding the assessment process. The pathway relies on evidence-based medicine by identifying patients as low risk of myocardial infarction on presentation to the emergency department (Shah et al., 2015b, Chapman et al., 2017a). These data were collected by measuring the concentration of troponin I, using a high-sensitivity assay, from venous blood samples of patients attending the Emergency Department. The primary outcome was subsequent myocardial infarction or cardiac death at 30 days. The benefits of making treatment decisions based on the best available evidence about an appropriate care pathway, are clearly in the best interest of the patient, but the development of the pathway was in fact disease centred rather than patient centred. The pathway was implemented based on biochemical and clinical data. Evidence-based

medicine has been described as 'clinician centred', in that it focuses on clinician interpretation of evidence, traditionally giving less attention to the patient's interpretation of the consultation activity (Bensing, 2000). With this interpretation, evidence-based medicine could be seen as a threat to 'patient centred' medicine.

It is indisputable that people should receive care based on the best available evidence, but this raises the question of what counts as evidence? Findings from the laboratory must be tested in randomised controlled trials (RCTs) in order to see how laboratory findings translate into a patient population. RCTs, or even meta-analyses of RCTs, are considered to be at the pinnacle of the evidence tree with regards to evidence-based medicine (Murad et al., 2016). Such trials recruit a very 'pure' population of patients aiming to produce two homogenous populations of people within which treatment groups can be compared. While these trials have undoubtedly advanced patient care, RCTs are designed to be performed on a disease state and not on a patient with all the complexities of the lifeworld (Bensing, 2000). The results must then be applied to a patient who may have been excluded from the trial population due to numerous factors including co-morbidities, age, or proximity to the study site. At the core of evidence-based medicine are individual patients (Greenhalgh et al., 2015). Writing in The Lancet as many as twenty years ago, Maynard stated that evidence-based medicine should only be part of the decision making process in deciding what care is appropriate for individual patients (Maynard, 1997). The work of this thesis has allowed the patient

perspective to be embedded into the evidence base of a new care pathway.

7.4 Delivering evidence-based medicine in the context of a clinical consultation

A clinical consultation represents a very nuanced kind of interaction. On the surface, it deals with the interpretation of a set of symptoms and biochemical values which can be compared against the diagnostic criteria that are typically displayed by patients with the particular disease category. In addition to this, from the patient perspective, the illness presentation, assessment process, and subsequent decision making occur within a complex environment, where information seeking, lay consultation and sense making all have great salience (chapter 5a), (Greenhalgh et al., 2015). An increase in protocol directed care has seen the focus of communication in a consultation moving from listening and empathy, to task-oriented communication in order to derive the next step in the protocol (Derksen et al., 2016). This was evidenced by interviewees in this thesis discussing a lack of communication. Patient management was regarded by some participants as centred exclusively around obtaining a blood sample. A brief communication then followed once results were available stating there was no evidence of myocardial infarction and the patient could be discharged. Following an evidence-based clinical pathway does not independently equate to good quality care. Throughout this thesis it has been highlighted where the communication between the clinician and patient can aid both parties in achieving a more satisfactory conclusion to the illness experience. More patient centred outcomes can be achieved when clinical pathways are enhanced by establishing a trustful and personal clinician-

patient relationship. This can be achieved through effective communication and is detailed in the discussion of chapter 5b. Protocol, and process driven care, has been described by medical practitioners as a barrier to the development of empathy, which is crucial if the clinician is to gain an understanding of the illness episode as experienced by that particular patient (Derksen et al., 2016). A patient's individual experience of illness may fit poorly with the recognised biomedical model of disease, (Greenhalgh et al., 2015) on which the clinician may base subsequent care. Or, in the case of the early rule-out pathway, it is often the absence of disease that does not fit with the patient's perception of the cause of their symptoms or their direct experience of such symptoms. A refinement of guidelines to recognise more patient centred data as evidence can augment the biochemical data upon which a guideline is based (Kemper, 2015). The evidence uncovered during this research reveals that effective clinician–patient communication provides a way to enable the collision between clinical pathways and patient centred care to be eased.

Discussion will now turn to the symptom presentation of men and women with myocardial infarction. Possible reasons for the prevailing culture within medicine that women may present more commonly with atypical symptoms, despite research evidence that may be counter to that claim are explored.

7.5 Symptom presentation of men and women with myocardial infarction

A sub-study of the HighSTEACS clinical trial addressed the symptom

presentation of patients diagnosed with myocardial infarction using sex-specific criteria. Two major findings are reported. Firstly, women with type 1 myocardial infarction reported *more* typical symptoms than men. Secondly, the cumulative effect of between one and four typical pain features predicted a diagnosis of type 1 myocardial infarction more strongly in women than in men, even after adjusting for baseline characteristics including age and comorbidity. Although supported by other research (Milner et al., 1999, Devon et al., 2014, Rosenfeld et al., 2015, Rubini Gimenez et al., 2014), these data are contra to the message in international guidelines and popular clinical opinion, which asserts that atypical symptom presentations are more common in women.

The accurate interpretation of clinical symptoms in patients with suspected acute coronary syndrome has implications for patient triage, treatment and subsequent management. Contrary to what data in this thesis have demonstrated, the symptom message which appears to have gained dominance is that women with myocardial infarction are more likely than men to present with atypical symptoms, and without pain. A main research study driving this message was derived from a large registry of patients diagnosed with unstable angina (Canto and Centor, 2002). These same authors now highlight the "problem of making general and mutually exclusive statements about sex, considering the substantial overlap of symptom presentation in women and men" (Canto et al., 2014). The issue here is that the message of women being 'atypical' aligned very well the with construction of coronary heart disease as a 'man's disease'. This is the message that appears to have

remained both within public discourse (MacInnes, 2006) and professional discourse (Madonis et al., 2017). Some research articles describing the atypical symptom presentation in women will have reached wide audiences due to appearing in high impact journals, e.g. Journal of the American Medical Association (Canto et al., 2012). A subsequent review article by the same group of authors acknowledging the inconclusive nature of the results, only achieved publication in a much lower impact journal – Canadian Journal of Cardiology - therefore reaching a greatly reduced readership (Canto et al., 2014). This may contribute to the continued traction that assumed sex differences in symptom presentation seems to have. Despite numerous research studies either showing inconclusive results, or results counter to that claim, the message persists. The next section will discuss possible reasons for the dominance of this discourse.

7.6 Construction of coronary heart disease as a male disease

A rise in morbidity and mortality among white, middle-aged males in 1950's America was linked to coronary heart disease (Riska, 2010). This prompted investigation into the link between coronary heart disease and men which revealed the Type A personality construct (Riska, 2010). The idea of a white male executive, who was extremely competitive, and immersed in a stressful professional environment, was deemed to predict coronary heart disease. The construct of coronary heart disease being a 'man's disease' was therefore born, and perpetuated by the industry of medical research at the time. The validation of the instruments developed to assess for a Type A personality

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were only tested on white middle-class males and therefore became self-affirming. As the causal link to coronary heart disease was given as the heavily gendered construct of personality (competitiveness, aggression), this identified female gender as different and not obviously at risk of coronary heart disease.

The evidence base for coronary heart disease was therefore constructed around a white male physiology selected to represent the norm (Heidari and Bachelet, 2018). As women were not deemed to conform to the norm of a patient with coronary heart disease, women were consequently massively under-represented in clinical trials (Wenger, 2012). This therefore translates into the trials upon which presenting symptom profiles are based. As introduced in chapter 6, the gendered interpretation of symptom presentation may also perpetuate the message of atypical characteristics in women.

9.7 Gendered interpretation of symptom presentation

Studies aiming to evaluate the presenting symptoms of men and women with myocardial infarction have focused on sex differences, but the wider concept of gender may have important implications in how these results can be interpreted. This is an example of how positivist, hypothesis driven research can provide *an* answer to a research question, but it is unlikely to be able to provide a *complete* explanation of findings.

As opposed to sex, gender encompasses differences between men and

women that are due to behaviours, attitudes, and expectations of local networks and wider society: a social rather than biological construct. Perceptions of gender influence behaviour and interpretation of ill health, both from the perspective of the patient and the clinician (Regitz-Zagrosek, 2012). Before receiving a diagnosis for a presentation of chest pain, patients experience a gendered assessment process. Previous studies have shown that women being assessed in a primary care environment for coronary heart disease were asked fewer questions than men and received less medication than men (Arber et al., 2006). Clinician certainty of diagnosis was also lower in female patients, which correlated with decreased ordering of diagnostic tests, referral to specialists, and prescription of medication (Lutfey et al., 2009). When considering practice in an Emergency Department environment, a highly gendered effect was noted with female patients being less likely to survive a myocardial infarction if treated by a male doctor (Greenwood et al., 2018). This study only correlated the sex of the assessing clinician in the Emergency Department with survival and did not follow the patient through their illness journey in hospital. Data from within our own centre reveal that women with myocardial infarction are less likely to be referred to cardiology, less likely to receive angiography or revascularisation, and are less likely be prescribed secondary prevention medication than men (Shah et al., 2015a). It is unlikely that sex of the attending clinician in the Emergency Department had a greater impact on survival post myocardial infarction than the provision of appropriate therapy later down the line. However, the sex of the attending clinician may impact on whether a female patient is referred for specialist

cardiology review, and it is also possible that sex of the clinician influenced the course of treatment once in the care of cardiology. Cardiology is a heavily male based speciality (Lau and Wood, 2018), therefore male clinician sex could be a contributing factor throughout the patient journey. The gendered process of symptom presentation and interpretation is therefore influenced by both patient and clinician's own sex. The gendered approach to the assessment of women with suspected acute coronary syndrome, is likely to be reflected in the documentation of symptoms at presentation and has been previously discussed in chapter 6. The focused objective data collection aiming to determine presenting symptoms of men and women with myocardial infarction in this thesis did not allow for consideration of the complex gendered interactions taking place by both the patient and clinician during the assessment process.

While research is often claimed to be objective and aims to address bias in study design, the significance of gender bias in research is often underestimated (Heidari and Bachelet, 2018). The Sex and Gender Equity in Research (SAGER) guidelines were launched in 2016 recommending the routine reporting of sex and gender dimensions in research (SAGER, 2016). Whilst the majority of journals support the SAGER principles, they are not made mandatory for reporting and publishing of research findings. Analysis stratified by sex can reveal disparities in healthcare, but without a gender analysis, is inadequate in understanding the causes of these disparities (Heidari and Bachelet, 2018). During the qualitative component of this study,

the concept of gender was reflected upon, as gender differences did not appear to be as significant as reported in prior clinical literature (Adamson et al., 2009, Foster and Mallik, 1998, Noureddine et al., 2008). Data from the main HighSTEACS trial gave particular attention to sex, recruiting a study population that was 47% female, and reported a prespecified analysis by sex of the impact of introducing sex-specific thresholds into clinical practice for the diagnosis of myocardial infarction (Shah et al., 2018). The influence of gender, however, was not taken into account.

Disaggregation of data by sex is an important first step that can highlight sex differences and similarities that call for further investigation. Gender permeates personal and professional interactions at all levels including health, therefore incorporating gender analysis into health systems research is a core element in producing an effective equitable health system (Morgan et al., 2016). Frameworks exist that allow the exploration of how gender power relations are established and negotiated within healthcare through focusing on the components of 1) access to resources, 2) division of labour and everyday practices, 3) social norms, beliefs and perceptions, and 4) decision making. Investigation at this level may also reveal how the research process itself may be loaded with biases. For example what significance is attached to data of different methodologies, what data is collected and how it is managed, and how findings are disseminated and who is involved in the peer review process (Morgan et al., 2016).

A retrospective reflection of the possible influence of gender suggests two areas where gender may have impacted HighSTEACS trial data. The primary outcome of the trial was subsequent myocardial infarction or death from cardiovascular causes at 1 year after initial presentation. This was assessed for by classifying patients as acute myocardial infarction, unstable angina, cardiac chest pain due to non-coronary pathology (e.g. tachyarrhythmia), non-cardiac chest pain (clear alternative diagnosis), or symptoms of unknown origin. This classification was performed by two independent cardiologists reviewing clinical data (Shah et al., 2018). As has been previously mentioned, cardiology is a heavily male based specialty, and as such the adjudication panel was purely male. The disease classification attributed to patients may have been influenced by male gender of the adjudication panel. Secondly, the information on which the adjudicated diagnosis was made was abstracted from medical records. As previously discussed, the information documented in medical records is subjected to a gendered interpretation by the assessing clinician and therefore only represents information deemed significant by this individual. Performing qualitative interviews with the adjudication panel may have revealed any gender significant biases in the adjudication of cases. Going forward, I aim to utilise a gender framework to offer an additional level to analysis of future projects.

7.8 Gender and use of healthcare services

As well as assessment being a gendered process on the part of clinician interpretation of symptoms, accessing healthcare has also previously been

described as a gendered process. Men have been portrayed as reluctant users of the health service, which has led to constructions of masculinity in relation to health, as strong stoicism (Robertson, 2003). This public perception of male stoicism has the regrettable association that women may behave in a different manner to men, and seek help for trivial complaints (Hunt et al., 2010). This could have implications that medical practitioners may attribute symptoms to less trivial complaints when women present to the healthcare system. In contrast to the widely held beliefs about gender and help seeking detailed above, in the context of suspected acute coronary syndrome, delayed help seeking by women is often given as a reason for poor outcomes in this group. The reasons for delayed help seeking are likely to be multifactorial and several reasons have been offered. Firstly, the social construction of coronary heart disease as a 'man's disease' has implications on how a woman experiencing symptoms of chest pain, as well as those around her, may act. The extent to which a patient views themselves as a candidate for coronary heart disease is derived from media representation, accessible scientific information, and accounts of illness experience from family and friends (Lockyer, 2005, Davison et al., 1991). The general perception that men are at greater risk of heart disease also has a bearing on how lay advice is offered once a woman has discussed her symptoms. Whereas a man having chest pain is likely to be directed towards seeking professional healthcare by the lay people he consults, a woman is less likely to be directed towards appropriate medical care (Richards, 2002). Secondly, although women may recognise their symptoms as abnormal, they may not acknowledge the seriousness of their

nature. Coupled with an unrecognised vulnerability to coronary heart disease, the mismatch of symptoms experienced to those expected from a coronary event, (Sjostrom-Strand and Fridlund, 2008, Schoenberg, 2003) may lead to individuals attributing their symptoms to a more benign cause and not seeking appropriate help (MacInnes, 2006). Women have also been reported to be concerned about wasting doctors' time and do not want to be branded as a 'worrier' (Schoenberg et al., 2003). Even when acute coronary syndrome has been confirmed, women have been found to rate their cardiac disease as less severe than men when controlling for other measures of cardiac disease severity, which may further explain gender variations in care seeking behaviour (Nau et al., 2005). Thirdly, women have also been described as having a desire to maintain social control and responsibilities, by upholding their roles as good wives, good mothers, and good employees/employers. Symptoms were viewed as intrusions in their daily lives, against which the female participants of a study shielded themselves, therefore not seeking appropriate help (Isaksson et al., 2013, Turris and Finamore, 2008). While these explanations are framed as the actions of women in response to chest pain, the majority of these studies were carried out using female-only participants. Using single sex samples denies the opportunity to perform comparative analyses and to ask whether similar health seeking behaviours occur in a wider population, rather than in women exclusively.

It is interesting to note that gender did not appear to be a key differentiating factor in the experience of men and women in this thesis. The prioritisation of

caring activities over personal help seeking has previously been cast as a female trait (Turris and Finamore, 2008). Evident in accounts from the qualitative study in this thesis, were instances of men prioritising caring activities for a spouse or children over seeking assessment for their own symptoms. Gender norms and expectations are changing over time, with an increase in women's economic contribution to the home, and men taking on more childcare responsibilities (Pelletier et al., 2014). This thesis has revealed that both sexes sometimes presented typically *and* atypically, both were sometimes engaged in paid employment and/or caring activities that seemed to influence their actions regarding coronary symptoms, and both were concerned about using health services appropriately. A factor that appeared to be much more prominent than gender in a decision to seek professional assessment, was what can be termed the moral use of health service resources, something that cuts across sex and gender.

It was common in accounts for both men and women to portray their attendance at the Emergency Department as a considered action, and appropriate in the context of a health service under severe financial pressure. The decision to use the Emergency Department was framed against a background of having first explored other avenues of assessment in primary care, and a symptom story serving to validate why such a presentation was appropriate in their particular circumstance. Previous work exploring approaches to help seeking has interpreted delay in presentation and only seeking help as a 'last resort' as a representation of masculinity (George and

Flemming, 2004). It is possible that this 'last resort' was a function of morality and not gender. This representation of healthcare usage as a moral act has also been suggested in other studies (Townsend et al., 2008, Townsend et al., 2006).

7.9 Reflections

A major part of my learning from this thesis has been my growing understanding of myself as a researcher. This has had an impact on the way I have interpreted data produced as part of this thesis, and will shape my research endeavours going forwards. In chapter 4, when considering the research methods that would be used as part of this thesis, I stated that I could identify with a pragmatist position, acknowledging the validity of a variety of perspectives and forms of knowledge. My intention at that time was to justify the use of different methodologies to answer the two different research questions posed. After being immersed in research data during this process, I now appreciate a deeper validity in using differing forms of knowledge, not just between research questions, but also within them.

In order to answer the first question about symptom presentation in men and women with myocardial infarction, the methods used were positivist in nature. My perception at the start of this task, was that I could objectively collect data on presenting characteristics of men and women, in order to determine whether sex differences existed in their presenting symptoms. Although I hold that the data I have provided are robust, I no longer think that such focused,

detached data collection can fully answer the question posed. These data have started to answer the question of whether sex differences exist in the presenting characteristics of men and women with myocardial infarction; but through the analysis process, the idea of a detached researcher now seems both unachievable and inappropriate. Throughout this discussion, I have suggested various means by which the clinical assessment process and data collection methods may be shaped by gendered interactions. However, gender is not the only factor at play. The power dynamic between a person experiencing ill health and those who have the capacity to treat the illness episode, will also have influence in shaping the interaction; this will intersect with gender, but not in a clear-cut way. The data used for this study are the product of the environment in which they are generated. I now view the positivist interpretation of data as deconstructing a research question into component parts, with a focus on only one element. The analysis of such data can provide a robust conclusion, but from a single view point. My stance as a researcher would now necessitate stating such a conclusion was drawn from a specific interpretation of data, and should be treated as *an* interpretation, and not the *definitive* answer.

Conversely, the methods I have used to gain an understanding of the patient experience of chest pain, and how this may be shaped by the early rule-out pathway, are qualitative and interpretive in nature. There are clearly many other important aspects to the early rule-out pathway (that are important to patient care) that I have not addressed in this thesis, and that can be captured

using quantitative methods. Key questions regarding the number of missed cases of myocardial infarction, the number of repeat Emergency Department presentations, and an assessment of the degree of non-adherence to the pathway will all be captured as part of the main trial. It is by opening up the trial methodology to include qualitative techniques that the mechanism by which biochemical and clinical data can be translated into effective patient care can be revealed. Using qualitative methods maintains the patient at the centre of the chest pain episode and reinforces the distinction between the collection of symptoms indicating a disease state (or excluding a disease state) and illness as experienced by the patient. Qualitative data has also enabled exploration of the intersection between the healthcare system and the lifeworld of trial participants. The use of different methodologies provides complementary perspectives incorporating physiological data alongside real patient experience.

With a broader view of the nature of evidence required to answer a research question, I can identify learning that I can take with me as I develop my research career. A methodological addition of observational field work would have provided an additional layer of evidence to aid interpretation of my findings as well as providing data on the important issue of communication in a clinical setting. Observing the assessment process would have provided useful data for both questions in this thesis. It would have revealed whether interactions and patient stories differed between researcher and patient, compared to clinician and patient. It would have also uncovered more about

the dynamics and timings of the interaction, such as whether data are recorded in medical records real time, or documented at a later point, and how long clinicians spend with the patient, and it may have revealed appropriate times to deliver key pieces of information. While I view the content of patient accounts as a depiction of their illness experience, observation would have revealed if certain care activities and communications were taking place, but at a time when participants were unable to process events, therefore did not form part of their illness accounts. Observations would also have allowed for an appreciation of how clinical staff have responded to the change in practice of using the chest pain pathway for the rapid rule-out of myocardial infarction. The practical application of the pathway is dependent upon it aligning with the routines and cultures of the Emergency Department environment. Exploring the clinician view of assessing patients using the early rule-out pathway will be a valuable avenue for further exploration.

The use of qualitative research within a clinical trial and its growing popularity within the community of clinical trial researchers is indicative of a greater acceptance and integration of multiple methods (Snowdon, 2015). In order to recognise the added value of qualitative findings, researchers must appreciate that the more established quantitative outcome evaluations selected to answer a research question may not provide a complete picture of all the factors involved. This is particularly relevant in the implementation of new clinical pathways or interventions where the interplay between human and technical factors can be significant. The value awarded to qualitative research within

trials is dependent upon how the qualitative research is incorporated into the study. Embedding a qualitative component into a study design can benefit a trial by optimising the intervention, facilitating interpretation of trial findings, and enabling more effective use of funding by steering researchers towards interventions more likely to be effective in future trials (O'Cathain et al., 2013). The more the qualitative component is embedded into the trial design, the greater the opportunity to maximise the value of the qualitative component (O'Cathain et al., 2014). Conversely, lack of reporting of qualitative data can also diminish the perceived contribution of this evidence to the overall trial. Reporting of qualitative research in peer-reviewed journals with explicit conclusions drawn in relation to the impact of qualitative research will aid this challenge and raise the profile of the value of inclusion of qualitative methodology in healthcare research. Also crucial to the implementation of an intervention is the exploration of contextual factors which may have significance when the intervention is employed outwith a trial setting, or away from the host trial site.

7.10 Quality improvement

In addition to making an independent contribution to knowledge regarding the experience of chest pain assessment, this thesis has explicitly revealed how an intervention can be refined and enhanced by using qualitative research to aid the clinical assessment of patients attending the Emergency Department with chest pain. Key messages revealed from this study are 1) the patient must remain at the centre of their life world to achieve an assessment carried out

with empathy, 2) the lay and professional work of symptom appraisal that has occurred prior to presentation to the Emergency Department may influence the patient interpretation of illness experience, 3) reassurance does not automatically stem from negative test results but is a process that develops throughout the assessment process and is dependent on the patient-clinician relationship, and 4) the clinical consultation can create an environment where patients are encouraged to consider their future susceptibility to ill health. This may have implications for future applications of using high-sensitivity troponin in screening populations for risk of developing coronary heart disease. In being aware of these factors, it will be possible for clinicians to apply the early rule-out pathway in a way that responds to patient's needs.

This thesis has also highlighted how the message that women with myocardial infarction more commonly present atypical symptoms is at odds with current research evidence. This has implications for patient triage, assessment, and provision of appropriate therapy. Women with myocardial infarction are 50% more likely to receive an incorrect initial diagnosis than men (Wu et al., 2018). As treatment for myocardial infarction is time dependent, assessing a patient against incorrect criteria and therefore delaying diagnosis could be a major reason for the worse outcomes seen in women post myocardial infarction. Not only is this an issue for clinicians but also for public health messages. A lack of awareness of heart attack symptoms may also prove a barrier to seeking help. The British Heart Foundation have included research from this thesis in their latest report "Bias and Biology" (BHF, 2019) which details how women

with myocardial infarction receive poorer care than men in diagnosis, treatment and aftercare. This research in this thesis may go some way to redressing this disparity.

7.11 Implications for future research

Throughout the analysis process, several areas for further study have been revealed. Firstly, the main trial will evaluate the safety and efficacy of the early rule-out pathway, and this thesis has provided a deep analysis of patient experience of care based on this pathway. The obvious element missing is the real-world application of the pathway from the point of view of the clinicians. An exploration of barriers and facilitators to using the early rule-out pathway will reveal its practical use in the Emergency Department setting and may add to our understanding of the clinical factors underpinning our main trial data.

Secondly, the value of embedding qualitative research into study design to complement and enhance clinical trial data has been demonstrated throughout this thesis. Following on from the work of the early rule-out pathway, a new clinical trial has been developed. It is hypothesised that patients without myocardial infarction or known coronary artery disease who have high-sensitivity cardiac troponin concentrations between 5 ng/L and the 99th centile upper reference limit may benefit from further investigation for coronary artery disease at or soon after discharge. Computed tomography coronary angiography (CTCA) is recommended as the first line investigation for all patients presenting with suspected stable anginal chest pain (NICE, 2010), but

the role of CTCA in the assessment of patients with acute chest pain is unclear. Diagnostic strategies must be both clinically effective and cost-effective. This trial therefore aims to determine whether the use of high-sensitivity cardiac troponin testing to target CTCA improves outcomes in patients with acute chest pain in whom myocardial infarction has been ruled out, is safe, and is cost effective.

A qualitative component to this trial may help interpret trial data in two ways. Firstly, it is necessary to understand how this population who are assessed as higher risk, identify with their new 'at risk self'; how they choose to use this information, and whether their personal perception of their health changes over time. Looking ahead to the post trial phase, if found to be effective the trial intervention must be applied outwith the trial environment and become part of routine clinical care. In order to fully understand the intervention it is necessary to gain an understanding of how information is delivered to and received by the patient. Qualitative exploration of a patient's perception and understanding of the clinical consultation they receive after being diagnosed with obstructive coronary heart disease, or their interpretation of the information contained in the form of patient letters will enable the intervention to be effectively applied in a clinical environment. Recruitment of participants from the standard care arm will act as a control to reveal whether themes identified in the intervention arm are unique to those receiving the CTCA intervention. As mentioned earlier, use of a gender framework may add another level of analysis to this investigation. The main trial data will be disaggregated by sex but a deeper

analysis of the qualitative data may reveal a gendered interpretation of events concerning perceived health status, how individuals interpret the information they receive, what future actions they take in response to this information, and what future input they require in order to feel supported.

Finally, the HighSTEACS trial evaluated the impact of introducing sex-specific high-sensitivity troponin thresholds for the diagnosis of myocardial infarction (Shah et al., 2018). While use of sex-specific thresholds identified five-times more additional women than men with myocardial injury, women received approximately half the number of treatments for coronary artery disease as men and their outcomes were not improved (Lee 2019, under review). Another recent study investigated sex differences in acute myocardial infarction guideline-indicated care as defined by the European Society of Cardiology (ESC) and Acute Cardiovascular Care Association (ACCA) quality indicators, and concluded that women in England and Wales less frequently received guideline indicated care and had a higher mortality than men (Wilkinson et al., 2019). While women may be older at presentation and have different pathology (Pasupathy et al., 2017), these factors cannot fully explain sex-differences in excess mortality post acute myocardial infarction (Alabas et al., 2017). As suggested by application of the SAGER guidelines, highlighting a sex disparity reveals the need for further investigation (Heidari and Bachelet, 2018). It is hypothesized that greater attention to the delivery of guideline indicated therapy has the potential to reduce the mortality gap between men and women (Wilkinson et al., 2019). However, little is known of the context specific factors

that influence clinical practice decisions in order to initiate guideline indicated therapy. Study of this phenomenon may provide a more nuanced understanding of where clinical decision making may lead to clinical practice gaps.

The approach of focused ethnography can combine interviews and field observations to understand how experts make complex decisions in a real-world environment. I propose interviewing clinicians coupled with viewing a video recording of their activity performing clinical consultations surrounding access to guideline-based therapy post NSTEMI. This technique is considered the most powerful tool in retrospective studies of reasoning as the video provides interviewees with strong evidence to explain their reasoning during the task of clinical assessment (Pelaccia et al., 2014). A microcamera mounted at eye level of the assessing clinician provides an "own-point-of-view" perspective. By viewing the video recording prior to interview, an increased awareness of the cognitive processes occurring is generated (Unsworth, 2005). A brief review of the literature has revealed clinical decision making is shaped by individual, interpersonal, environmental and organisational influences (Claessens et al., 2014, Manja et al., 2019). Exploration of these themes may reveal how clinical decision making may influence access to angiography post acute myocardial infarction.

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Appendices

Appendix 1   Topic guide

An exploration of the lived experience of chest pain and how it may be shaped by the implementation of an early rule-out pathway for myocardial infarction

Topic guide
1) Patients' beliefs of the cause of chest pain
2) The interrelationship between health care seeking behaviour, self-care and social support
3) Patients' experiences of how a cardiac cause has been ruled out
4) Patients' experience of standard of care

As the interview progresses the topic guide will be used flexibly. The participant will determine the direction of conversation. Prompts are listed below to facilitate the interview.

Introduction
Revisit aim of study and introduce researcher
Discuss ethical issues – consent, confidentiality, anonymity, permission to record
Talk through and gain informed consent

1)   Patients' beliefs of the cause of chest pain
Explore the most recent visit to hospital with chest pain

Could you tell me about what happened to take you in to hospital last week?
- In your own words what do you think caused the pain?

2)   The interrelationship between health care seeking behaviour, self-care and social support

Could you explain what had been happening before going in to hospital?
- GP visit/NHS 24/lay support sought/internet advice
- sought medical advise for chest pain on previous occasions
- social support available

How are you getting on now you have been home for a week or so?
- mentions anxieties/worries - can you tell me more about that
- returning to normal activities or not? If not, expand on the cause.

3)   Patients' experiences of how a cardiac cause has been ruled out

Tell me about the tests that you had done, - what were the doctors looking for?
How did you feel during this time?

- Are you reassured by what you have been told regarding your symptoms?
- Is there any kind of treatment/interaction that would have made you feel better/led you to believe that your symptoms were not cardiac?

4)   Patients' experience of standard of care

Can you tell me about how you felt when you were told you could go home?
- What did you think about the communication provided by staff regarding your symptoms and potential causes?
- mentions relationships with healthcare staff - expand
- Was there any particular interaction that you found useful?
- How did you feel on discharge? (thoughts/concerns/emotions/plans/aims)
- mentions emotional responses - expand
- mentions return to work or normal activities if not already covered
- did they feel they knew what they could or couldn't do on going home?
- have they used the health service since discharge due to unanswered questions?
- Is there anything that would have improved the way that you received care and information regarding your symptoms?

5)   Future health (added due to emergent theme)

Has your episode of pain altered the way think about anything or the way you would act in a particular situation?
- Introduces something about health behaviours – expand
- Introduces future risk of heart disease – explore
- Introduces health promotion activity

Closing the interview
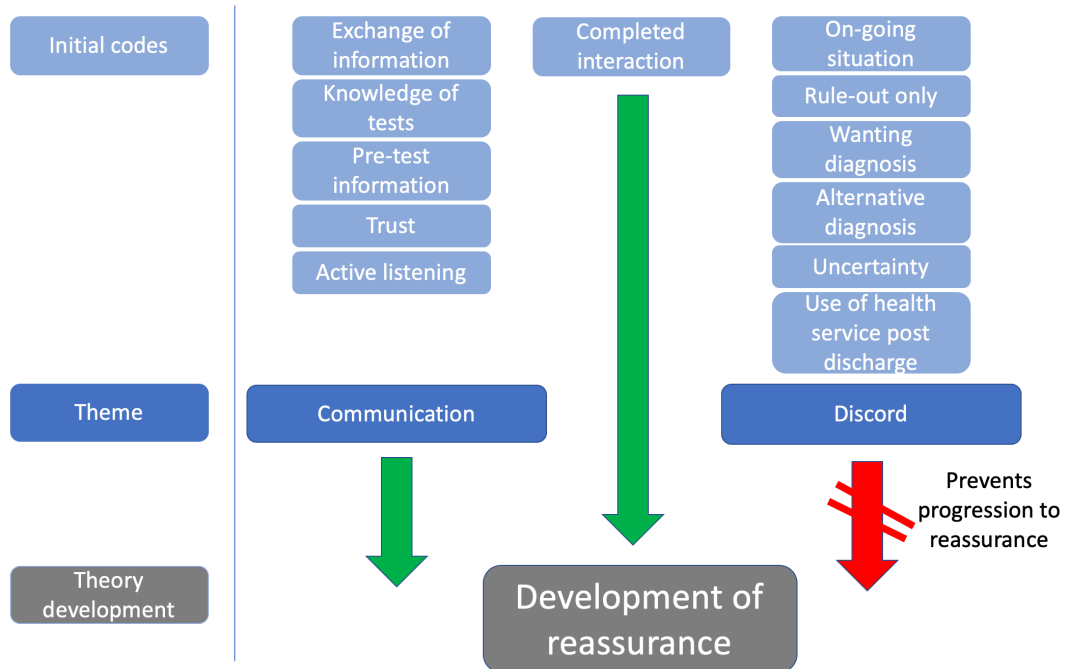Is there anything we haven't talked about that you would like to cover?
Is there anything you would like to ask me before we end?
Is there any message you would like to give the NHS about attending the ED for assessment of chest pain?
Thank you

Appendix 2   Example of code and theme development

Appendix 3 Ethical approval

Scotland A Research Ethics Committee

Research Ethics Service
Waverley Gate
2-4 Waterloo Place
Edinburgh
EH1 3EG
Direct Telephone: 0131 465 5678
Dorothy.Garrow@nhslothian.scot.nhs.uk

NHS SCOTLAND

12 December 2014

Dr Nicholas Mills
BHF Centre of Cardiovascular Sciences
University Of Edinburgh
Chancellor's Building
EH16 4SB

Dear Dr Mills,

Study title:	High-Sensitive Troponin in the Evaluation of patients with Acute Coronary Syndrome (HighSTEACS): A randomised controlled trial
REC reference:	12/SS/0115
Amendment number:	REC Reference AM02
Amendment date:	13 November 2014
IRAS project ID:	109801

The above amendment was reviewed on 28 November 2014 by the Sub-Committee in correspondence.

Ethical opinion
The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents
The documents reviewed and approved at the meeting were:

Document	Version	Date
Notice of Substantial Amendment (non-CTIMP)		13 November 2014
Participant consent form [Sub-Study 1 HighSTEACSconsent]	V5	03 September 2014
Participant consent form [Sub-Study 2 consent]	V1	03 November 2014
Participant information sheet (PIS) [SubStudy 2]	V1	03 November 2014
Participant information sheet (PIS) [SubStudy 1 HighSTEACS]	V4	29 July 2013
Research protocol or project proposal [Study Protocol HighSTEACS Trial]	V4	27 October 2014
Research protocol or project proposal [HighSTEACS Protocol amendment AM02 list]	V1	03 November 2014

Membership of the Committee
The members of the Committee who took part in the review are listed on the attached sheet.

Chairman Dr Ian Zealley
Vice-Chairman Dr Colin Selby

R&D approval
All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance
The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at http://www.hra.nhs.uk/hra-training/

12/SS/0115:	Please quote this number on all correspondence

Yours sincerely,

[signature]

Professor Nigel Webster
Chair

E-mail: Dorothy.garrow@nhslothian.scot.nhs.uk

Enclosures: List of names and professions of members who took part in the review

Scotland A REC
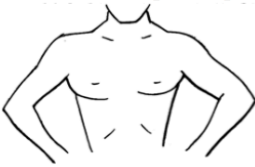**Attendance at Sub-Committee of the REC meeting on 28 November 2014**

Committee Members:

Name	Profession	Present	Notes
Dr Mary Macleod	Clinical Pharmacologist/Consultant Physician	Yes	
Dr Zoe Morrison	Senior Lecturer in Management Studies	Yes	
Professor Nigel Webster	Chair of Anaesthesia & Intensive Care	Yes	

Also in attendance:

Name	Position (or reason for attending)
Dr Alex Bailey	Scientific Officer

Appendix 4　　HighSTEACS suspected acute coronary syndrome symptom checklist

Presenting symptom									
Chest pain	☐	SOB	☐	Palpitations	☐	Collapse	☐	Other_____	☐

Quality, severity and duration of pain							
Nature of pain		**Radiation**		**Associated symptoms**		**Severity and duration**	
Tight	☐	Left arm	☐	Nausea/Vomiting	☐	pain score/10 _____	
Dull	☐	Right arm	☐	Sweating	☐	Duration of pain　　　minutes	
Squeezing	☐	Back	☐	Palpitations	☐	No. of episodes in 24hr_____	
Gripping	☐	Jaw/neck	☐	SOB	☐		
Ache	☐	Other_____	☐	Collapse	☐		
Crushing	☐			Other_____	☐		
Heavy	☐						
Pressure	☐						
Sharp	☐						
Stabbing	☐						
Hot	☐						
Burning	☐						
Indigestion	☐						
Other_____	☐						

Pain characteristics	
Worse on changing position for example sitting up or turning to the side	Yes/ No
Worse on palpation	Yes/ No
Worse on exertion (e.g. climbing stairs)	Yes/ No
Better with rest	Yes/ No
Better with nitrates	Yes/ No
Worse on changing position for example sitting up or turning to the side	Yes/ No
Is the pain intermittent/discrete/continuous?	
If previous myocardial infarction or known angina: similar / worse / different / na	

Location		
Central Chest	Yes/ No	Mark with an 'X' areas where pain is present
Left chest	Yes/ No	
Right chest	Yes/ No	
Arm	Yes/ No	
Jaw	Yes/ No	
Epigastric	Yes/ No	
Abdominal	Yes/ No	
Other	Yes/No	