Affective and cognitive influences on decision making in healthcare

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The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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ABSTRACT

Diagnostic error makes a substantial contribution to harmful or potentially harmful events in emergency care. While there is knowledge about some of the cognitive thought processes involved in diagnostic decision making, little is known about the role that affect plays in diagnostic judgements, despite research outside healthcare suggesting that decisions involving risk and uncertainty are sometimes driven by affect-based, rather than cognitive-based (rational thinking) features. The aim of this research was to identify some of the affective influences in the diagnostic decision making process and to explore the role that affect played in diagnostic judgement.

The narrative review in Chapter 2 uses psychological dual process theories as a theoretical framework to bring together literatures from within and outside healthcare to explain the potential role of affect in diagnostic decision making. The review provides examples of how theory and empirical evidence is relevant to diagnostic decision making and highlights the current gaps in knowledge. The epistemological underpinnings of methodological approaches adopted in the empirical studies, definition of key concepts and justification of research methods and measures are discussed in the following chapter.

Studies 1 - 3 present the results of online experimental studies (two pilot studies with doctors and medical students and one main study with 77 doctors across two NHS Hospital Trusts). These drew upon the distinct diagnostic stage of information gathering in order to try and identify whether types (mood, anticipatory affect, anticipated affect) and positive and negative sources (patient factors, team factors, previous experience) of affect influenced clinicians' decision-making for diagnosis. Findings suggested that affect may influence thoroughness and order of information gathered for diagnosis. Team factors appeared to evoke the most intense affective reactions and specific emotions were identified as being potentially important in diagnostic decision making.

Study 4 used clinical simulation to explore differences in perceptions of affect and whether affect played a role in the perceptions of factors critical for effective clinical decision making during critical incidents in 54 healthcare professionals (27 junior doctors and 27 nurses or allied health professions). Findings indicated that both individual and social affect were associated with perceptions of clinical performance and suggested that the two groups of healthcare professionals focused on different affective cues. Cooperation was an important predictor of perceptions of individual and team communication behaviour and team effectiveness for both professional groups.

Sixteen semi-structured interviews with doctors working in Accident and Emergency or Anaesthetic departments in two NHS Hospital were conducted in Study 5. Critical Decision Method and the analytic strategy of Framework Approach were used to interrogate the affective features in diagnostic and case management decision making during incidents in emergency care. Eight sources and 5 types of affect were identified and both positive and negative emotions featured in diagnostic and case management decisions. Doctors discussed how affect informed and motivated decisions and also how the intensity of affect, the lack of affect as a conscious process and the rational processes involved in clinical decision making meant that it was not always perceived to play a role.

The thesis identified sources and types of affect that feature in diagnostic decision making and findings suggest that affect does influence diagnostic judgements. The thesis concludes by discussing the implications and recommendations for clinical practice and future research.

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ABBREVIATIONS

ANS	Autonomic Nervous System
CDM	Critical Decision Method
CRM	Crew Resource Management
DOH	Department of Health
EASI	Emotions as Social Information
EMG	Electromyography
I-PANAS-SF	International Positive and Negative Affect Schedule
NDM	Naturalistic Decision Making
NPSA	National Patient Safety Agency
NTS	Non-technical skills
PANAS	Positive and Negative Affect Schedule
PANAS X	Positive and Negative Affect Schedule – Expanded Form

CHAPTER 1

INTRODUCTION AND OVERVIEW

1.1 Introduction

The aim of this chapter is to briefly summarise the rationale for this research and to provide a brief description of the content of the chapters in the thesis.

1.2 Background and rationale

Patient safety is an important area of research which influences new policy and practice in healthcare (Department of Health (DoH), 2000, 2001, 2006; National Patient Safety Agency, (NPSA) 2005). The decisions that healthcare professionals make are central to the delivery of timely, comprehensive, safe care. However, clinical decisions are vulnerable to oversights and inaccuracies (Bion & Heffner, 2004; DoH, 2000, 2006; Institute of Medicine, 1999; Weingart, Wilson, Gibberd, & Harrison, 2000), and the catastrophic outcomes that result from erroneous healthcare decisions are well documented in academic research (Bion & Heffner, 2004; Weingart *et al*., 2000) and polices on safer patient care (DOH, 2000, 2001, 2006).

Diagnostic decision making is pivotal to healthcare practice. It forms the basis of how patients are assessed and managed, and determines their treatment, referral, and follow-up. However, diagnostic error is a significant cause of adverse events in healthcare (Graber, Franklin, & Gordon, 2005; Schiff *et al*., 2009). This can occur through misdiagnosis (e.g. inaccurately determining that a patient's intermittent pelvic discomfort is due to menstrual pain rather than an ectopic pregnancy), delayed diagnosis (e.g. not determining that a patient's chronic cough might be due to a malignant lung tumour until their fourth consultation for the same symptoms, by which time only palliative, rather than curative treatment can be offered), and failed

diagnosis (e.g. not recognising that a patient required assessment for the treatable condition of pernicious anaemia leading to the development of neurological damage).

Studies indicate that diagnostic error occurred in 6% of patients admitted to 2 NHS hospitals in the UK (Neale, Woloshynowych, & Vincent, 2001) and accounted for 29.7% preventable deaths across 1000 adult patients in a recent retrospective case record review across 10 acute hospitals in England (Hogan *et al*, 2012). In the U.S, between 40,000 and 80,000 annual hospital deaths are due to misdiagnosis (Leape, Berwick, & Bates, 2002). A review of medical error in primary care also revealed that diagnostic error was attributed to between 26% to 78% of all identified errors, and was found to be more likely to culminate in significant patient harm or admission to hospital than other types of medical error in a primary care setting (Sanders & Esmail, 2003). As misdiagnosis, delayed and failed diagnosis make a substantial contribution to adverse events in clinical medicine (Graber *et al*., 2005; Schiff *et al*., 2009) a greater understanding of the factors involved in diagnostic error is required (Berner, 2009; Crandall & Wears, 2008; Graber, Gordon, & Franklin, 2002; Newman-Toker & Provonost, 2009).

Clinical decision making is generally considered to be a rational process. Work which has highlighted how cognitive sequences may contribute to both failure and efficiency in clinical judgement (Pani & Chariker, 2004; Parker & Lawton, 2003) still dominates current understanding of the processes involved, and has identified cognitive biases and the use of heuristics as important factors in diagnostic error (Croskerry, 2009a, 2013; Elstein, 1999; Norman, 2009). However, while healthcare professionals may strive to make diagnostic and case management decisions which are grounded in a systematic appraisal of clinically relevant facts (e.g. referring the patient for an immediate second opinion due to their subtle but persistent symptoms), diagnostic judgements and case management choices may sometimes be influenced by non-rational, affect-based processes and factors (e.g. discharging the patient with instructions

to return if symptoms become worse because the referring consultant on the current shift is known to be intimidating and unpleasant).

Despite this, there has been scant attention given to studies that specifically examine the influence of affect on diagnostic decision making in clinical practice (Croskerry, Abbass, & Wu, 2010). This is contrary to growing empirical evidence that under certain circumstances, it is how a behaviour makes individuals feel, rather than a logical appraisal of the potential risks to their health, that is pivotal in explaining erroneous judgements and risky actions involving health related behaviour such as speeding and smoking (Lawton, Conner, & Parker, 2007) and across a wide range of situations and settings (Bechara, Damasio, Tranel, & Damasio, 1997; Ditto, Pizarro, Epstein, Jacobson, & MacDonald, 2006; Hsee & Kunreuther, 2000).

With increasing awareness and evidence that multifarious, and often overlapping factors impact diagnostic decision making (Ely, Kaldjian, & D'Alessandro, 2012; Kostopoulou, Delaney, & Munro, 2008; Schiff *et al*, 2009; Siminoff, Rogers, Thomson, Dumenci, & Harris-Haywood, 2011), there has been an emphasis on the need to adopt new approaches to increase understanding of the complex issues and processes involved in clinical judgement, in order to improve clinical performance and healthcare delivery (Croskerry *et al.*, 2010; Fischer & Ereaut, 2012; Institute of Medicine, 1999). To Err is Human (Institute of Medicine, 1999) pioneered such an approach. It focused on why errors occur within healthcare practice and highlighted the importance of identifying and pre-empting the elements within clinical practice and clinical settings that contribute to sub-optimal decision making and other active failures. This new direction has encouraged the use of psychological theory to help understand the contributory factors for error in organizations where individuals have to make judgements and decisions under conditions of risk and uncertainty (Reason, 1990, 1997).

As the research detailed here examines whether affect influences the diagnostic decision making process, two important psychological dual process theories; Cognitive-Experiential Self-Theory (CEST: Epstein, 1994) and Risk as Feelings (Loewenstein, Weber, Hsee, & Welch, 2001) were drawn upon in this thesis. These theories were chosen as they propose that everyday decisions are derived from a complex interplay between emotion-based and cognitive-based processing and evaluative systems, thus providing an insight into the processes involved in clinical decision making.

The research presented in this thesis employs a range of methods to explore the role that affect plays in diagnostic judgement and to identify some of the affective influences involved during the diagnostic decision making process. It utilises current understanding of affect and decision making from both within and outside healthcare.

1.3 Thesis aims

This thesis has six main research aims:

1. To bring together two literatures (within and outside healthcare) to explain the potential role of affect in diagnostic decision making.
2. To develop and test methods for conducting research to examine the role of affect in diagnostic decision making.
3. To understand and explain the main sources and types of affect that influence diagnostic decision making and the interplay between them.
4. To identify the discrete emotions (e.g. anger, happiness etc.) that feature in diagnostic decision making and consider their role.
5. To examine the relationships between affect and perceptions of team factors that are critical for effective clinical decision making.

6. To explore to what extent healthcare professionals are able to reflect on the role of affect in the decisions they make.

1.4 Outline of thesis

The structure of the thesis and chapter summaries are presented below:

Chapter 2 – A narrative literature review of the role of affect in diagnostic decision making: Current understanding and knowledge gaps

This chapter addresses the first research aim of bringing together two literatures to explain the potential role of affect in diagnostic decision making. It describes how the limited literature from within healthcare suggests that affect impacts clinical judgement, and illustrates how further understanding of affective influences on diagnostic decision making can be derived from research outside healthcare. The role of affect in a dual process model of decision making and the importance of different *types* of affect experienced by an individual during decision making (mood, anticipatory affect and anticipated affect) is highlighted. The review provides examples of how theory and empirical evidence outside healthcare is relevant to diagnostic decision making and highlights the current gaps in knowledge. It concludes by setting out a research plan to address the main research aims of the thesis.

Chapter 3 – Methodological and contextual considerations

In this chapter the second research aim of developing and testing new methods for conducting research to examine the role of affect in diagnostic decision making is considered. This begins with a discussion of the epistemological underpinnings of methodological approaches adopted in each of the six empirical studies, and is followed by the definition of key concepts and justification of research methods and measures. The challenges of patient safety research, conducting research in a healthcare setting, and studying affect are also considered.

Chapter 4 – Using experimental methodology to examine the influence of affect on facts chosen for information gathering in diagnosis

Here, the results of two online experimental studies designed to serve as manipulation checks and pilots for the main experimental study with doctors described in Chapter 5 are discussed. These two studies addressed the second research aim, by presenting and testing a new experimental method for conducting research to examine the role of affect in diagnostic decision making. The findings of the studies also contribute to the third research aim which is to understand and explain the main sources and types of affect that influence diagnostic decision making and the interplay between them, and the fourth research aim which attempts to identify the discrete emotions (e.g. anger, happiness etc.) that feature in diagnostic decision making and to consider their role.

The first study involved a sample of 129 participants (31 doctors across all departments from one NHS Hospital Trust and 98 Year 4 and Year 5 medical students across four UK medical schools). This presents findings which assessed whether emergency care vignettes used in the studies evoked the intended general emotional response, and whether specific negative and positive emotions were induced by the vignettes.

The second study involved the sample of 98 Year 4 and Year 5 medical students across four UK medical schools to further examine whether types (mood, anticipatory affect, anticipated affect) and positive and negative sources (patient factors, team factors, previous clinical experience) of affect influenced medical students' decision-making regarding the facts considered important for diagnosis. It concludes by discussing the findings of the two pilot studies and the implications for the design and analysis of the main online study described in Chapter 5.

Chapter 5 – The influence of affect on thoroughness and order of information gathering for diagnosis and case management

This chapter presents the findings of the main experimental online study with 77 doctors across two NHS Hospital Trusts and addresses the same research aims of the two pilot experimental studies described in the previous chapter. This study drew upon the distinct diagnostic stage of information gathering, in order to try and identify whether types (mood, anticipatory affect, anticipated affect) and positive and negative sources (patient factors, team factors) of affect influence clinicians' decision-making for diagnosis. It concludes by discussing the significance and limitations of the results obtained from this study and those from the online experimental studies described in Chapter 4.

Chapter 6 – Does affect play a role in perceptions of communication behaviour and team effectiveness during critical incidents?

This chapter describes a study that used simulation to explore whether affect influenced the perception of individual and team performance and team effectiveness during critical incidents in 54 healthcare professionals (27 junior doctors and 27 nurses or allied health professions) from one NHS Hospital Trust. As well as contributing further to the second, third and fourth main research aims considered in the online experimental studies, the studies presented in this chapter also address the fifth research aim to examine the relationships between affect and perceptions of team factors that are critical for effective clinical decision making. The findings also elicit knowledge for the sixth main research aim, which is to explore to what extent healthcare professionals are able to reflect on the role of affect in the decisions they make.

Chapter 7 – Do affective influences feature in diagnostic and case management decision making in emergency care? A qualitative approach

The study presented in this chapter reports the findings from 16 individual interviews with Accident and Emergency doctors and Anaesthetists across two NHS Hospital Trusts. The qualitative method of Critical Decision Making and the analytic strategy of Framework Approach are described, before themes concerning source and type of affect that influence

diagnostic and case management decision making in emergency care are discussed. This study assists in providing further knowledge for 2-6 of the main research aims.

Chapter 8 – Thesis summary

This final chapter synthesises the research findings from the entire thesis and evaluates their contribution to the six main research aims and to extending knowledge on the influence of affect on diagnostic decision making. It identifies the limitations of the methods and findings, before implications for future research and practice are discussed.

CHAPTER 2

A NARRATIVE LITERATURE REVIEW OF THE ROLE OF AFFECT IN DIAGNOSTIC DECISION MAKING: CURRENT UNDERSTANDING AND KNOWLEDGE GAPS

2.1 Overview

This chapter presents a review of the current understanding of the role of affect in diagnostic decision making. The objectives of this review were: 1) To establish what is currently known about affect and diagnostic decision making; 2) to demonstrate how psychological theory may inform our understanding about affect and diagnostic decision making; and 3) to determine what knowledge gaps still remain and to develop a research plan to address these.

In order to address objectives 1-3 above it was necessary to draw together literature that would help to understand relevant theory, methods and the practical implications for diagnostic decision making. As this would require a comprehensive coverage of relevant literature, a systematic review that employed a limited focus that is confined by the purpose of the specific research question and imposed strict quantitative appraisal of the quality of studies was not appropriate to the type of review required (Collins and Fauser, 2005). Therefore, it was decided that a narrative review would be more conducive to the breadth of understanding required to address the objectives of the review.

The review considered both theoretical and empirical literature from both within the healthcare domain focusing specifically on diagnostic decision making, and from outside the healthcare domain focusing on decision making under uncertainty, and was organised into two distinct but related sections. Firstly, empirical evidence of the influence of affect on diagnostic decision making within the healthcare domain was assessed, and the application of psychological theory

to the influence of affect on diagnostic judgement was appraised. Secondly, theoretical and empirical psychological research from outside the healthcare domain was examined. This allowed for the synthesis of existing knowledge and identification of prevailing approaches and knowledge gaps to be assimilated across evidence from clinical diagnosis, psychological, and decision making literature. Importantly, a review of the literature outside the healthcare domain also assisted in highlighting the areas where theory and empirical evidence from another arena may potentially help to explain the complexities involved in clinical decision making. This strategy also provided insight into what mental processes and workplace settings and conditions appear to have a positive or negative impact upon diagnostic performance. A summation of the literature and rationale for the research is set out, before culminating in the generation of a research plan to address the main research questions for this thesis.

2.2 Method

2.2.1 Inclusion and exclusion criteria

Although a narrative literature review was undertaken, parameters were set in order to identify relevant literature (Green, Johnson, and Adams, 2005). As this research draws upon theory and empirical evidence from both within and outside the healthcare arena, literature from both wider industry and from healthcare-specific settings was included. Therefore, published articles of psychologically-based theoretical discussions, reviews, commentary and empirical studies that examined the influence of affect on decision making and/or behaviour were included in this review. Secondary sources, articles in foreign languages, and articles unconnected to affect and decision making were excluded.

2.2.2 Search strategy

A number of electronic databases were searched for literature within and outside healthcare. The databases were: Web of Science; Psycinfo; Medline; EMBASE; Pubmed and Cochrane

Library. Searches were restricted to articles published between 1980-2013. Search terms were informed by two important psychological theories; Cognitive-Experiential Self-Theory, (CEST: Epstein, 1994) and Risk as Feelings (Loewenstein *et al.*, 2001). These allowed for the creation of a framework which helped to guide the review. For the review of the literature in the context of healthcare, titles were searched using the combined search terms: effect* OR influenc* OR assoc* OR impact* OR role* OR cause* OR factor* OR mislead* SAME/AND affect* OR emotion* OR gut* OR instinct* OR intuiti* OR mood* SAME/AND decision* OR judg* OR risk* OR reason* OR uncertain* SAME/AND clinic* OR medic* OR diagnos* OR physician* OR doctor* OR nurs* OR patient* OR shar* SAME/AND error* OR "adverse outcome*" OR "adverse event*" OR safe*. For the review of wider and generalised literature, titles were searched using the combined search terms: effect* OR influenc* OR assoc* OR impact* OR role* OR cause* OR factor* OR mislead* SAME/AND affect* OR emotion* OR feel* OR gut* OR instinct* OR intuiti* OR mood* SAME/AND decision* OR judg* OR risk* OR reason* OR uncertain*. After extraction of duplicates, all article abstracts were read and assessed against the inclusion and exclusion criteria. Relevant articles were downloaded and a manual checking of references for further suitable articles was carried out. Key concepts that emerged on reading the literature assisted in forming the structure of the review.

2.3 Sources of affect in clinical decision making

Healthcare professionals work in an emotionally-charged setting. The need for urgent response, caring for patients in extreme pain or with life-threatening conditions, and discussing treatments and prognoses with patients and relatives are all features of the working experience of health professionals. Work by Croskerry, Abbass, and Wu (2008, 2010) has already acknowledged the potential for affect-based factors to influence clinical decision making. Literature on clinical decision making suggests that when working in health care some of the more immediate sources of affect are patient factors, team factors and previous experience. The literature on each of

these sources and how they may influence diagnostic decision making is summarised before describing how knowledge from outside healthcare may assist in developing understanding about the role of affect in diagnostic judgement.

2.3.1 Patient factors

Healthcare professionals can experience powerful instantaneous feelings in response to attending to patients and these emotional reactions may influence their clinical behaviour. In a reflective account of her internship in an emergency department, Amato (2007) describes how the disgust she felt when examining a female patient's maggot infested wound influenced her judgement of the patient, and resulted in her providing care that lacked in compassion. Similarly, the narratives of 24 newly qualified anaesthetists in which they reflected upon their experiences of clinical practice, demonstrated that feelings of horror were common occurrences (Iedema, Jorm, & Lum, 2009).

Findings in primary care further highlight the important role of affect. In a study involving physicians and diabetes patients, it was found that a physician's rating of how much they liked a patient was positively correlated with both physician and patient ratings of the patient's physical and mental health (Hall, Horgan, Stein, & Roter, 2002). In another study exploring the emotions of 75 primary care physicians during consultations with frequent attender patients, higher positive emotions of happiness and pleasure, protection, and professional well-being were associated with the belief that the patient genuinely needed their help, while the negative emotions of increased sadness and discouragement were associated with higher referral of patients to specialists. Indifference, rage-anger, and anxiety-nervousness were also found to be related to feelings of exasperation, while increased levels of feeling guilt were associated with a reduced belief that they could solve the patient's problem (Bellon & Fernandez-Asensio, 2002).

These studies suggest that affect may be a key component in the formation of a health professional's perceptions concerning the health status of a particular patient. Furthermore, they imply that the positive and negative feelings health professionals experience in response to a patient may influence their clinical management decisions and behaviour. As health professionals care for different categories of patients (e.g. frequent vs infrequent attenders; chronic vs acute presentations) it is important to establish whether these patients provoke different affective responses, and whether these affect-based reactions impact diagnostic and case management decisions.

2.3.2 Team factors

Communication is critical for effective decision making (Christensen, *et al*., 2000; Leonard, Graham, & Bonacum, 2004; Reader, Flin, Lauche, & Cuthbertson, 2006). In a clinical team context health professionals must share relevant clinical information, their interpretation of patient symptoms, and the desires and feelings of the patient. How and whether important clinical information is shared may be influenced by affect-based responses and reactions of team members to the work climate.

Systems factors such as a culture of blame, weak leadership or supervision, a lack of available equipment, or poor scheduling, may all impact on what it feels like to work in a particular specialty unit. Research has suggested that the conditions and practices which may be inherent in clinical settings and organizations can impact upon health professionals' affective states, which then hinders clinical performance (Burgess, 2010; Fogarty & McKeon, 2006; Mesman, 2009; Nolan, 2000). For example, a study involving 176 nurses across 11 hospitals in Queensland, Australia, found that poor organizational climate resulted in health professionals reporting low morale and distress, which produced more violations and consequential medication errors (Fogarty & McKeon, 2006).

Not only do healthcare professionals carry forward their own affect-based responses to systems factors (e.g. lack of available equipment) to the clinical teams they work in; they also have affect-based reactions when working in teams where colleagues may be unfriendly and intimidating or cheerful and supportive. Effective communication and shared cognition within clinical teams is essential for optimal care (Flin, O'Connor, & Crichton, 2008). The important role that team performance plays in providing safe patient care is reflected in the recent requirement for the WHO Surgical Safety Checklist (Haynes *et al.*, 2009) to be used by surgical teams during all surgical interventions in the NHS in England and Wales (National Patient Safety Agency, NPSA, 2009) as well as the call for a pre-list briefing and post-list de-briefing to be incorporated into the schedule of perioperative teams (NPSA, 2010). It is also important to acknowledge that affective factors in team situations have the potential to compromise the sharing of clinical information. In their theoretical model of team performance, Annett, Cunningham, and Mathias-Jones (2000), suggest that affective factors involved in team morale and cohesiveness, filter into all aspects of team processes, from cognition to communication and co-ordination, and ultimately shared goals.

In many clinical contexts, those working together often vary on a daily basis between established and ad hoc teams. In a setting, which involves health professional rotation, and the use of locum doctors and temporary agency staff, this distinction is particularly pertinent. According to Annett and Stanton (2000),

"Members of a group may share a number of common features but do not necessarily share a common goal and may well be in competition with each other. A work team, on the other hand, not only collaborates, but can succeed or fail as a whole and the members of the team share the benefits and costs of success or failure." (p.1046)

Team factors such as incompatible goals (McDonald, Waring, Harrison, Walshe, & Boaden, 2005) intergroup rivalry (Hewett, Watson, Gallois, Ward, & Leggett, 2009), and ineffective cross disciplinary communication (Murray & Enarson, 2007) are all cited as important underlying factors in medical errors.

There is some emerging recognition of affect in models of non-technical skills in teamwork (Fletcher, Flin, McGeorge, Galvin, Maran, & Patey, 2003; Yule, Flin, Paterson-Brown, & Maran, 2006), but at present these models are largely framed within a cognitive tradition, and as such, the role of affect is not explicit. As diagnosis often involves a team of health professionals across a range of disciplines, it is important to establish how, and what type of affect has a positive and negative impact upon established and ad hoc clinical teams; whether these types of affect influence the diagnosis that different disciplines make; or whether affect has an impact on the amount and quality of clinically important information that is shared within and between clinical teams.

2.3.3 Previous experience

Affective factors which stem from a health professional's previous clinical experience may influence diagnosis in two distinct ways. The qualitative feelings experienced by a health professional during a past patient presentation (whether the experience was associated with strong positive or negative emotions or involved particularly unusual or exceptional features) may lead to a current patient presentation that has a similar presentation or requires similar decisions, being guided by the feelings previously associated with the past case. For example, a doctor who three months ago had experienced extreme anxiety when a young female patient was re-admitted to the A&E department with a suspected ectopic pregnancy, after they had discharged her earlier with instructions to take pain killers for menstrual pain following complaints of dull pelvic pain, may find that the similar anxiety she feels when another young female patient presents with similar symptoms, may lead her to unnecessarily order a pelvic

ultrasound. Croskerry and colleagues (Croskerry *et al*., 2008, 2010) discuss this in terms of "counter transference", suggesting that the positive or negative affect that a health professional may feel for a patient may reflect the positive or negative feelings they felt towards a previous patient who presented with similar signs and symptoms. A recent experimental study in which 132 physicians provided treatment decisions in response to a computer based clinical scenario involving a patient with an abdominal aortic aneurysm, found that physicians who were presented with a bad patient outcome scenario experienced increased levels of anxiety and decision regret which influenced their choice of treatment strategy for the next patient with the same condition (Hemmerich, Elstein, Schwarze, Ghini Moliski, & Dale, 2012).

Alternatively, a more quantitative type of experience (e.g. the amount and recency of exposure to a disease) may also have an affect-based impact on the clinical choices that physicians make (Berner & Graber, 2008; Norman & Eva, 2010). The number of encounters with a specific disease is often a gauge of perceived expertise. Expertise has been linked to health professionals' level of confidence (Croskerry, 2009a; Norman & Eva, 2010), and it is suggested that high confidence may result in an increased tendency to use rapid, intuitive-based decisions, rather than decisions based on reasoned and rational thinking (Berner & Graber, 2008). For example, during diagnostic reasoning for suspected bacteremia patients, Poses and Anthony (1991) found that doctors' intuitive probability estimates were influenced by their recent experiences of the disease, leading to over-diagnosis. Further studies have shown that more experienced physicians requested fewer cues of clinically relevant information than less experienced residents (Kostopoulou, *et al*., 2008b) and family physicians with more experience reported a higher number of cases when they used gut feelings for diagnostic decisions than family physicians with less experience (Woolley & Kostopoulou, 2013). These findings support Croskerry's (2009a) claim that more experienced clinicians tend to adopt less systematic approaches. Familiarity with a disease may therefore make experienced clinicians over-certain, due to being more vulnerable to the powerful influence of instincts or gut feelings that may be

generated by their immediate affective responses to patient presentations, rather than a slower, rational processing of clinical details.

Under which circumstances less systematic, fast, instinctive judgement is beneficial or harmful for diagnostic decision making is unclear. More knowledge about how experience and confidence impact affective factors, and how this influences the amount and type of information a health professional processes for diagnosis is now required. This, along with increasing our understanding about whether expertise facilitates a more rapid assimilation of the most pertinent diagnostic cues, would clearly have important implications for the delivery of efficient and timely care.

In summary, a doctor's own affective response to their work environment may help to explain inappropriate information gathering or clinical behaviour and empirical studies which explicitly examine the role of affect in these processes are needed.

2.4 How affect influences decision making: Knowledge from outside healthcare

Although there are extensive gaps in the healthcare literature about the role of affect in decision making, there is knowledge that can be drawn upon from outside healthcare to better understand its influence. In using this, it may be possible to develop a theory of affect in diagnostic decision making and identify testable hypotheses to guide future research. Evidence for the role of affect in decision making and the potential for dual process models to help unpick the affect-based processes which may be involved in diagnostic decision making will be described in the following section.

2.4.1 The case for the role of affect in decision making

Research suggests that under conditions where there is risk and uncertainty, affect may drive behavioural decisions and judgements in unique and direct ways, above and beyond the influence of cognition (Ariely & Loewenstein, 2006; Ditto *et al*., 2006; Lawton *et al*., 2007, Lawton, Conner, & McEachan, 2009). Zajonc's (1984) primacy-of-affect hypothesis postulates that in particular situations, affective evaluations may precede or are autonomous to cognitive appraisal. This is supported across a number of studies (Ditto *et al*., 2006; Norton, Bogart, Cecil, & Pinkerton, 2005). The somatic marker hypothesis (Damasio, 1996) proposes that bodily states which occur during the experience of situations are mapped in the brain and form a vital cortical link between a situation and visceral response. As a result, whenever that situation is repeated, peripheral cues reactivate appropriate responses based on affect-based learning from previous experience (Damasio, 1996). For example, if we are bitten by a dog we may experience fear. From this point onwards, whenever a dog approaches, our immediate reaction is to feel fear. This, in turn guides our behavioural response to the stimulus (e.g. don't stroke dogs) and our decision making (do not visit friend who has dog). Evidence for this hypothesis has been gathered during studies examining gambling task decisions (Bechara *et al*., 1997), and in cognitive neuroscientific findings (see Naqvi, Shiv, & Bechara, 2006). As a health professional's previous clinical experience may determine their affective response to a clinical situation, which in turn, guides the clinical decisions they make (Berner & Graber, 2008; Croskerry *et al*., 2008, 2010; Norman & Eva, 2010), then hypothetically, potential errors could be overcome through clinicians engaging in more reflective practice (Bradley, 2005; Epstein, 1999; Mamede, Schmidt, & Rikers, 2007) or de-biasing strategies (Croskerry, 2002, 2003).

Heuristics are also deemed to create biases in risky decision making which in turn can lead to judgemental errors across a variety of contexts and settings (Parker & Lawton, 2003; Tversky & Kahneman, 1974). Outside healthcare, the concept of heuristics (Tversky & Kahneman, 1974) has been used to explain how attempts to overcome time constraints and cognitive overload

leads to shortcuts in mental processes for information gathering, information integration and action decisions (Kahneman, Slovic, & Tversky, 1982; Parker & Lawton, 2003; Tversky & Kahneman, 1974). The use of heuristics has been implicated in creating biases in risky decision making which in turn can lead to judgemental errors and less optimal outcomes across a variety of contexts and settings (Parker & Lawton, 2003; Tversky & Kahneman, 1974). While many cognitive heuristics have been identified and examined (see Tversky & Kahneman, 1974), the specific function and role of what has been termed the "affect heuristic" (Slovic, Peters, Finucane, & MacGregor, 2002) is paramount to this review.

While cognitive heuristics enable individuals to employ quick and efficient processing strategies to appraise the costs and benefits of a particular choice or behaviour, the affect heuristic (Slovic *et al*., 2002) allows individuals to use their general affective reactions to stimuli as a judgement gauge and indicator (Slovic & Peters, 2006; Slovic *et al*., 2002). The role of reflex affective responses in decisions concerning risky choice actions, has led to the affect as information hypothesis (Schwarz & Clore, 1983). This asserts that positive or negative values are attributed to these affective responses, which then determines which of the choices available to us we approach and which we avoid (Weber & Johnson, 2009). For example, whether or not you decide to accept a lift home from a friend who you know is probably over the drink-drive alcohol limit may be influenced by the instantaneous gut feelings you connect with the choice facing you which stem from your past experience of indulging in this risky behaviour. Therefore, if your previous experiences of accepting lifts from friends who are over the drink-driving limit have been positive (e.g. you have enjoyed reminiscing about the night out on the drive back, and have always got home safely) you are more likely to accept the lift (approach the choice). However, if your previous experiences have been negative (e.g. you have previously felt anxious for the entire journey home because you have narrowly avoided having road accidents) you are more likely to decline the lift (avoid the choice). While there is much empirical evidence which would seem to support the idea that affect contributes to the rational

assessment of risk (Bechara *et al*., 1997; Lawton *et al*., 2007, 2009; Martinez, Bonnefon, & Hoskens, 2009; Parker, Stradling, & Manstead, 1996; Reid & Gonzalez-Vallejo, 2009), it is also clear that in some cases, the affective, rather than cognitive reaction to risk, drives decisions and behaviour which can lead to suboptimal outcomes (Ariely & Loewenstein, 2006; Lawton *et al*., 2007, 2009). As it is possible that the affect heuristic produces behavioural responses which are inconsistent with health professionals' preferred course of action or clinical protocols and guidelines, it is important to understand the role affect plays in patient safety incidents which stem from such deviations in clinical practice.

At an even more fundamental level, it has also been suggested that the visceral responses which are used to direct judgement may act as an attentional spotlight which highlights or blunts relevant information (Loewenstein *et al*., 2001; Peters, Vastfjall, Garling, & Slovic, 2006). There is support for this effect in studies which have shown that despite being aware of the potential risks involved in a particular behaviour, or more objective information on which a decision can be made, individuals will still choose to engage in a behaviour or make a decision that is based on their feelings (Ariely & Loewenstein, 2006; Lipshitz & Shulimovitz, 2007; Norton *et al*., 2005). For example, bank loan officers were found to value the gut feelings they had about applicants above financial information when deciding whether to approve their applications for credit (Lipshitz & Shulimovitz, 2007). In healthcare, the recognition or oversight of critical and appropriate clinical information and facts has important implications for the accuracy and timeliness of diagnosis (Kostopoulou *et al*., 2008b; Schiff *et al*., 2009; Siminoff *et al*., 2011). As such, it is crucial that we understand the type of circumstances in which a health professional's own affective response facilitates or hinders attention to relevant diagnostic information.

It is also argued that decisions are influenced by the "vividness effect" (Nisbett & Ross, 1980). This suggests that information which has emotionality, provokes concrete images, and is

memorable, will influence judgement through being more salient than information which does not. This may explain how, and to what extent, affective responses to stimuli and situational and environmental cues will influence decision making (Mann & Ward, 2007; Nisbett & Ross, 1980). Interestingly, vividness has been found to be important for predicting others' likelihood of engaging in risk-taking. For example, Hsee and Weber (1997) found that when another unknown individual was seen (concrete), participants tended to use their own feelings towards risk when predicting those of unknown others, while when the unknown individual was unseen (abstract), they did not refer to their own feelings. This demonstration of "self-other discrepancies" for risk preference suggests that the visceral feelings which drive one's own risk judgements are also used to empathise with the risky choices others have to make. However, the intensity of the feelings required to predict decision making by others must match those that influence our own. This may require others to be concrete and proximal, rather than abstract and distal (Hsee & Weber, 1997). In a clinical context, a busy shift with a heavy case load, or time critical incidents, may mean that diagnostic decisions are sometimes based on written case notes and test results, rather than face-to-face consultations with patients. To what extent this has an impact on a health professional's use of empathetic feelings when making diagnostic decisions, and whether this affects outcomes in terms of desirability from the perspective of the patient, is an important consideration which is currently unknown.

Prospect theory (Kahneman & Tversky, 1979) proposes that risk attitudes and choice can be influenced by the way decision options are framed. Across a number of studies it has been found that we demonstrate a tendency to be more risk-averse in the face of gains and risk-taking in the face of losses (Kuhberger, 1998). One explanation for this finding is that the way an individual imagines that the consequences of their decision will make them feel, has a powerful impact on the choice they make (Fagley, Coleman, & Simon, 2010). When faced with potential losses, individuals seem willing to choose riskier choices in an attempt to try to avoid the negative future affect they would feel due to their decision. This suggests that a health

professional's immediate affective response, when faced with the possible clinical consequences and outcomes of the decision they have to make, may guide the decision they chose.

Furthermore, Thalmann and Wiedemann (2006) found that risk appraisals were affected by an individual's established attitudes, and that divergences in existing attitudes resulted from individual responses to highly affective information. It was found that when individuals who were assessed as being least concerned with the possible health risks of mobile telecommunication technology were provided with information that hinted that the technology caused alarming diseases, they regarded the risk as being less than it actually was, while those assessed as being most concerned, believed the risk to be higher. This implies that decisions may also be influenced by our emotional response to a choice task (Peters & Slovic, 1996; Peters *et al*., 2006; Thalmann & Wiedemann, 2006). Such findings suggest that the non-rational, affect-based aspects of diagnostic decision making which stem from both the affective reactions a health professional experiences during the diagnostic decision making process, or due to the affect they bring to a diagnostic decision choice, may direct the type of information that they consider important when assessing patient presentations that involve risk and uncertainty.

2.5 Can dual process theories outside healthcare help to further understand diagnostic decision making?

2.5.1 Decision making and dual process theories

Dual process theories propose that everyday decisional thought processes and behavioural outcomes can be understood in terms of a complex interplay between two separate but interacting processing and evaluative systems. In decision making research, it is inferred that system 1 (an affective-based system characterised as being fast, intuitive, pattern-based and unconscious) and system 2 (a cognitive-based system considered to be slow, reasoned, normative and conscious) integrate and overlap to varying degrees during decision making

under risky and uncertain conditions (Epstein, 1994; Loewenstein *et al*., 2001; Smith & DeCoster, 2000; Strack & Deutsch, 2004).

One dual process theory, the risk-as-feelings hypothesis (Loewenstein *et al*., 2001), draws clear distinctions between the determinants of these two systems. It proposes that if the two evaluative systems conflict, how good we feel while engaging in the behaviour is often a more powerful behavioural determinant than whether it is the right thing to do. Recent research across a number of health-risk behaviours has provided evidence supporting this. Individuals' affect-based beliefs were found to predict the likelihood of both self-reported and objectively measured engagement in the two risk behaviours of speeding and smoking (Lawton *et al*., 2007), while in another study, affective attitudes were more powerful predictors than cognitive attitudes for self-reported binge drinking, daily alcohol use, smoking and speeding behaviour (Lawton *et al*., 2009). These studies suggest that while these two systems may work in parallel, they may be distinguishable in terms of their evaluative contributions (Smith & DeCoster, 2000); either judging risk through analytical reasoning (Finucane & Holup, 2006), or through subjective visceral feelings (Loewenstein *et al*., 2001).

2.5.2 Dual process models and diagnostic decision making

Dual process models have already been used to help construct theoretical accounts of the role of affect and cognition in diagnostic reasoning (Croskerry, 2009a, 2009b, 2013; Elstein, 1999, 2009; Elstein & Schwarz, 2002; Norman, 2009). Within these models, heuristics operate within system 1. These rapid, pattern-based mental shortcuts based on previous experience are deemed necessary and useful problem solving strategies which assist in avoiding cognitive overload in demanding and time limited situations (Tversky & Kahneman, 1974).

As discussed earlier, cognitive heuristics enable individuals to employ quick and efficient processing strategies to appraise the costs and benefits of a particular choice or behaviour, and

some theorists argue that in certain situations the affect heuristic plays a powerful role in decision making (Finucane, Alhakami, Slovic, & Johnson, *et al.*, 2000; Slovic *et al.*, 2005) by enabling individuals to use their emotional reactions to stimuli as a judgement gauge and indicator (Finucane *et al*, 2000; Slovic, Peters, Finucane, & MacGregor, 2005). In a clinical setting, whether or not a junior doctor decides to consult a senior colleague about the significance of a patient's vague symptoms, may be influenced by the instantaneous positive or negative gut feelings they connect with the choice facing them which is based on their past experience. If their previous experience of consulting the senior colleague was positive (e.g. they felt proud because the senior colleague praised them for their assertiveness) they are more likely to consult the colleague. If the doctor's previous experience of consulting the senior colleague was negative (e.g. they felt embarrassed because the senior colleague spoke sharply to them for wasting their time) they are more likely to avoid seeking the colleague's opinion. As health professionals regularly work in highly emotional environments, under sustained stressful and time constrained conditions, the affect heuristic may direct judgement when urgent clinical decisions are required (Croskerry, 2002).

It is unclear when heuristics are advantageous or detrimental in clinical judgement. Instantaneous judgement involved in heuristics may sometimes lead to biases and interpretation mistakes (Elstein, 1999; Finucane *et al*., 2000; Graber *et al*., 2002). Croskerry (2003) lists over thirty cognitive heuristics and biases which can result in diagnostic error. He suggests that errors often occur due to a mismatch between clinical conditions, or social situations and an individual's ability to accurately interpret information (Croskerry, 2009a; Croskerry, 2009b). For example, confirmatory bias may lead to health professionals fixating on an incorrect course of information gathering due to the initial diagnosis generated when first encountering a patient (Klein, 2005,) while hindsight bias has been implicated in contaminating diagnostic second opinions (Henriksen & Kaplan, 2003).

Less is known about the role of the affect heuristic in clinical judgement (Croskerry *et al*., 2008, 2010), but it may be an important component when diagnosis requires a rapid reaction to the specific features and characteristics of a patient (Croskerry *et al*., 2008, 2010). The initial perception of others and the immediate reactions to their specific features and characteristics may sometimes be based on stereotypes, and this process may have implications for diagnostic decision making (Bodenhausen, 2005; Geirsson, Hensing, & Spak, 2009). Bodenhausen (2005) suggests that stereotyping creates an "illusion of accuracy" (p.113), when faced with complex patient information. During patient presentations, affect based heuristics may make a doctor focus on features or information which complement their own embedded affect-based beliefs or associations. These features or information then become salient for diagnosis. An example of this was found in a study involving Swedish general practitioners, who were presented with vignettes of either male or female patients detailing symptoms and signs which indicated alcohol dependence, or symptoms without signs of alcohol dependence. It was found that across both types of presentations while male patients, in comparison to female patients tended to be advised to cut down on their drinking, female patients in comparison to male patients were more likely to be advised to stop drinking altogether. It was also found that female patients were more likely to be referred for complementary therapy in comparison to male patients. This suggests that affect-based gendered perceptions concerning alcohol-related problems may have influenced their clinical management of male and female patients (Geirsson *et al*., 2009).

Diagnostic overshadowing (Reiss, Levitan, & Szysko, 1982) may be another example of how affect-based heuristics can result in health professionals wrongly attributing a patient's co-existing or newly reported symptoms to a previously diagnosed condition. This has been found to be prevalent in patients whose symptoms of mental or physical illness have been erroneously considered to be due to a known and established intellectual disability (Garner, Strohmer, Langford, & Boas, 1994; Spengler, Strohmer, & Prout, 1990) and is also considered to be a factor in the misdiagnosis of a range of co-morbid conditions in primary care (Kostopoulou *et*

al., 2008a). As the positive and negative affect felt towards frequent attender patients have been shown to impact GPs' clinical decisions and actions (Bellon *et al*., 2002), it is reasonable to assume that these feelings may have a role in diagnostic error and could account for some inequalities in healthcare.

There is a need for more research which explores the use of, and interplay between, affect-based and cognitive-based heuristics in diagnostic decision making. In particular, it is important to identify the clinical circumstances, contexts, for which type of patients they are used, and whether their use facilitates or jeopardizes diagnostic reasoning (Croskerry *et al*., 2010; Elstein, 2009; Norman, 2009).

2.6 Types of affect

Research from outside healthcare also suggests that different types of affect that are experienced by an individual are important in decision making. Studies indicate that mood states, anticipatory affect (instantaneous visceral responses) and anticipated affect (thoughts of future feelings) all appear to impact judgement and choice and may help to provide further understanding of how affect influences diagnostic judgement.

2.6.1 Mood states

Mood is often viewed as an extension of core affect. Core affect can be considered as a general level of emotional equilibrium that the individual unconsciously tries to maintain (Russell, 2003). While it is posited that core affect is not generated in response to a particular stimulus, mood may often be traceable to a particular event or object (Russell, 2003). According to Waters (2008), affective states are often regarded as either integral affect (the visceral feelings in direct response to the stimulus provoking a judgement or decision which is discussed in the following section on anticipatory affect); or as incidental affect (emotional states, such as mood,

which although may influence everyday decisions, originate from prior events unrelated to the stimulus requiring immediate judgement).

Incidental affect is a transitory emotional state which originates from prior events unrelated to the stimulus requiring immediate judgement (e.g. receiving good news just before attending a patient consultation results in you attending the consultation in a happy mood) and has been found to influence a variety of risk perceptions (Bruyneel, Dewitte, Franses, & Dekimpe, 2008; Caruso & Shafir, 2006). In a review of 34 experimental, quasi-experimental and correlational studies, Waters (2008) found that in general, studies demonstrated that negative mood was related to judging that more negative health hazards and life events would occur, and that positive hazards and events were less likely. On the other hand, positive mood produced optimism so that more positive and less negative events were judged as being more likely.

Research has also found that everyday behavioural choices may be driven by attempts to maintain a positive mood state or regulate negative affect. For example, in one study, Caruso and Shafir (2006) found that when an individual's positive current mood was made salient this tended to result in choices that corresponded with their current positive mood. Alternatively, when the individual's negative mood was made salient, this appeared to cause them to indulge in a behaviour which would help to regulate their negative mood. Furthermore, Bruyneel *et al.* (2008) posit a much more complex explanation of risk-related decisions, arguing that the continual effort required in the regulation of negative affect leads to the draining of resources needed for self-control. This process, also known as "ego depletion" *(*Baumeister, Bratslavsky, Muraven, & Tice, 1998*)*, results in an inability to successfully resist risk.

There is only limited research in healthcare suggesting that mood may be important in directing diagnostic decisions and behaviour. Isen, Rosenzweig, & Young (1991), found a manipulation to increase positive emotion in doctors, resulted in faster diagnostic choices and a tendency to show more concern and interest in the case. Another study involved the completion of a self-

report questionnaire exploring 188 primary care physicians' perceptions of how their mood influenced their behaviour with patients (Kushnir, Kushnir, Sarel, & Cohen, 2011). It was found that the physicians perceived that on days when they were in a negative mood they talked less to patients and were more likely to refer them for laboratory or diagnostic tests, or for consultations with a specialist, while on positive mood days they perceived that they engaged in inverse behaviour. However, while this study demonstrates that primary care physicians perceive that their positive and negative mood produces different clinical behaviour, it does not provide direct evidence that mood would have the same effect during the real-time clinical decisions that they make. Further studies which assess the impact of positive and negative mood on real-time clinical decisions are required.

Schwarz (1997) argues that mood directly alters the way an individual processes and reacts towards information. Martin, Ward, Achee and Wyer's (1993) experimental study found that across stimulus-based and memory-based tasks, when asking to stop was an indication that adequate information had been gathered those in a positive mood requested stopping before those in a negative mood. In contrast, when the stop request indicated cessation of task enjoyment doing the task, those in a negative mood requested stopping before those in a positive mood. These findings suggest that positive and negative moods inform behavioural motivations and decisions by communicating current task progress or enjoyment of the task in hand, and in turn, whether information processing needs to be continued or stopped.

In another study exploring perception and judgement of others, Avramova and Stapel (2008) found that positive affect tended to direct focus to broader, abstract features of the person, while induced negative affect directed focus to more specific, confined details. These findings clearly have implications for the behavioural and decisional motivations of healthcare professionals during the diagnostic process. In particular, they suggest that the positive or negative affect that a clinician may bring to a case may influence how much information the clinician gathers in

order to make a diagnosis and suggest that mood may have an important role in determining the type of details that become more noticeable when presented with clinical information. Furthermore, studies examining the processing of stereotypical features suggest that affect may also influence how such information is used in decision making. Positive affect has been shown to make the use of heuristic-based stereotyping more likely, while negative affect appears to reduce its use (Park & Banaji, 2000). There is also evidence to suggest that individuals in sad moods tend to adjust negative, but not positive stereotyping when making judgements (Lambert, Khan, Lickel, & Fricke, 1997). This may indicate that whether information based on stereotyping is or is not used in clinical decision making, may be influenced by the affect that the healthcare professional is currently feeling.

Although studies have found some evidence that negative mood states appear to increase the tendency to take more risks (Hockey, Maule, Clough, & Bdzola, 2000; Pezza Leith & Baumeister, 1996), there are discrepancies in the findings. The work of Lerner and Keltner (2000, 2001) demonstrates that different negative emotions lead to different appraisal tendencies. So, while anger can cause individuals to consider they have more control over a situation, which leads to more risk-taking, anxiety can lead to feelings of low personal control, and therefore an aversion to risk. This suggests that the relationship between positive and negative affect and information gathering may be much more complex. Lerner and Tiedens (2006) posit that such findings may be embedded in the temporal motivation and goals attached to different affect. For example they suggest that the recollection of angry situations from the past tend to be associated with being unpleasant and devoid of reward, while the prospect of using anger in future situations may be associated with more pleasant feelings due to a sense of the possibility of potential reward. Furthermore, Pezza Leith and Baumeister (1996) conclude that because anger (an emotion that is likely to induce high arousal in an individual) appears to increase risk-taking, while sadness (an emotion associated with low arousal) appears to produce a decrease in risky choice, that high arousal may be a contributing factor to risk-taking.

Indeed, Lerner and Keltner (2000) propose "a model of emotion-specific influences on judgement and choice" (p. 473). and emphasize the importance of establishing and identifying not only how positive and negative emotion influence decision making under different situations, but how specific emotions impact judgement and choice. Such findings highlight that incorporating the different elements of positive or negative mood under one category of positive or negative affect is problematic. It also emphasises the importance of establishing and identifying not only how positive and negative affect influence diagnostic decision making under different situations, but how specific emotions impact diagnostic judgement and choice.

2.6.2 Anticipatory affect

Immediate affective reactions to stimuli can produce strong visceral states (e.g. feeling anger when a patient is verbally abusive). Evidence suggests that visceral states can direct decisions and behaviour in a number of settings and contexts (Ariely & Loewenstein, 2006; Nordgren, van der Pligt, & Harreveld, 2008). Of particular interest, is the apparent capacity for visceral feelings to sometimes guide behaviour and decisions in favour of risk-taking behaviour and judgements which result in the least optimal outcomes.

An important finding within literature examining visceral states and impulsive and risky behaviour is the "empathy-gap effect" (Ariely & Loewenstein, 2006; Nordgren, van Harreveld, & van der Pligt, 2009). This refers to the finding that when individuals are asked to think about how a stimulus or situation may make them feel, when they are in a "cold" non-aroused state (e.g. a doctor writing up a patient management plan), they seem unable to invoke a feeling of visceral arousal and tend to misjudge how being in a "hot" aroused condition (e.g. the doctor performing CPR when the patient unexpectedly goes into cardiac arrest) impacts their decisions and actions. In the area of health psychology, experiments which have used the manipulation and comparison of individuals in hot states (e.g. a smoker craving for a cigarette) and cold states (e.g. a smoker who has smoked and has satisfied their need for a cigarette) have found that

when an individual's current state is one of heightened arousal (e.g. in a higher hot state), judgements concerning smoking and sexual behaviour appear to be driven by visceral state, rather than a more logical appraisal of whether the chosen behaviour or decision is most beneficial to one's health or is in accordance to morally acceptable conduct (Ariely & Loewenstein, 2006; Nordgren *et al*., 2008).

Furthermore, choice tasks in gambling games (Bechara, Damasio, Damasio, & Anderson, 1994; Bechara et al., 1997), have suggested that advantageous decision making is dependent upon the appropriate interpretation of affective-based physiological responses (Bechara *et al*., 1994, 1997), and indicates that increased visceral arousal triggered by active involvement (e.g. unwrapping a pack of cigarettes and igniting a lighter) might explain the propensity to undertake higher risks (Martinez *et al*., 2009). As detailed earlier, a healthcare provider's immediate visceral reaction to patients (Amato, 2007; Bellon *et al*., 2002), rather than a logical appraisal of their condition or injury, may drive clinical judgement and behaviour irrespective of whether these decisions and actions are the most beneficial or adhere to professionally acceptable conduct (Loewenstein, 2005). For example, a patient who a healthcare provider feels is feigning pain may be given a lower dose of painkiller, or none at all.

Outside healthcare, impulse-control beliefs have been tested with behavioural measures of self-control for hunger and cigarette craving (Nordgren *et al*., 2009). Evidence of a "restraint bias" (Nordgren *et al*., 2009) demonstrated that inaccurate beliefs that temptation can be withstood actually resulted in individuals being more likely to position themselves in high risk situations as part of their self-control strategies, and consequently indulging in the behaviour they believed they could resist. This suggests that if it is possible to find a way for clinicians to employ more evaluative and calculated approaches which consciously counter-act the power of strong visceral impulses during the diagnostic process, erroneous diagnostic judgement may be reduced. It also implies that to improve collective judgements, strategies which raise clinical

team members' awareness of each individual's tendency to be influenced by affective factors when making clinical decisions need to be developed (Croskerry *et al*., 2010).

2.6.3 Anticipated affect

Anticipated affect refers to an individual's conscious consideration of how their current actions may make them feel in the future (e.g. If I do not order the test because I think I know what the problem is, but discover that my first guess was wrong, I will regret it later). The role of regret and, in particular, avoidance of post-decisional regret, appears to play an important role in decisions involving risk and uncertainty. For example, it has been found that individuals who watched a video in which a driver's post-decisional regret of driving over the speed limit was made salient, become more risk-averse when considering their own driving behaviour (Parker *et al*., 1996). In contrast, maximising anticipated pleasure and minimising displeasure has been found to influence decision making during gambling scenarios (Bonniot-Cabanac & Cabanac, 2009; Mellers & McGraw, 2001). Whether the anticipated emotion impacting risky decisions is positive or negative in nature, may also be a reflection of how frequently the behavioural outcome of the risky decision has actually been, or is likely to be experienced (Lawton *et al*., 1997).

Connolly and Zeelenberg (2002), suggest that decision justification theory explains the main components which lead to regret. These are the tendency for individuals to weigh the outcome of the choice favoured against the choice discarded, and the inclination to blame themselves for choices made. In a review of a number of studies of decision making under uncertainty, Zeelenberg (1999) showed that when individuals expected to learn the outcome of discarded choices, they engaged in either increased or decreased risk-taking, dependent on whether they believed that the risk choice chosen would protect them from experiencing the most regret. Selecting and discarding choices is a pivotal part of the diagnostic decision making process. As such, more focused empirical research examining whether clinicians' choices are based on

avoiding or experiencing specific future emotions, and whether those choices augment or compromise optimal diagnostic judgements, would progress understanding of the role of anticipated affect in diagnostic performance.

Van Dijk and Zeelenberg (2006), demonstrated that students presented with scenarios where positive or negative outcomes were uncertain, had lower scores for both predicted positive anticipated feelings (satisfaction, happiness and feeling good) and predicted negative anticipated feelings (disappointment, unpleasantness and feeling bad), than students presented with scenarios where the outcome was certain. The authors suggest that uncertain, as opposed to certain outcomes, blunts consideration of the outcomes, which consequently dulls emotional response. This dulling effect on emotions, known as the disjunction effect (Tversky & Shafir, 1992), may hinder the affective-based feedback crucial for generating the sense of comprehension and control which are important components in rational decision making, and may result in sub-optimal choices. While little is known about the role of anticipated affect in diagnostic decision making, these findings have clear implications for medicine, where decisions with uncertain outcomes are routine, or where the feedback on outcomes of decisions may be delayed or unknown. Further research now needs to establish what types of uncertain clinical outcomes increase or diminish affective-based feedback, and under what clinical circumstances this assists or impedes decision making.

2.7 Current knowledge gaps

This review of current knowledge from inside and outside healthcare highlighted that the role of affect in diagnostic decision making is still relatively unexplored (Croskerry *et al*., 2008, 2010; Iedema *et al*., 2009; Ubel, 2005). So far, progress has mainly been theoretical or based on anecdotal evidence. It is now important to extend knowledge of diagnostic decision making processes beyond a cognitive approach and to understand how and why affect influences

diagnostic performance. In order to make progress, current models explaining how system 1 and system 2 processing interacts during diagnostic decision making must be further refined. One way of achieving this is by identifying the sources and types of affect that influence diagnostic decision making, establishing the mechanisms involved in the processing of affective factors, and assessing how they affect clinical outcomes.

2.8 Research plan

In an attempt to address the main thesis aims described in Chapter 1, this research presents a set of empirical studies with health professionals and medical students that used clinical scenarios to examine the role of affect in diagnostic decision making in emergency care. Due to the exploratory nature of the research, quantitative methodology using experimental methods (Chapters 4 and 5, correlational methods (Chapter 6), and qualitative methodology using individual interviews (Chapter 7) were utilised during this research. A mixed methods approach was taken in order to attain an accurate, balanced, and thorough appraisal of the influence of affect on diagnostic judgement. An explanation of the approach taken is described in Chapter 3.

CHAPTER 3

METHODOLOGICAL AND CONTEXTUAL CONSIDERATIONS

3.1 Introduction

This chapter describes the epistemological approaches underlying the mixed methods employed in this research, and defines and explains key concepts and measures. The challenges of patient safety research and conducting research in a healthcare setting are also discussed.

3.2 Methodology

3.2.1 Philosophical underpinnings

It is suggested that a researcher should address the "philosophical worldview" (p.5) which shapes the design of a programme of research to help facilitate transparency in the reasoning behind the strategies and methods chosen (Creswell, 2009). In this thesis, specific research methods will be discussed in the chapters describing each empirical study. This section will explain the main philosophical considerations for taking a mixed method approach to examine the role of affect in diagnostic decision making.

Traditionally, knowledge about decision making under risk and uncertainty has been informed by an experimental approach, taking place in lab-based, highly controlled conditions (Kahneman, 2011; Klein, 2008). Experimental designs have been utilised in research testing judgement as a rational process based on algorithmic decision strategies of utility and probability (Von Neumann & Morgenstern, 1947), and in research examining non-rational processes in decision making such as heuristics (Tversky & Kahneman, 1973) and affect (Bechara *et al.*, 1994; Finucane *et al.*, 2000; Loewenstein *et al.*, 2001). However, the positivistic foundation of experimental strategies to obtain an understanding of decision making has been criticised for the lack of consideration of the domain, context, and setting which are

specific to the real-life situations where risky decisions are made (Crandall, Klein & Hoffman, 2006; Klein, 2008). This view is supported within clinical decision making literature. For example, in "How Doctor's Think", Jerome Groopman (2008), provides numerous clinical examples where applying a Bayesian solution to diagnostic decision making does not account for the way that health professionals make diagnostic judgements with complex, dynamic, and conflicting information.

In order to try and attain a plausible and comprehensive understanding of diagnostic decision making, on completion of the narrative literature review detailed in Chapter 2, it was decided that a mixed methods procedure utilising a Concurrent Transformative Strategy[1] approach (Creswell, 2009) would: 1) enable the theoretical framework of Cognitive-Experiential Self-Theory, (CEST: Epstein, 1994) and Risk as Feelings (Loewenstein *et al*., 2001) to shape the design of studies; and 2) allow for triangulation[2] of data collected by quantitative and qualitative methods to interpret whether results refute or support theoretical perspectives, or suggest that current theoretical models should be extended.

Crotty (1998) suggests that an epistemology, "is a way of understanding and explaining how we know what we know." (p. 3). This programme of research uses quantitative and qualitative methods underpinned by the epistemological perspective of subtle realism (Hammersley, 1990). The methods support the tenet of subtle realism that in order to gain a perspective of the reality of the phenomena under study, the context in which this process takes place should be

[1] Concurrent Transformative Strategy (Creswell, 2009) is a mixed methods approach that simultaneously collects quantitative and qualitative data in order to inform the research objectives derived from a theoretical framework.

[2] Denzin (1970) splits triangulation into several types, and "methodological triangulation" is one of these. It is a technique for joining together the findings derived from various research methods. While it can be used to validate results, Pope & Mays (2006) suggest that for mixed methods, the data collected from different approaches should be viewed as complementary and combined to attain a broader insight into the phenomena in question. It is this use of triangulation that is employed for the data collected by quantitative and qualitative methods in this thesis.

authentically represented, reconstructed or reflected. It also allowed for combining mixed methods to provide a more rich and varied insight into the research topic (Pope and Mays, 2006). Therefore, experimental studies in Chapter 4 and Chapter 5 explored the influence of affect on information gathering for diagnosis by using every day clinical scenarios and diagnostic stages to elicit doctors' and medical students' responses. In Chapter 6, clinical simulation was used to explore the influence of affect on perceptions of communication performance and team effectiveness during critical incidents in junior doctors and nurses. This extracted knowledge from health professionals when they were interacting in, and responding to, situations that reflected their lived-in world. Finally, the individual interviews with doctors are presented in Chapter 7. These interviews drew on accounts of clinical practice to gain knowledge of the diagnostic decision making process that takes place within the social and situational context in which they occurred.

3.3 Measures

3.3.1 The measurement of affect

Experiential self-reports, behaviour and physiological states are all ways in which affective response to stimuli can be measured. In a recent review of these measures of emotion, Mauss & Robinson (2009) concluded that there was evidence to suggest that self-report measures appeared to be most suitable to capturing the current affective states of valence and arousal. They also determined that different types of behavioural and physiological measures demonstrated higher sensitivity to either valence (e.g. electromyography (EMG) of facial behaviours) *or* arousal (e.g. vocal pitch or amplitude). However, they concluded that while current measures of emotion, such as self-report and autonomic nervous system (ANS), appeared to better reflect the affective dimensions of valence and arousal, rather than specific emotions (e.g. happiness, anger) "there is no 'gold standard' measure of emotional responding." (p. 228).

While it may be desirable that methods be wholly guided by the theoretical framework underlying a programme of research, it is also acknowledged that in reality the demands of conducting research in an applied field necessitates that pragmatic aspects such as time, resources and inconvenience for participants are also considered (Brannen, 1992). Therefore, when choosing measures of affect, the setting and context in which studies were conducted also played a significant role in determining the suitability of the possible choices. As the target sample was doctors working in an acute hospital setting, attaining the support of clinical leads and doctors within participating Trusts was imperative to the success of the studies. Therefore, clinicians were consulted in the design of each study (see individual empirical study method sections) to ascertain the feasibility and limitations of particular types of measurement. As studies either took place on Trust premises, or recruitment materials were distributed within participating Trusts, feedback suggested that the time required for participation should be kept to a minimum so as not to be considered an unacceptable burden by both participating doctors and clinical leads. The busy and changeable daily workloads of the doctors also meant that where possible, it was important to allow flexibility to participate, so that this could be done during their own free time.

It was therefore decided that self-report measures of affect would be used in the research studies presented in this thesis as they would: 1) facilitate a consistent approach which would allow comparison and contrast of the influence of affect across samples and contexts; 2) enable the measurement of both the affective dimensions of valence and arousal; 3) assist in gaining knowledge about the role of specific discrete emotions in diagnostic decision making; 4) be amenable to all study designs and settings; and 5) be the least burdensome and efficient way to measure affective response in an applied, time-restrictive setting.

3.3.2 Defining affect

Research examining affect and decision making has been criticised for incongruous and unclear use of terminology and a lack of emphasis on understanding both the unique roles of different types of affect, as well as the function and impact of interplay and feedback loops (Baumeister, DeWall, & Zhang, 2007a; Baumeister, Vohs, DeWall, & Zhang, 2007; Sjoberg, 2006). Baumeister *et al*. (2007a) argue that the tendency for theorists to use the terms *affect* and *emotion* synonymously hinders the understanding of the role of two fundamentally distinctive "emotional phenomena*"* *(*p. 12) related to decision making. It is posited that *affect* is an instantaneous reaction to situations or stimuli which is largely devoid of mindful awareness. Thus, affect-based decision making is characterised by automaticity and speed. *Emotion* on the other hand, is regarded to be a more gradual, wholly mindful response to situations or stimuli. Emotion-based decision making is therefore characterised as being reflective and less rapid. Due to the use of these terms interchangeably in the literature, it is often not possible to distinguish their roles in decision making instances. While this distinction merits further investigation, the scope of this thesis does not allow for the examination of the individual roles of affect and emotion, as defined by Baumeister *et al*. (2007a), in diagnostic decision making.

However, in the review, literature from within healthcare identified sources of affect that appeared to be pertinent for diagnostic judgement, while literature from outside healthcare determined an appropriate theoretical framework which could be used to explain how and why these affective sources influence diagnostic decision making. Therefore, the studies included in this thesis do attempt to be explicit in terms of assessing the specific and interactional influences that sources (e.g. patient, team, previous experience) and types (e.g. mood, anticipatory affect, anticipated affect) of affect have on diagnostic decision making. The studies also attempt to identify the specific emotions (e.g. anger, happiness etc.) that feature in diagnostic judgement, and to determine their role.

3.3.3 Defining and measuring diagnostic decision making

It has been argued that much current work has incorrectly approached diagnosis as a static decision problem (Wears, 2009). Drawing upon Klein, Orasanu, Calderwood, & Zsambok's, (1993) naturalistic decision making (NDM) approach and Rasmussen's (1993) notion of decision making as process reliant on interconnected action sequences, Wears (2009) emphasises that in reality diagnostic decision making is a dynamic process. He proposes that although reasoned diagnostic decision making is considered to follow a logical sequence moving from initial activation to observation and identification, and finally leading to task definition, step formulation and execution; real-life diagnostic decision making actually jumps between these stages, depending on continuous feedback from ever changing developments and outcomes.

While diagnosis is a dynamic decision problem, researchers have broken the diagnostic decision making process into distinct stages (Kostopoulou *et al*., 2008b; Schiff *et al*., 2009; Wear, 2009). For example, Schiff *et al*. (2009) used the DEER taxonomy tool to divide the diagnostic process into seven distinct stages of access/presentation, history, physical exam, tests, assessment, referral/consultation and follow-up, in order to identify at what stage diagnostic error occurred and, what went wrong within each stage, across 669 cases which involved 310 clinicians. As the objective of this thesis is to identify whether sources and types of affect influence the decisions made for diagnosis, it was helpful to draw upon the work described above to assist in clearly distinguishing distinct stages involved in the diagnostic process, and to determine the specific actions requiring decisions within each stage. The stages and decision actions which formed the model used to distinguish the processes involved in diagnostic decision making in this thesis are shown in Figure 3.1.

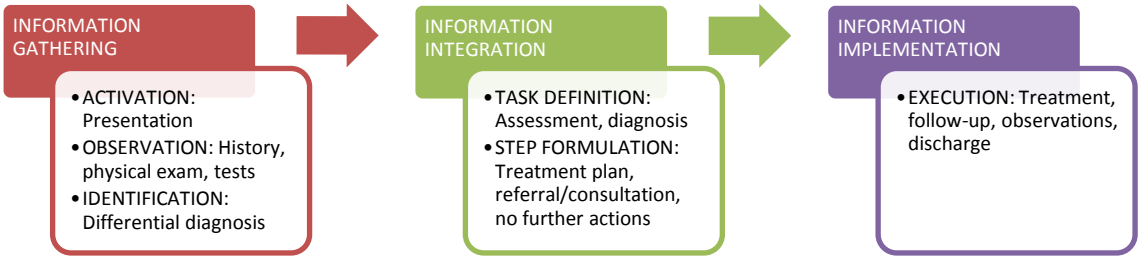

Figure 3.1 Proposed rational stages and decision actions involved in the diagnostic process (adapted from Schiff *et al*., 2009; Rasmussen, 1993; Vicente, 1999; Wears, 2009).

The approach of dividing the diagnostic process into distinct stages and actions allowed appropriate measures which would be able to single out specific decisions to be identified or developed. This enabled the examination of whether, and what type of affect influenced a specific diagnostic stage or action; the exploration of what the implications of decision choices at a particular stage were; and to determine whether this would be likely to impact progression through further diagnostic decision stages (Kostopoulou *et al*., 2008b; Schiff *et al*., 2009; Wear, 2009).

3.3.4 Case management

The complex nature of diagnosis, due to the need for constant reappraisal following assimilation and synthesis of intricate and changeable information, has already been discussed in section 3.3.3. In addition to this, when a patient presents with signs and symptoms for diagnosis, part of their healthcare also requires the clinician to stabilise or ameliorate their presenting symptoms, whether or not a clear diagnosis has been made. Feedback was sought from both senior and junior doctors across three specialties regarding how decisions made for diagnosis would be most accurately reflected in the research contained in this thesis. They indicated that

whether clinicians' diagnosis was guided by an immediate intuitive response to a patient's presentation, or whether it was ascertained through a slower and more logical process, possible differential diagnoses would be a central factor in the immediate treatment and/or actions implemented. Feedback also suggested that in some cases, a patient's response to either immediate treatment or a longer period of management may also assist in reaching a definitive diagnosis.

The important link between diagnosis and case management for safe patient outcomes is further supported in research. For example, one study found that when family doctors were presented with diagnostic scenarios, inappropriate management that could have been potentially harmful was planned in 78% of incorrectly diagnosed cases (Kostopoulou *et al*., 2008b). Furthermore, it is also possible that a patient's positive or negative response to treatment and actions may alter expected trajectories and may contribute to misdiagnosis or diagnostic delay. Therefore, it was decided that where appropriate, case management decisions would be included as a distinct sub-category of diagnostic decision making.

3.3.5 Team communication

Studies looking directly at clinical judgements suggest that team factors may play a role in decision making (Christensen *et al*., 2000; Leonard *et al*., 2004; Reader *et al*., 2006). In a clinical team context, health professionals must communicate relevant clinical information and their interpretation of patient symptoms to each other to ensure timely and appropriate case management. However, research has shown that health professionals sometimes hold different views concerning the need for emergency care for patients, despite all being presented with the same information (Gill, Reese & Diamond, 1996). This highlights the importance of clear communication within clinical teams.

How and whether clinical information important for diagnosis and the most appropriate case management is shared, may be influenced by affective responses and reactions of individuals to working in hostile and intimidating or cheerful and supportive teams. Although team factors may be important sources of affect for clinical decision making, studies directly examining the role of affect in clinical team decision making, which replicate the real-life contexts and settings in which clinical teams make decisions, are scarce. It was therefore decided that within the set of studies here, quantitative and qualitative methodologies would be used to address this knowledge gap in order to advance the understanding of the affective features of team communication. More specifically, these methods would be used to assess whether there was a relationship between affect and perceptions of individual and team communication performance and effectiveness in clinical situations involving teams of healthcare professionals.

3.4 Context

3.4.1 Challenges of patient safety research

The main aim of patient safety research is to identify factors involved in sub-optimal or unsafe clinical practices, cognition and behaviour, and to develop interventions which adjust, mitigate or defend against these harmful factors in order to improve clinical outcomes. However, it is suggested that issues with, "visibility, ambiguity, complexity, and autonomy" (p. 2) contribute to difficulties with engaging healthcare professionals and organisations in patient safety research and initiatives (see Leistikow, Kalkman, & de Bruijn, 2011). Therefore, it was possible that using a psychological approach to identify a potential patient safety problem may be interpreted by healthcare professionals and organisations as being forged purely to satisfy the perspective of the researcher's discipline. The success of any patient safety research is dependent on the support and uptake of Research Ethics Committees, Trust Research and Development departments, healthcare professionals, and managers. Due to this, patient safety strategies must attempt to reconcile any tension between different perspectives. In order to

mitigate this, it was pivotal that approval bodies and healthcare professionals and managers were convinced of the relevance of the topic to patient safety. In order to do this it was important that study research proposals demonstrated that the theoretical framework was founded on robust methods and explicit causal processes (Mark, Hughes, & Jones, 2004), and could be appraised through transparent, replicable methods (Foy *et al*., 2011).

3.4.2 Applying theory and empirical evidence to the healthcare setting

Contrasting opinions regarding the relevance of laboratory based, or other industry findings to a specific organizational context are rife in the research arena (Hodgkinson & Healey, 2008). While it is argued that transferability of results from different settings should be viewed with caution, there are increasing numbers of researchers and policy makers calling for healthcare quality and safety research to draw upon current knowledge, and the rigorously assessed methods and theories that underpin it (Foy *et al*., 2011; Mark *et al*., 2004; Parker & Lawton, 2003). Rather than being pre-occupied with highlighting the potential mismatches between different research approaches, the advancement of knowledge on how to provide safe healthcare is reliant on information from relevant past research and the ability to select and incorporate the most useful and previously tested approaches and methods:

"Arbitrary distinctions between basic and applied health research obscure a balanced view of the scientific basis of health and health care. Indeed, a fundamental weakness of the past has been the failure to make appropriate use of scientific methods to ensure that the products of science and technology are fully exploited in practice." (Peckham, 1996, Foreword)

Therefore, theory and empirical evidence are not only central to establishing and defining the variables that are important within a specific patient safety context; they also allow relational components and processes to be clearly illustrated, appropriately measured, tested, and modified (Mark *et al*., 2004).

This thesis examines how and why non-rational processes may be integral to clinical decision making, and in a large part, focuses on healthcare professionals at an individual level in order to identify which sources and types of affect impact their thought processes during everyday practice. Therefore, it was important to consider how the research topic of affect and diagnostic decision making would be supported and received by healthcare professionals. While supporting clinicians and review bodies approached the research with interest, one health professional expressed a more general response below,

"Many (clinicians) may appreciate they have emotions, but few will appreciate the real or possible influence this will have on their decision making or their reaction to patients and colleagues around them." (Consultant)

As demonstrated in the literature review in Chapter 2, one explanation for this response may be that clinical decision making has traditionally been considered to be a wholly rational process (Croskerry *et al*., 2008, 2010; Pani & Chariker, 2004; Parker & Lawton, 2003). Furthermore, the last decade has seen a shift from assigning clinical error to individual factors, to adopting a systems approach, where error in clinical judgement is attributed to the conditions and practices that are inherent in clinical settings and organisations (Burgess, 2009; Fogarty & McKeon, 2006; Institute of Medicine, 1999; Mesman, 2009; Nolan, 2000; Reason, 1997, 2000).

This research challenges the embedded belief that clinical decision making is a purely rational process and posits that alongside the current emphasis on a systems approach to patient safety research, there is also a need to further understand the role of healthcare professionals' own thought processes in clinical decision making. The tension between these different perspectives is acknowledged in healthcare literature (Croskerry *et al*., 2008, 2010; Esmail, 2006; Leistikow, Kalkman, & de Bruijn, 2011; Ubel, 2005). Weick and Sutcliffe (2003) suggest that hospitals are organizations where "cultural entrapment" (p. 73) can lead to those that work within them to

fail to notice new or alternative approaches to safety problems due to a collective fixation on established practices and beliefs. While prevailing assumptions about healthcare practice may still shape healthcare systems, the research presented in the remaining chapters examines the evidence for adopting a new approach to further our understanding of diagnostic decision making.

CHAPTER 4

USING EXPERIMENTAL METHODOLOGY TO EXAMINE THE INFLUENCE OF AFFECT ON FACTS CHOSEN FOR INFORMATION GATHERING IN DIAGNOSIS

4.1 Introduction

In this and the next chapter, three experimental studies are presented which examine the role of affect in diagnostic information gathering. This chapter describes the development of an online questionnaire that was used with medical students and doctors to examine the impact of affect on information gathering for diagnosis and case management. The first section of this chapter presents the results of a preliminary study in which the manipulation of anticipatory affect in response to affective cues in written clinical scenarios was assessed. The final section presents a second study which used the online questionnaire to examine affective responses to affective cues and sources of affect in written clinical scenarios in medical students. It also details the results of methods designed to examine whether affect influenced the appropriateness of facts considered important for diagnosis and thoroughness of information gathering for diagnosis in medical students and discusses possible explanations of the findings. Chapter 5 presents study 3, an experimental study examining the influence of affect on thoroughness and order of information gathering for diagnosis and case management in a sample of doctors, before discussing the limitations and problems encountered with the experimental approaches taken.

4.1.1 Affect and information gathering for diagnosis

Deciding and acting upon the most likely diagnosis requires a combination of both rational and non-rational processing to confirm, disconfirm or reassess whether a diagnosis is correct, or when an alternative diagnosis should be considered (Rudolph, Morrison & Carroll, 2009; Wear, 2009). In the proposed rational stages and decision actions involved in the diagnostic process (see section 3.3.3) information gathering is activated by the initial presentation of the case. The decisions and choices which stem from the initial presentation (e.g. whether to take a further

history; whether to perform a physical exam; what tests and investigations to order; what the differential diagnoses may be) are likely to be due to what are considered to be the most salient facts and features in the initial presentation.

The review in Chapter 2, presented both theoretical and empirical evidence of how affect impacts judgement by influencing how and what information is processed. Evidence that positive mood results in individuals focusing on broader, diffuse attributes, while negative mood guides individuals to focus on precise and confined details when gathering information (Avramova & Stapel, 2008; Isbell, Burns, & Haar, 2005), would appear to be pertinent in what is perceived to be the most important and appropriate features in the activation stage of the diagnostic decision making process. Furthermore, as individuals have shown that they consider how they may feel in the future when making current decisions (see section 2.6.3), it is important to also gain knowledge of the role that anticipated affect plays in diagnostic and treatment decisions.

The assertion that quicker, heuristic-based thinking is more likely to occur when individuals are feeling in a positive affective state (Isen *et al*., 1991, Park & Banaji, 2000) or are confident in their judgements (Berner & Graber, 2008) while slower, analytical reasoning is believed to occur when individuals are experiencing negative affective states (Park & Banaji, 2000) may also explain differences in the thoroughness of information gathering for diagnosis. Diagnostic decision making research has used the measure of time to assess a number of clinically relevant outcomes such as diagnostic accuracy (Sherbino, Dore, Wood *et al*., 2012) and time taken to make a diagnosis (Kostopoulou *et al*., 2008b). However, it is also feasible that differences in the time spent on diagnostic tasks may also indicate the thoroughness of information processing (Isen *et al*., 1991). Similarly, in medical settings clinical notes concerning a patient's presentation may also be hand-written or typed into a computer. The number of words in clinical notes may denote the level of detail applied to processing clinical features. Therefore it

is feasible that affect may influence thoroughness of information gathering which may be demonstrated through the number of words used and the time taken to detail clinical features.

As actions which are directed by salient features in a patient presentation directly impact progression through further diagnostic stages (Kostopoulou, *et al.*, 2008ab; Mamede *et al*., 2013; Schiff *et al.*, 2009), it is crucial that we understand whether affective factors influence clinicians' perceptions and processing of salient facts, and the implications of decisions at this diagnostic stage.

4.2 Study 1

4.2.1 Aims

The aim of study 1 was to serve as a manipulation check for both the study with medical students and study 3 with Acute NHS Hospital Trust doctors. The main objective of this study was to examine whether the emergency care vignettes developed for these studies evoked the intended anticipatory response (negative, positive and neutral affect).

4.2.2 Hypotheses

As the main aim of Study 1 is to test the manipulation of affect using positive and negative affective cues in clinical case presentations, it was hypothesized that:

1. Medical students and doctors in the positive affect condition would have higher positive anticipatory affect in comparison to medical students and doctors in the negative and neutral affect conditions.
2. Medical students and doctors in the negative affect condition would have higher negative anticipatory affect in comparison to medical students and doctors in the positive and neutral affect conditions.

4.3 Method

4.3.1 Participants

Despite the recruitment methods described below, the number of doctors who agreed to participate in the study was low and only 31 doctors were recruited. It was therefore decided that the relevant responses from medical students who participated in study 2 would be amalgamated with the responses from doctors in study 1 so that the manipulation check could be completed (see section 4.7.1 for recruitment of medical students).

The final sample of 124 participants consisted of 25% (n = 31) doctors across all departments from one Acute NHS Hospital Trust and 75% (n = 93) Year 4 and Year 5 medical students across four UK medical schools. There were 85 (69%) females and 38 (31) % males (based on 123 participants due to missing data for 1 participant). Age ranged from 20 to 54 years with a mean of 25.19 (SD = 5.39).

The recruitment of doctors was carried out across one Acute NHS Hospital Trust. Due to the general clinical nature of the emergency care scenarios, doctors across all specialties and grades were included. Participants were recruited through a variety of methods. The study advert and questionnaire link was posted on the Trust intranet and, on obtaining the Ward Sister's permission was displayed in clinical specialty wards across the Trust. Permission was also gained to present brief details of the study and to hand out the study advert at Junior doctor sessions and, where permission was gained, at the beginning or end of departmental meetings. An email including brief details of the study and the study questionnaire link was also distributed on one occasion to University staff employed as doctors in the participating Trust. All methods of recruitment provided doctors with the option of completing a paper copy of the questionnaire if they felt that this would be more convenient. No incentive for participation was offered.

4.3.2 Ethics

Approval to undertake research with NHS health professionals was granted by NHS (Ref: 10/H1302/65) and University of Leeds' Institute of Psychological Sciences' Research Ethics Committees (Ref: 12-0039) and the Trust Research and Development Department. Approval to undertake research with medical students was granted by the Medicine and Dentistry Educational Research Ethics Committee at the University of Leeds (Ref: EDREC/10/017), prior to approaching and obtaining either further ethical approval or appropriate authorisation from individual medical schools. Care was taken to address all potential ethical issues in the Participant Information Sheets and to remind participants of their right to withdraw at any time. To protect anonymity, codes made up of letters and numbers were used on all completed questionnaires and participants were assured that any email they chose to provide for participation in the prize draw would be used only for that purpose.

4.3.3 Design

The design was an experimental design with three between-participants conditions (whether the version of the emergency care scenario read by the participant was designed to promote positive affect, negative affect, neutral affect) and three within-participant conditions (all participants were presented with one scenario where affect was generated from a patient source, one scenario where affect was generated from a team source, and one scenario where affect was generated from previous experience). The dependent variable was the affective response (general positive, general negative, hostility, and fear) to the emergency care scenarios.

Block randomisation was used to randomly allocate participants to one of three conditions (positive affect, negative affect, or neutral affect). This was used to balance potential extraneous variables across conditions and controlled for researcher bias in the recruitment process. Order of scenario was counterbalanced over six sequences to control for any potential effect of order.

4.3.4 Materials

4.3.4.1 Case presentations

Three emergency care scenarios were developed in collaboration with healthcare professionals (Consultant Anaesthetist and Consultant in Elderly Care). As it was intended that the scenarios would also be used in studies with Year 4 and 5 medical students and doctors across all grades and specialties, it was decided that the scenarios should contain common clinical presentations. The process of ensuring that the scenarios were suitable for Year 4 and Year 5 medical students is described in more detail in section 4.7.4.1.

The scenarios were also designed to focus on a specific source of affect. Therefore one scenario presented a patient with stomach pain and focused on the patient as the source of affect, one scenario presented a patient with chest pain and focused on the clinical team as the source of affect, and one scenario presented a patient with respiratory symptoms and focused on previous experience as the source of affect. As well as positive and negative affect versions of each scenario, a neutral affect version was also retained and included as one of the conditions in the study. It was decided that the neutral affect condition would aid the evaluation of the manipulation of affect as well as potentially providing knowledge of affective reactions and decisions to a non-affective-laden source. The presentations are included in the appendices (appendix A).

4.3.4.2 Online questionnaire

An on-line and paper version of the questionnaire was developed for this study. This was designed with feedback from doctors (see section 4.3.5 below). Technical help (e.g. computer programming and on-line set up) was provided by the IT department in the Institute of Psychological Sciences, University of Leeds.

4.3.5 Face validity

Feedback concerning the content and structure of the questionnaire was obtained from a consultant and junior doctor working in an Acute NHS Hospital Trust. After reading all versions of the case presentations and the proposed structure of the phase 2 questionnaire, both indicated that the neutral and affect versions of the scenarios were realistic and reflected true experience. They also confirmed that the scenarios were an appropriate length and that the clinical content was appropriate for all grades and specialties of doctors.

4.3.6 Measures

4.3.6.1 Demographics

Each participant indicated their age, sex, clinical grade, number of years in present grade, total number of years postgraduate clinical experience and specialty by either clicking or ticking the appropriate answer from a choice of responses, or writing the relevant answer in the text space provided.

4.3.6.2 Affective response

4.3.6.2.1 Mood

A two item scale was used to assess the mood of the participant before they read each emergency care vignette. Valence had a score range of 1 = extremely sad to 7 = extremely happy, and arousal had a score range of 1 = extremely alert to 7 = extremely tired. The arousal item was reverse-scored. The overall score range was 1-7. A higher score indicated a more positive mood.

4.3.6.2.2 Anticipatory affect

Although 46 items of the 60 item version of the Positive and Negative Affect Schedule – Expanded Form (PANAS-X: Watson and Clark, 1994) were initially used to measure participants' anticipatory affect after reading each emergency care vignette, only 29 doctors

completed the questionnaire. Feedback from doctors suggested that they found the completion of the 46 items after each scenario too laborious. Therefore in an attempt to boost low recruitment, this was reduced to the two main scales of General Positive and General Negative Affect. This version of the questionnaire only resulted in the recruitment of 2 further doctors to the study. As 93 medical students and 29 doctors had completed the four sub-scales of General Positive Affect, General Negative Affect, Hostility and Fear of the 46-items version of the Positive and Negative Affect Schedule – Expanded Form (PANAS-X: Watson & Clark, 1994), these scales were used in the analysis.

The two sub-scales of General Positive Affect (α = .94; e.g. active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, strong) and General Negative Affect (α = 95; e.g. afraid, scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset, distressed) each had 10 items. The sub-scales of Hostility (α = 90; e.g. angry, hostile, irritable, scornful, disgusted, loathing) and Fear (α = 96; e.g. afraid, scared, frightened, nervous, jittery, shaky) each had 6 items. All items had a score range of 1 = very slightly or not at all, to 5 = extremely. A higher score indicated a higher feeling of positive, negative, hostile, or fearful anticipatory affect.

4.3.7 Procedure

After reading either the online or paper copy of the participant information sheet and completing the online or paper copy of the consent form, participants were randomly allocated to one of three conditions (positive affect, negative affect, or neutral affect). Participants then provided an anonymous participant code and demographic information. They were then asked to read either three positive, negative, or neutral affect case presentations. Before reading each case presentation, participants were asked to respond to two questions assessing their current mood. After each scenario, participants were asked to complete scales from the PANAS X.

4.3.8 Analysis

The SPSS statistical software package (Version 19.0) was used for statistical analysis. Cronbach's Alpha was used to assess the reliability of each measurement. Differences between conditions and scenarios for anticipatory affect were assessed by examination of mean scores and a mixed design MANCOVA. This was conducted to compare ratings of anticipatory affect (general positive, general negative, hostility and fear) across condition (positive, neutral and negative affect) and clinical scenario (patient, team and previous experience). Cohen's (1988) guidelines for eta squared were used to interpret the strength of partial eta squared. Participants' baseline mood scores were used as the covariate in the analysis to control for the effect of existing mood on the affective response. All mean scores presented in tables are adjusted for the covariate. Greenhouse-Geisser corrections were applied to variables that violated the assumption of sphericity. All additional univariate tests of between-subjects effects and post-hoc comparisons controlled for Type 1 error by applying a Bonferroni correction for multiple analyses.

4.4 Results

4.4.1 Mood

Baseline mood was generally moderate across all conditions. A one-way between-groups ANOVA demonstrated that there were no differences in baseline mood between the positive (M = 4.58, SD = 1.00), neutral (M = 4.46, SD = 0.96) or negative affect (M = 4.54, SD = 1.13) conditions, F (2, 122) = 1.60, p = .853.

4.4.2 Manipulation of affect

The mean and standard error for ratings of general anticipatory affect across conditions are presented in Table 4.1. The mean score responses were all below the mid-point score of 3 indicating low arousal of anticipatory affect across all conditions. Despite this, mean scores

were in the intended direction. Medical students and doctors in the positive affect condition reported a higher mean score for positive anticipatory affect in response to scenarios than

Table 4.1 Mean (Std. Error) general anticipatory affect across conditions

	Positive	Neutral	Negative
	N = 31	N = 41	N = 32
Positive	2.60 (0.11)	2.54 (0.09)	2.36 (0.11)
Negative	1.44 (0.09)	1.40 (0.08)	1.85 (0.09)
Hostility	1.18 (0.06)	1.12 (0.05)	1.69 (0.06)
Fear	1.65 (0.13)	1.64 (0.11)	2.09 (0.13)

medical students and doctors in the neutral and negative affect condition. Conversely, medical students and doctors in the negative affect condition reported higher mean scores for negative, hostile and fearful anticipatory affect, than those in the neutral or positive affect conditions. While mean scores were greater between the negative affect condition and both the neutral and positive affect conditions, differences between the positive and neutral affect conditions were small. This indicates that the positive and neutral affect scenarios generated similar levels of anticipatory affect.

The mean and standard error for ratings of anticipatory affect for scenarios across conditions are presented in Table 4.2. All mean scores were again below the mid-point of 3, suggesting that for all scenarios arousal of anticipatory affect was low. In the positive affect condition the patient source of affect elicited lower positive anticipatory affect than the team or previous experience source of affect scenarios. The team source of affect scenario generated higher scores for negative, hostile and fearful anticipatory affect than either the patient or previous experience source of affect scenarios.

Table 4.2 Mean (Std. Error) general anticipatory affect within scenarios across conditions

	Positive			Neutral			Negative		
	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.
Positive	2.49 (0.12)	2.66 (0.13)	2.63 (0.12)	2.30 (0.10)	2.65 (0.11)	2.67 (0.11)	2.15 (0.12)	2.26 (0.12)	2.69 (0.12)
Negative	1.23 (0.08)	1.67 (0.12)	1.41 (0.09)	1.30 (0.07)	1.49 (0.10)	1.39 (0.08)	1.61 (0.08)	2.21 (0.12)	1.71 (0.09)
Hostility	1.15 (0.09)	1.32 (0.10)	1.06 (0.04)	1.19 (0.08)	1.12 (0.09)	1.04 (0.04)	1.81 (0.09)	2.13 (0.10)	1.13 (0.04)
Fear	1.32 (0.11)	1.98 (0.17)	1.63 (0.16)	1.41 (0.09)	1.87 (0.14)	1.66 (0.14)	1.66 (0.11)	2.44 (0.16)	2.17 (0.16)

Prev. Exp.: Previous experience

A mixed design MANCOVA with mood as a covariate revealed that there was a significant interaction between condition and scenario for combined anticipatory affect, F (16, 188) = 4.53, p = < .001, with a large effect size (partial eta squared = .28). There was a significant main effect for condition, F (8, 196) = 6.46, p = < .001, with a large effect size (partial eta squared = .21), but no main effect for clinical scenario, F (8, 93) = 1.78, p = .091. Mood was not a significant covariate for condition, F (4, 97) = 0.92, p = .458, or clinical scenario F = (8, 93) = 0.82, p = .585.

With a Bonferroni adjusted alpha level of .013, the univariate effects for interaction showed positive anticipatory affect, F (4, 200) = 4.01, p = .004, with a medium effect size (partial eta squared = .07), negative anticipatory effect, F (3.28, 163.96) = 5.16, p = .001, with a medium effect size (partial eta squared = .09), and hostile anticipatory affect, F (3.75, 187.41) = 16.43, p = < .001, with a large effect size (partial eta squared = .25), to be significant. Post-hoc comparisons indicated that there were no significant differences across scenarios for positive anticipatory affect. The mean scores for negative and hostile anticipatory affect for both the patient and team source of affect scenarios were significantly higher for medical students and doctors in the negative condition than those in both the neutral and positive condition. Medical students and doctors in the negative previous experience source of affect scenario felt significantly higher negative anticipatory affect than those in the neutral source of affect scenario. There were no significant differences in mean scores for positive, negative or hostile anticipatory affect between medical students and doctors in the neutral condition and those in the positive condition for any of the three scenarios.

4.5 Discussion

The aim of study 1 was to assess the success of the manipulation of positive and negative affect across conditions and scenarios in preparation for study 2 with medical students and study 3 with Acute NHS Hospital Trust doctors.

The difference in the mean scores, although not significant, demonstrated that medical students and doctors reported higher positive anticipatory affect in the positive affect condition than both the negative and neutral affect conditions. This implies that there was limited success in the manipulation of positive affect. The significant difference in mean scores for negative affect indicated that medical students and doctors had higher negative and hostile anticipatory affect in the negative affect condition than both the negative and neutral affect conditions. Therefore, while the hypotheses that medical students and doctors in the positive affect condition would have higher positive anticipatory affect than those in the negative and neutral affect condition was not supported by statistically significant differences, the hypothesis that medical students and doctors in the negative affect condition would have higher negative anticipatory affect in comparison to those in the positive and neutral affect conditions was supported. However, the effect was dependent on the source of affect. In particular, patient and team source of affect, evoked statistically significant higher negative and hostile anticipatory affect in medical students and doctors in the negative condition compared to those in in the positive and neutral conditions, while the previous experience source of affect scenario only elicited higher negative anticipatory affect in medical students and doctors in the negative affect condition, in comparison to those in the neutral condition. The team source of affect appeared to evoke more intense negative, hostile and fearful responses than either the patient or previous experience source of affect scenarios.

These findings therefore provide some preliminary support for the notion that the type and intensity of affective responses in medical students and doctors may be specific to particular sources of affect within a clinical setting. Mean scores between the positive and neutral condition were often similar, and while there were significant differences between both the positive and neutral conditions when compared to the negative affect condition, there were no significant differences between the positive and neutral condition. This suggests that scenarios

in the positive and neutral conditions were eliciting a similar affective response and may imply that an affective reaction to a stimulus or situation is never completely neutral.

4.6 Study 2

4.6.1 Aims

This study used the online questionnaire described in the first part of this chapter, to further explore general affect and discrete emotions in medical students in response to clinical case presentations. It also more specifically drew upon the distinct diagnostic stage of information gathering in order to identify whether types (mood, anticipatory affect, anticipated affect) and sources (patient factors, team factors, previous experience) of positive, negative and neutral affect influenced the appropriateness of facts deemed important for diagnostic decision making, and thoroughness of information gathering for diagnosis in a sample of medical students across four UK medical schools.

The main objectives in this study were: 1) to examine whether affective cues presented in a clinical scenario influenced the appropriateness of facts considered important for diagnosis, and thoroughness of information gathering (e.g. number of words used and time taken to describe facts considered important for diagnosis) and 2) to assess whether, and to what extent, different affective cues and specific sources of affect induced general affect and discrete positive and negative emotions.

4.6.2 Hypotheses

As positive affect has been associated with heuristic based thinking and negative affect with systematic thought processes, it was hypothesized that:

1. Medical students in the positive affect condition would demonstrate faster, less methodical decision making than medical students in the negative or neutral affect conditions.
2. Medical students in the negative affect condition would demonstrate slower, more considered decision making than medical students in the positive or neutral affect conditions.

As it is reasonable to assume that positive affect leads to greater confidence, it was also hypothesized that:

3. Medical students in the positive affect condition would have higher ratings for measures of confidence than medical students in the negative affect condition.

While the role of discrete emotions, positive and negative anticipated affect, and specific sources of affect (e.g. patient factors, team factors, previous experience) were assessed in this study, the current dearth of research in this area meant that these were exploratory, and therefore hypotheses were not generated.

4.7 Method

4.7.1 Participants

The sample[3] consisted of 93 Year 4 and Year 5 medical students across four UK medical schools. There were 67 (73%) females and 25 (27%) males (based on n = 92 due to missing data for 1 participant). Age ranged from 20 to 32 years with a mean of 22.87 (1.88).

In order to establish the level of clinical knowledge and experience required to generate meaningful responses to the emergency care scenarios that were presented to participants in the

[3] Due to a dearth of empirical studies that have manipulated affect in scenarios and measured appropriateness of information gathering for diagnosis, a statistician was consulted in order to perform sample size calculations based on estimates of effect size. With an alpha level of 0.05, $d = 1.00$, a sample size of 20 in each group gave 80% power (Simulated power = 0.7980) to find a significant effect in an ANOVA test.

study, senior teaching staff involved in developing and delivering undergraduate medicine course modules in a UK university were consulted in order to ascertain which undergraduate medicine year groups would be suitable to be included in the study. As a result of this consultation, it was decided that only medical students in Year 4 and Year 5 of a UK undergraduate Medicine degree should be recruited.

Participants were recruited through two main methods. After gaining permission from each participating medical school, the study advert and questionnaire link was either posted on an electronic noticeboard that could be accessed by all Year 4 and Year 5 Undergraduate Medicine students, or was emailed directly to Year 4 and Year 5 students who had previously agreed to be sent details of current studies in which they could participate. Clicking on the hypertext link took the medical student to the participant information sheet. One main cash prize of £50 and two runners-up prizes of £25 were offered as an incentive for participation.

4.7.2 Ethics

The ethical approvals obtained for this study have been described in section 4.3.2.

4.7.3 Design

The design was an experimental design with three between-participants conditions (whether the version of the emergency care scenario read by the participant cued positive affect, negative affect, neutral affect) and three within-participant conditions (all participants were presented with one scenario where affect was generated from a patient source, one scenario where affect was generated from a team source, and one scenario where affect was generated from previous clinical experience). The dependent variables were appropriateness of important facts chosen for diagnosis, and thoroughness of information gathering (e.g. number of words used to describe important facts for diagnosis, and time spent considering important facts for diagnosis).

Block randomisation was used to randomly allocate participants to one of three conditions (positive affect, negative affect, or neutral affect). This was used to balance potential extraneous variables across conditions and controlled for researcher bias in the recruitment process. Order of scenario was counterbalanced over six sequences to control for any potential effect of order.

4.7.4 Materials

4.7.4.1 Case presentations

The procedure involved in the development of the three emergency care presentations (see appendix A) is described in section 4.3.4.1. A consultant who was involved in delivering undergraduate medicine course modules in a UK university was consulted in order to ascertain that the case presentations were suitable for Year 4 and Year 5 undergraduate medicine students.

4.7.5 Measures

4.7.5.1 Affect

4.7.5.1.1 Mood

The mood measure was identical to that detailed in section 4.3.6.2.1.

4.7.5.1.2 Anticipatory affect

Four sub-scales of the Positive and Negative Affect Schedule – Expanded Form (PANAS-X: Watson and Clark, 1994) were used to measure anticipatory affect. These are described in section 4.3.6.2.2.

4.7.5.1.3 Anticipated affect

This measure contained 6 items with 2 sub-scales. Positive anticipated affect (e.g. “If the decisions that I made for the diagnosis and management of this patient were correct I would

feel…") contained 3 items (e.g. α = .93; proud, confidence, self-respect) and negative anticipated affect (e.g. "If the decisions that I made for the diagnosis and management of this patient were incorrect I would feel…") contained 3 items (α = .94; e.g. regret, shame, guilt). All items had a score range of 1 = not at all, to 7 = very much. Higher scores indicated higher positive or negative anticipated affect.

4.7.5.1.4 Confidence in most important facts for diagnosis

This measure contained 1 item (e.g. "Please indicate how confident you are that you have chosen the 5 most important facts for making a diagnosis by clicking the most appropriate answer below"). This had a score range of 1 = not at all confident to 7 = extremely confident. Higher scores signified higher confidence in the facts chosen for making a diagnosis.

4.7.5.2 Appropriateness of information gathering

4.7.5.2.1 Appropriateness of facts considered important for diagnosis

In order to measure the appropriateness of the facts considered important for diagnosis, three consultant doctors (a consultant in anaesthesia, a consultant in accident and emergency, and a consultant in elderly care) each read the neutral versions of the three scenarios and independently provided the five facts that they would consider important for obtaining a diagnosis (pieces of information extracted from each scenario that are critical for proceeding along the correct diagnostic trajectory). While the intention was to use each consultant's opinion to form an expert consensus of the five most appropriate facts for diagnosis, it was apparent that while there was some agreement between the consultants, the differences in the facts each considered important for diagnosis, meant that a consensus would be difficult to attain, (see appendix B). Due to this and time limitations with regard to the research programme, it was decided that all facts classed as appropriate by the three consultants would be used when scoring medical students' responses for important facts.

Appropriateness of facts was assessed by comparing the 5 facts chosen by each medical student with those provided by the expert panel. Any fact that was on the expert panel's list was given a score of 0 (appropriate), while any fact that was not on the list scored 1 (inappropriate). Due to the fact that a number of medical students provided more than one fact in each of the five free-text spaces provided in the on-line questionnaire, only the first fact *in each* of the 5 free-text spaces was given a score of 0 or 1. The score range was 1 to 5. Higher scores indicated a higher number of inappropriate facts for diagnosis.

4.7.5.3 Thoroughness of information gathering

4.7.5.3.1 Number of words used to describe important facts

This measure assessed the number of words that medical students used to describe the 5 most important facts for diagnosis for each of the 3 clinical scenarios. An initial inspection of the completed online questionnaires revealed that there was some variation in the number of words used to describe the 5 most important facts. While some medical students appeared to cut and paste sections of text which included both relevant and irrelevant information, others seemed to be more selective in the words chosen. This variation may have been an indicator of the level of consideration given to the scenario. To ensure consistency across participants, a set of criteria for determining a word unit was followed and is included in appendix C. A higher score indicated that a higher number of words were used to detail important facts.

4.7.5.3.2 Time spent considering important facts (duration)

This measure was the number of seconds taken to complete the questionnaire section which asked medical students to write the 5 most important facts for each of the 3 patient presentations. The time each participant took to complete the list of 5 most important facts was logged automatically by the online questionnaire once the section had been completed.

4.7.5.4 Other

4.7.5.4.1 Demographics

Each participant indicated their age, sex, and level of study.

4.7.6 Procedure

After reading the on-line participant information sheet and completing the online consent form, participants were randomly allocated to one of three conditions (positive emotion, negative emotion, or neutral emotion). Participants then provided an anonymous participant code and demographic information. They were then asked to read either three positive, negative, or neutral emotion emergency care vignettes. Before reading each scenario, participants were asked to respond to two questions assessing their current mood. After each scenario, participants were then asked to complete scales from the Positive and Negative Affect Schedule Expanded Form (PANAS-X: Watson & Clark, 1994), before being asked to list the 5 facts from the case presentation that they considered most important for diagnosis. Participants were then requested to indicate their level of confidence in the most important facts they had chosen for diagnosis.

Participants were then asked to complete scales assessing their positive and negative anticipated affect. On completion of the questionnaire, participants had the option of providing an email address if they wished to be entered into the prize draw.

4.7.7 Analysis

The SPSS statistical software package (Version 19.0) was used for statistical analysis. Cronbach's Alpha was used to assess the reliability of each measure. Differences for general affective response (positive anticipatory affect, negative anticipatory affect, hostility anticipatory affect, fear anticipatory affect, positive anticipated affect, negative anticipated affect and confidence in the most important facts chosen for diagnosis) and discrete emotions

(positive, negative, hostile and fearful anticipatory affect, positive and negative anticipated affect) were assessed by examination of mean scores and mixed design MANCOVAs across condition (positive, neutral and negative affect) and clinical scenario (patient, team and previous experience). Differences in the dependent variables of appropriateness of important facts for diagnosis, and thoroughness of information gathering (e.g. number of words used and time taken to describe important facts) across condition and clinical scenario were assessed by examination of mean scores and mixed design ANCOVAs. Cohen's (1988) guidelines for eta squared were used to interpret the strength of partial eta squared.

Participants' baseline mood scores were used as the covariate in the analysis to control for the effect of existing mood on outcomes. All mean scores presented in tables are adjusted for the covariate. Greenhouse-Geisser corrections were applied to variables that violated the assumption of sphericity. All additional univariate tests of between-subjects effects and post-hoc comparisons controlled for Type 1 error by applying a Bonferroni correction for multiple analyses.

Inspection of the free text revealed that in some instances long sections of text from the scenarios had been pasted into the free text spaces for the choice of important facts. To control for this, extreme scores for the measure, 'number of words used to describe important facts', were removed from the analysis. In order to control for unexpected distractions which may have prolonged the time taken to complete the answers, extreme scores for the measure of 'time' were removed from the analysis.

4.8 Results

4.8.1 Affect

4.8.1.1 Mood

Baseline mood was generally moderate across all conditions. A one-way between-groups ANOVA demonstrated that there was no difference in baseline mood between the positive affect (M = 4.56, SD = 1.10), neutral affect (M = 4.44, SD = 0.92) or negative affect (M = 4.61, SD = 1.10) condition, F (2, 91) = 0.23, p = .793.

4.8.1.2 General affective responses to clinical scenarios

The mean and standard error for ratings of general affective responses across conditions are presented in Table 4.3. The mean scores for general positive, negative, hostile and fearful

Table 4.3 Mean (Std. Error) general affective response across conditions

	Positive	Neutral	Negative
	N = 22	N = 29	N = 28
Positive	2.66 (0.12)	2.51 (0.11)	2.34 (0.11)
Negative	1.48 (0.11)	1.40 (0.09)	1.89 (0.10)
Hostility	1.15 (0.08)	1.10 (0.07)	1.69 (0.07)
Fear	1.73 (0.16)	1.68 (0.14)	2.17 (0.14)
Pos. Anticipated	5.69 (0.20)	5.50 (0.17)	5.39 (0.18)
Neg. Anticipated	4.74 (0.30)	3.88 (0.26)	4.15 (0.27)
Confidence	3.87 (0.21)	4.16 (0.18)	4.27 (0.18)

Pos. Anticipated: Positive Anticipated Affect; Neg. Anticipated: Negative Anticipated Affect

anticipatory affect supported the findings from study 1and are therefore not discussed further here. The mean scores for general anticipated affect showed that across conditions, medical students had higher levels of intensity for positive anticipated affect than negative anticipated affect. The highest positive and negative anticipated affect scores were from medical students in the positive affect condition. The lowest mean score for positive general anticipated affect was in the negative affect condition and the lowest score for negative general anticipated affect

was in the neutral affect condition. The mean scores for confidence in most important facts chosen for diagnosis show that levels of confidence were moderate. Medical students had the most confidence in the negative affect condition and the least confidence in the positive affect condition.

The mean and standard error for ratings for general affective responses are illustrated in Table 4.4. Both general positive and negative anticipated affect scores were higher across scenarios in the positive affect condition. The lowest positive anticipated affect score was in the patient source of affect scenario in the negative affect condition. There was more variation across scenarios for negative anticipated affect, with lower scores generally occurring in the scenarios in the neutral affect condition. The patient source of affect scenario had the lowest scores for confidence across all conditions.

A mixed design MANCOVA with mood as a covariate revealed that there was a significant interaction between condition and scenario for combined general affective responses, F (28, 126) = 2.42, p = < .001, with a large effect size (partial eta squared = .35). There was a significant main effect for condition, F (14 140) = 3.56, p = < .001, with a large effect size (partial eta squared = .26), but no significant main effect for clinical scenario, F (14, 62) = 1.42, p = .173. Mood was not a significant covariate for condition, F (7, 69) = 1.40, p = .218, or clinical scenario F (14, 62) = 1.18, p = .314.

With a Bonferroni adjusted alpha level of 0.007, the univariate effects for interaction showed hostility, F (4,150) = 12.27, p = < .001, with a large effect size (partial eta squared = .25), to be significant. Positive anticipatory affect was only marginally non-significant, F (4,150) = 3.57, p = .008, partial eta squared = .09. Negative anticipatory affect (p = .027) was significant at the .05 alpha level. Post-hoc comparisons indicated that medical students in the negative affect

Table 4.4 Mean (Std. Error) general affective response within scenarios across conditions

	Positive			Neutral			Negative		
	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.
Positive	2.57 (0.13)	2.77 (0.14)	2.64 (0.15)	2.28 (0.11)	2.64 (0.13)	2.61 (0.13)	2.12 (0.12)	2.26 (0.13)	2.64 (0.13)
Negative	1.26 (0.10)	1.69 (0.15)	1.49 (0.11)	1.31 (0.09)	1.53 (0.13)	1.37 (0.10)	1.63 (0.09)	2.25 (0.13)	1.78 (0.10)
Hostility	1.17 (0.12)	1.22 (0.13)	1.07 (0.06)	1.18 (0.10)	1.09 (0.11)	1.05 (0.05)	1.81 (0.10)	2.11 (0.11)	1.14 (0.05)
Fear	1.38 (0.13)	2.07 (0.20)	1.73 (0.20)	1.44 (0.11)	1.99 (0.18)	1.62 (0.17)	1.69 (0.12)	2.53 (0.18)	2.30 (0.18)
Pos. Ant.	5.51 (0.23)	5.75 (0.22)	5.82 (0.20)	5.33 (0.20)	5.68 (0.19)	5.50 (0.17)	5.00 (0.21)	5.58 (0.19)	5.57 (0.17)
Neg. Ant.	4.64 (0.33)	4.80 (0.35)	4.79 (0.33)	3.85 (0.29)	3.92 (0.30)	3.86 (0.29)	4.10 (0.29)	3.90 (0.31)	4.45 (0.29)
Confidence	3.63 (0.25)	3.81 (0.27)	4.17 (0.25)	4.23 (0.22)	4.02 (0.23)	4.23 (0.22)	4.27 (0.22)	4.06 (0.24)	4.48 (0.22)

Prev. Exp.: Previous experience; Pos. Ant.: Positive anticipated affect; Neg. Ant. Negative anticipated affect

condition had significantly higher feelings of hostility than medical students in either the positive or neutral affect condition in response to the patient and team source of affect scenarios. Positive anticipatory affect was higher for medical students in the positive affect condition in comparison to medical students in the negative, but not the neutral condition. However, this finding was marginally statistically not significant. Negative feelings were also higher in medical students responding to the negative affect versions of the patient and team source of affect scenarios than those responding to either the positive or neutral affect versions. There was also a higher rating of general negative affect in the negative affect condition in comparison to the neutral affect condition in the previous experience source of affect scenario. There were no significant differences in ratings of positive, negative, or hostile anticipatory affect between medical students in the neutral condition and those in the positive condition for any of the three scenarios.

4.8.1.3 Discrete anticipatory emotions in response to clinical scenarios

As can be seen in Table 4.5, medical students in the positive affect condition experienced higher discrete positive emotions in comparison to those in the neutral and negative conditions. Mean score differences tended to be greater between the positive and negative conditions, than the positive and neutral conditions. The only exception was for the emotion, active, for which medical students in the negative condition reported a higher mean score than those in the positive or neutral condition. In general, patterns of scores for each discrete positive emotion were similar across all conditions. Intensity of response was particularly low for the emotions, excited, proud and inspired across all conditions, while alert, determined, attentive and interested tended to score above the mid-point score of 3 across most conditions. The mean and standard error for ratings of discrete positive emotions for scenarios across conditions were also assessed. As can be seen in Table 4.6, the scenarios in the positive affect condition generally received the highest ratings for discrete positive emotions. The emotion alert scored above the mid-point of 3 in all scenarios across all conditions.

Table 4.5 Mean (Std. Error) discrete positive and negative anticipatory emotions across conditions

	Positive	Neutral	Negative
	N = 21	N = 26	N = 28
	(N = 19)	(N = 29)	(N = 27)
Positive			
Excited	1.94 (0.15)	1.77 (0.14)	1.59 (0.13)
Strong	2.18 (0.17)	2.02 (0.16)	2.05 (0.15)
Enthusiastic	2.60 (0.18)	2.41 (0.17)	2.10 (0.16)
Alert	3.59 (0.19)	3.29 (0.17)	3.29 (0.17)
Determined	3.33 (0.20)	3.10 (0.18)	3.00 (0.17)
Proud	1.61 (0.11)	1.26 (0.10)	1.19 (0.10)
Attentive	3.45 (0.20)	3.30 (0.18)	3.06 (0.17)
Active	2.78 (0.22)	2.76 (0.20)	2.80 (0.19)
Inspired	1.85 (0.15)	1.68 (0.14)	1.59 (0.13)
Interested	3.32 (0.18)	3.14 (0.16)	2.74 (0.15)
Negative			
Afraid	1.57 (0.18)	1.66 (0.14)	2.07 (0.15)
Scared	1.58 (0.19)	1.59 (0.15)	2.12 (0.16)
Nervous	2.25 (0.21)	2.08 (0.17)	2.47 (0.17)
Jittery	1.53 (0.16)	1.48 (0.13)	1.98 (0.14)
Irritable	1.41 (0.13)	1.25 (0.11)	1.84 (0.11)
Hostile	1.09 (0.10)	1.09 (0.08)	1.67 (0.08)
Guilty	1.14 (0.07)	1.06 (0.06)	1.22 (0.06)
Ashamed	1.20 (0.09)	1.06 (0.07)	1.25 (0.07)
Upset	1.19 (0.16)	1.16 (0.13)	1.87 (0.13)
Distressed	1.81 (0.16)	1.55 (0.13)	2.06 (0.13)

N in parentheses is for discrete negative anticipatory emotions

Table 4.6 Mean (Std. Error) discrete positive anticipatory emotions within scenarios across conditions

	Positive			Neutral			Negative		
	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.
Excited	1.95 (0.15)	1.89 (0.18)	1.98 (0.21)	1.43 (0.14)	2.02 (0.16)	1.88 (0.19)	1.50 (0.13)	1.46 (0.16)	1.81 (0.18)
Strong	2.28 (0.23)	2.06 (0.19)	2.21 (0.20)	1.97 (0.21)	1.97 (0.17)	2.12 (0.18)	2.14 (0.20)	1.98 (0.17)	2.02 (0.17)
Enthusiastic	2.59 (0.22)	2.48 (0.20)	2.74 (0.25)	1.97 (0.20)	2.60 (0.18)	2.65 (0.22)	1.88 (0.19)	1.90 (0.18)	2.52 (0.21)
Alert	3.22 (0.23)	3.87 (0.23)	3.67 (0.24)	3.02 (0.21)	3.43 (0.21)	3.43 (0.22)	3.14 (0.20)	3.27 (0.20)	3.46 (0.21)
Determined	3.28 (0.24)	3.37 (0.24)	3.34 (0.24)	2.78 (0.21)	3.44 (0.22)	3.07 (0.22)	2.49 (0.20)	2.96 (0.21)	3.54 (0.21)
Proud	1.47 (0.13)	1.96 (0.16)	1.39 (0.14)	1.27 (0.12)	1.22 (0.15)	1.30 (0.12)	1.18 (0.11)	1.19 (0.14)	1.22 (0.12)
Attentive	3.33 (0.23)	3.54 (0.24)	3.48 (0.23)	3.09 (0.21)	3.35 (0.22)	3.46 (0.21)	2.64 (0.20)	2.95 (0.21)	3.61 (0.20)
Active	2.47 (0.25)	3.11 (0.28)	2.77 (0.25)	2.16 (0.23)	3.04 (0.25)	3.07 (0.22)	2.46 (0.22)	2.81 (0.24)	3.15 (0.21)
Inspired	1.62 (0.17)	2.28 (0.24)	1.66 (0.21)	1.50 (0.15)	1.82 (0.22)	1.71 (0.19)	1.39 (0.14)	1.53 (0.21)	1.85 (0.18)
Interested	3.31 (0.24)	3.42 (0.22)	3.22 (0.25)	2.88 (0.21)	3.48 (0.20	3.06 (0.22)	2.38 (0.21)	2.60 (0.19)	3.24 (0.21)

Prev. Exp.: Previous experience

A mixed design MANCOVA with mood as a covariate revealed that there was a significant interaction between condition and scenario for combined discrete positive emotions, F (40, 106) = 1.98, p = .003, with a large effect size (partial eta squared = .43). There was no significant main effect for condition, F (20, 126) = 1.02, p = .448 or clinical scenario, F (20, 52) = 0.97, p = .512. Mood was not a significant covariate for condition, F (10, 62) = 1.50, p = .163, or scenario F (20, 52) = 0.84, p = .654.

With a Bonferroni adjusted alpha level of 0.005, the univariate effects for interaction showed determined, F (4, 142) = 4.82, p = .001, with a medium effect size (partial eta squared = .12), to be significant. The emotion, interested was only marginally non-significant, F (4, 142) = 3.65, p = .007, partial eta squared = .09. The emotions, attentive (p = .035), enthusiastic, (p = .044), excited, (p = .019), and proud, (p = .011) were significant at the .05 alpha level. Post-hoc comparisons indicated that in response to the patient source of affect scenario the mean scores for the emotions, determined and interested were significantly higher in the positive affect condition than the negative affect condition. Furthermore, the emotion, interested was also significantly higher in positive and neutral affect conditions in comparison to the negative affect condition for the team source of affect scenario. There were no significant differences in mean scores for discrete positive emotions between participants in the neutral condition and those in the positive condition for any of the three scenarios.

Medical students in the negative affect condition experienced higher discrete negative emotions in comparison to those in the positive and neutral conditions. The emotion, nervous had the highest mean (M = 2.47, SE = 0.17) and was the only negative emotion to score above 2 across all of the three conditions. The mean and standard error for ratings of discrete negative emotions for scenarios across conditions are illustrated in Table 4.7. All mean scores for discrete negative emotions were below the mid-point score of 3 indicating that negative emotions were low in intensity. Medical students in the negative affect condition generally had

higher mean scores than those in the positive and neutral condition, although ratings for the previous experience source of affect scenario were not consistently higher. The highest ratings of discrete negative emotions occurred in the team source of affect scenario.

A mixed design MANCOVA with mood as a covariate revealed that there was a significant interaction between condition and scenario, F (40, 106) = 1.58, p = .035, with a large effect size (partial eta squared = .37). There was a significant main effect for condition, F (20, 126) = 2.35, p = .002, with a large effect size (partial eta squared = .27), but not for clinical scenario, F (20, 52) = 0.84, p = .660. Mood was not a significant covariate for condition, F (10, 62) = 1.42, p = .192, or clinical scenario F (20, 52) = 0.73, p = .778.

With a Bonferroni adjusted alpha level of .005, the univariate effects for interaction showed the emotions, irritable, F (4, 142) = 6.52, p = < .001, with a large effect size (partial eta squared = .16), hostile, F (3.51, 124.60) = 9.93, p = < .001, with a large effect size (partial eta squared = .22), and upset, F (3.66, 129.98) = 4.81, p = .002, with a medium effect size (partial eta squared = .12), to be significant. The emotion, ashamed (p = .024) was significant at the .05 alpha level. Post-hoc comparisons indicated that medical students in the negative affect condition had significantly higher feelings for irritable and hostile than medical students in both the positive and neutral condition for the patient and team source of affect scenarios. There were also significant differences for the emotion, upset with higher scores occurring in the negative affect condition in contrast to the positive affect condition for the patient and team source of affect scenarios, and higher scores emerging in the negative affect condition in comparison to the neutral affect condition in both the team and previous experience source of affect scenarios. There were no significant differences in mean scores for discrete negative emotions between participants in the neutral condition and those in the positive condition for any of the three scenarios.

Table 4.7 Mean (Std. Error) discrete negative anticipatory emotions within scenarios across conditions

	Positive			Neutral			Negative		
	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.
Afraid	1.22 (0.16)	1.95 (0.23)	1.53 (0.24)	1.40 (0.13)	1.99 (0.19)	1.58 (0.19)	1.57 (0.13)	2.38 (0.19)	2.27 (0.20)
Scared	1.27 (0.16)	1.90 (0.24)	1.58 (0.25)	1.37 (0.13)	1.82 (0.20)	1.58 (0.21)	1.57 (0.14)	2.45 (0.21)	2.34 (0.21)
Nervous	1.79 (0.22)	2.63 (0.25)	2.32 (0.27)	1.82 (0.18)	2.34 (0.20)	2.06 (0.22)	1.86 (0.18)	2.89 (0.21)	2.67 (0.22)
Jittery	1.27 (0.14)	1.79 (0.24)	1.53 (0.21)	1.27 (0.12)	1.69 (0.19)	1.48 (0.17)	1.53 (0.12)	2.41 (0.20)	2.01 (0.17)
Irritable	1.37 (0.20)	1.48 (0.20)	1.37 (0.14)	1.44 (0.16)	1.13 (0.16)	1.20 (0.11)	2.16 (0.16)	2.20 (0.17)	1.16 (0.11)
Hostile	1.16 (0.16)	1.05 (0.17)	1.05 (0.04)	1.20 (0.13)	1.07 (0.14)	1.00 (0.03)	1.78 (0.13)	2.19 (0.14)	1.04 (0.03)
Guilty	1.05 (0.07)	1.16 (0.16)	1.21 (0.07)	1.04 (0.06)	1.10 (0.13)	1.04 (0.06)	1.14 (0.06)	1.41 (0.13)	1.11 (0.06)
Ashamed	1.27 (0.13)	1.11 (0.16)	1.21 (0.09)	1.03 (0.10)	1.05 (0.13)	1.10 (0.07)	1.15 (0.11)	1.57 (0.14)	1.04 (0.07)
Upset	1.00 (0.17)	1.26 (0.22)	1.32 (0.17)	1.13 (0.14)	1.21 (0.18)	1.13 (0.13)	1.56 (0.14)	2.33 (0.18)	1.71 (0.14)
Distressed	1.37 (0.16)	2.26 (0.24)	1.80 (0.21)	1.33 (0.13)	1.83 (0.19)	1.50 (0.17)	1.57 (0.13)	2.59 (0.20)	2.02 (0.18)

Prev. Exp.: Previous experience

As can be seen in Table 4.8, medical students in the negative affect condition provided higher ratings of discrete hostility and fear emotions than those who were in either the positive or neutral affect conditions. In the negative affect condition the highest mean discrete hostility score was for anger, and the highest mean fear score was for nervous. Interestingly, nervous also demonstrated the same high score pattern across all conditions. When ratings of

Table 4.8 Mean (Std. Error) discrete hostile and fear anticipatory emotions across conditions

	Positive N = 21	Neutral N = 28†	Negative N = 28
Hostility			
Angry	1.19 (0.11)	1.12 (0.09)	1.93 (0.09)
Hostile	1.08 (0.09)	1.10 (0.08)	1.70 (0.08)
Irritable	1.43 (0.13)	1.25 (0.11)	1.88 (0.11)
Scornful	1.11 (0.08)	1.04 (0.07)	1.46 (0.07)
Disgusted	1.13 (0.10)	1.12 (0.08)	1.75 (0.08)
Loathing	1.02 (0.10)	1.01 (0.09)	1.40 (0.09)
Fear			
Afraid	1.61 (0.17)	1.66 (0.15)	2.09 (0.15)
Scared	1.62 (0.18)	1.60 (0.16)	2.15 (0.16)
Frightened	1.78 (0.19)	1.56 (0.16)	2.25 (0.16)
Nervous	2.25 (0.20)	2.08 (0.17)	2.50 (0.17)
Jittery	1.59 (0.16)	1.49 (0.14)	2.01 (0.14)
Shaky	1.67 (0.17)	1.71 (0.15)	2.04 (0.15)

For † N = 29 for discrete fear anticipatory emotions

discrete hostility emotions for scenarios across conditions were assessed (see Table 4.9), the team source of affect emerged as the scenario that evoked the most intense feelings of hostility within the negative affect condition, with angry being the highest rated discrete emotion. The

previous experience source of affect scenario produced the lowest intensity for hostility emotions. An inspection of mean scores for discrete fear emotions (see Table 4.10) also showed that the team source of affect scenario evoked the most intense feelings of fear, with nervous reported as the highest fear emotion. In the case of fear, the patient source of affect scenario received the lowest ratings.

A mixed design MANCOVA with mood as a covariate revealed that there was a significant interaction between condition and scenario for combined discrete hostile emotions, F (24, 126) = 2.06, p = .006, with a large effect size (partial eta squared = .28). There was also a significant main effect for condition, F (12, 138) = 3.84, p = < .001, with a large effect size (partial eta squared = .25), but not for clinical scenario, F (12, 62) = 1.07, p = .401. Mood was not a significant covariate for condition, F (6, 68) = 1.02, p = .422, or clinical scenario F (12, 62) = 0.87, p = .579.

With a Bonferroni adjusted alpha level of .008, the univariate effects for interaction showed the emotions, angry, F (3.53, 128.91) = 10.84, p = < .001, with a large effect size (partial eta squared = .23), hostile, F (3.60, 131.32) = 9.58, p = < .001, with a large effect size (partial eta squared = .21), irritable, F (4, 146) = 5.69, p = < .001, with a large effect size (partial eta squared = .14), and disgusted, F (3.59, 130.89) = 7.05, p = < .001, with a large effect size (partial eta squared = .16), to be significant. The emotions, scornful (p = .019) and loathing (p = .020) were significant at the .05 alpha level. Post-hoc comparisons indicated that feelings for angry, hostile, irritable, and disgusted were significantly higher for participants in the negative affect condition than those in both the neutral and positive affect conditions for both the patient source and team source of affect scenarios. There were no differences between conditions in the previous experience source of affect scenario. There was no significant difference between the mean scores for the discrete hostile emotions between participants in the neutral condition and those in the positive condition for any of the three scenarios.

Table 4.9 Mean (Std. Error) discrete hostile anticipatory emotions within scenarios across conditions

	Positive			Neutral			Negative		
	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.
Angry	1.29 (0.17)	1.29 (0.20)	1.00 (0.07)	1.21 (0.14)	1.11 (0.18)	1.04 (0.06)	1.97 (0.14)	2.67 (0.18)	1.14 (0.06)
Hostile	1.14 (0.15)	1.05 (0.16)	1.05 (0.06)	1.21 (0.13)	1.07 (0.14)	1.01 (0.05)	1.79 (0.13)	2.21 (0.14)	1.10 (0.05)
Irritable	1.43 (0.19)	1.53 (0.20)	1.34 (0.14)	1.42 (0.17)	1.14 (0.17)	1.21 (0.12)	2.18 (0.17)	2.22 (0.17)	1.22 (0.12)
Scornful	1.14 (0.13)	1.19 (0.13)	1.00 (0.06)	1.11 (0.11)	1.00 (0.12)	1.00 (0.05)	1.54 (0.11)	1.71 (0.12)	1.14 (0.05)
Disgusted	1.05 (0.15)	1.29 (0.18)	1.05 (0.06)	1.11 (0.13)	1.22 (0.16)	1.04 (0.05)	1.96 (0.13)	2.21 (0.16)	1.07 (0.05)
Loathing	1.00 (0.12)	1.05 (0.16)	1.00 (0.07)	1.03 (0.10)	1.00 (0.14)	1.00 (0.06)	1.40 (0.10)	1.65 (0.14)	1.14 (0.06)

Prev. Exp.: Previous experience

Table 4.10 Mean (Std. Error) discrete fear anticipatory emotions within scenarios across conditions

	Positive			Neutral			Negative		
Fear	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.
Afraid	1.19 (0.15)	2.00 (0.22)	1.62 (0.23)	1.40 (0.13)	1.99 (0.19)	1.59 (0.20)	1.62 (0.13)	2.36 (0.19)	2.28 (0.20)
Scared	1.24 (0.16)	2.00 (0.24)	1.62 (0.24)	1.37 (0.14)	1.84 (0.21)	1.58 (0.21)	1.62 (0.14)	2.46 (0.21)	2.36 (0.21)
Frightened	1.43 (0.15)	2.09 (0.26)	1.81 (0.23)	1.27 (0.13)	1.95 (0.22)	1.47 (0.20)	1.72 (0.13)	2.60 (0.22)	2.44 (0.20)
Nervous	1.76 (0.20)	2.67 (0.24)	2.34 (0.25)	1.83 (0.17)	2.35 (0.20)	2.06 (0.21)	1.89 (0.18)	2.93 (0.21)	2.69 (0.22)
Jittery	1.29 (0.14)	1.85 (0.23)	1.62 (0.21)	1.27 (0.12)	1.70 (0.20)	1.49 (0.18)	1.58 (0.12)	2.42 (0.20)	2.03 (0.18)
Shaky	1.43 (0.18)	2.09 (0.23)	1.48 (0.21)	1.48 (0.15)	2.11 (0.20)	1.55 (0.18)	1.72 (0.15)	2.39 (0.20)	2.00 (0.19)

Prev. Exp.: Previous experience

A mixed design MANCOVA with mood as covariate revealed that there was no significant interaction between condition and scenario for combined fear emotions, F (24, 128) = 0.69, p = .854, and no significant main effect for condition, F (12, 140) = 1.76, p = .061 or clinical scenario, F = (12, 63) = 1.46, p = .165. Mood was not a significant covariate for condition, F (6, 69) = 0.31, p = .931, clinical scenario F (12, 63) = 1.27, p = .258.

4.8.1.4 Discrete anticipated emotions in response to clinical scenarios

The mean scores and standard error for discrete positive and negative anticipated emotions are illustrated in table 4.11. While scores were higher in the positive affect condition for all three

Table 4.11 Mean (Std. Error) discrete positive and negative anticipated emotions across conditions

	Positive	Neutral	Negative
	N = 21	N = 28	N = 27
Positive			
Proud	5.64 (0.24)	5.45 (0.21)	5.50 (0.22)
Confidence	5.72 (0.21)	5.67 (0.18)	5.44 (0.18)
Self-respect	5.64 (0.24)	5.34 (0.21)	5.07 (0.22)
Negative			
Regret	5.03 (0.30)	4.39 (0.26)	4.46 (0.27)
Shame	4.64 (0.36)	3.62 (0.31)	3.74 (0.31)
Guilt	4.51 (0.34)	3.52 (0.30)	3.99 (0.31)

discrete positive emotions, all emotions were above the mid-point of 4, indicating a moderate intensity for anticipated affect across all conditions. Scores for discrete negative emotions were also highest in the positive affect condition. The future emotion of regret was the highest of the three discrete negative emotions across all the conditions. However, the discrete negative

emotions tended to have a lower mean score, suggesting that medical students experienced a lower intensity of feeling when considering negative future feelings.

The mean and standard error for ratings of discrete positive and negative anticipated emotions for scenarios across conditions (see Table 4.12) show that positive anticipated affect had a generally consistent pattern and was high within all scenarios across all conditions. The lowest score was for self-respect in the patient source of affect scenario. In terms of the discrete negative emotions, all emotions scored above the mid-point of 4 in all scenarios in the positive affect condition, but shame and guilt fell below the mid-point in all scenarios in the neutral condition, and the patient and team source of affect scenario in the negative affect condition. The emotion, regret was highest in the team source of affect scenario in the positive affect condition, but was also the only negative emotion to consistently score above the mid-point of 4 across all scenarios and conditions. Medical students in the positive team scenario rated their anticipated feeling of shame almost 1.3 scale points above medical students in the negative team scenario. The previous experience source of affect scenario scored highest for all discrete negative emotions in the negative affect condition.

A mixed design MANCOVA with mood as covariate demonstrated that there was no significant interaction between condition and scenario for combined positive and negative anticipated emotions, F (24, 124) = 0.84, p = .685, and no significant main effect for condition, F (12 136) = 1.11, p = .356 or clinical scenario, F = (12, 61) = 1.51, p = .146. Mood was not a significant covariate for condition, F (6, 67) = 1.70, p = .135, or clinical scenario, F (12, 61) = 0.16, p = .520.

Table 4.12 Mean (Std. Error) discrete positive and negative anticipated emotions within scenarios across conditions

	Positive			Neutral			Negative		
	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.
Positive									
Proud	5.38 (0.30)	5.76 (0.26)	5.76 (0.25)	5.17 (0.26)	5.70 (0.23)	5.49 (0.22)	5.05 (0.27)	5.79 (0.23)	5.68 (0.22)
Confidence	5.62 (0.23)	5.67 (0.24)	5.86 (0.22)	5.51 (0.20)	5.82 (0.21)	5.67 (0.19)	5.14 (0.20)	5.56 (0.22)	5.64 (0.19)
Self-respect	5.38 (0.28)	5.81 (0.26)	5.72 (0.25)	5.25 (0.25)	5.50 (0.22)	5.28 (0.22)	4.59 (0.25)	5.30 (0.23)	5.31 (0.23)
Negative									
Regret	4.86 (0.33)	5.29 (0.38)	4.95 (0.37)	4.34 (0.29)	4.51 (0.33)	4.32 (0.32)	4.24 (0.30)	4.33 (0.33)	4.82 (0.32)
Shame	4.48 (0.38)	4.67 (0.39)	4.76 (0.40)	3.56 (0.33)	3.70 (0.34)	3.59 (0.34)	3.79 (0.34)	3.38 (0.35)	4.06 (0.35)
Guilt	4.33 (0.39)	4.52 (0.40)	4.67 (0.37)	3.54 (0.34)	3.45 (0.35)	3.56 (0.33)	3.99 (0.35)	3.68 (0.35)	4.31 (0.33)

Prev. Exp.: Previous experience

4.8.2 Appropriateness and thoroughness of information gathering for diagnosis

The means and standard errors for appropriateness of important facts for diagnosis and thoroughness of information gathering (e.g. number of words used and time taken to list important facts) across condition (see Table 4.13) and scenario by condition are illustrated in Table 4.14.

4.8.2.1 Appropriateness of important facts chosen for diagnosis

Mean scores for inappropriate answers were very similar across conditions. However, scores in the negative affect condition had a marginally higher mean than those in the positive and neutral

Table 4.13 Mean (Std. Error) appropriateness and thoroughness scores across conditions

	Positive	Neutral	Negative
	N = 22	N = 29	N = 28
Appropriateness	1.50 (0.18)	1.58 (0.16)	1.61 (0.16)
Number of words†	17.58 (1.17)	15.16 (1.00)	15.20 (1.00)
Time (seconds)‡	173.52 (16.79)	138.63 (13.89)	138.49 (14.37)

Note for † N = 20 (positive affect), N = 27 (neutral affect), N = 27 (negative affect), for ‡ N = 19 (positive affect), N = 28 (neutral affect), N = 26 (negative affect)

affect conditions. Mean scores across scenarios showed that at least 1 out of 5 facts considered important for diagnosis was inappropriate for all scenarios across all conditions. The patient source of affect scenario had the highest mean for inappropriate answers across all conditions.

A mixed design ANCOVA showed that there was no significant interaction between condition and scenario for appropriate answers, F (4, 150) = 0.87, p = .482. There was no significant

main effect for condition, F (2, 75) = 0.12, p = .888, or scenario, F (2, 74) = 0.09, p = .910. Mood was not a significant covariate for condition, F (1, 75) = 3.53, p = .064 or scenario, F (2, 74) = 0.60, p = .553. The lack of any significant difference in mean scores for appropriateness of the most important facts for diagnosis did not support the hypotheses that when gathering information for diagnosis, medical students in the positive affect conditions would use less methodical decision making processes, while medical students in the negative affect conditions would use more considered decision making processes.

4.8.2.2 Number of words used to describe important facts for diagnosis

The mean scores for the number of words show that medical students in the positive affect condition took an average of over 2 words more than participants in the negative affect condition to describe the most important facts for diagnosis. Mean scores across scenarios (see Table 4.14) illustrates that medical students in the patient source of affect scenario in the positive affect condition used the highest number of words. The lowest number of words used was from medical students in the previous experience source of affect scenarios in the negative affect condition. A mixed design ANCOVA with mood as covariate demonstrated that there was no significant interaction between condition and scenario for number of words, F (4, 140) = 1.32, p = .267. There was no significant main effect for condition, F (2, 70) = 1.54, p = .222, or scenario, F (2, 69) = 0.36, p = .701. Mood was not a significant covariate for condition, F (1, 70) = 0.02, p = .904 or scenario, F (2, 69) = 0.46, p = .633.

Although medical students in the positive condition used more words when describing important facts for diagnosis than medical students in the negative condition this was not statistically significant and therefore did not support the hypothesis. When gathering

Table 4.14 Mean (Std. Error) appropriateness and thoroughness scores within scenarios across conditions

	Positive			Neutral			Negative		
	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.	Patient	Team	Prev. Exp.
Appro.	1.83 (0.22)	1.56 (0.25)	1.11 (0.25)	1.85 (0.19)	1.35 (0.22)	1.55 (0.22)	1.90 (0.20)	1.48 (0.22)	1.45 (0.23)
Words	19.31 (1.65)	18.04 (1.20)	15.38 (1.37)	14.60 (1.42)	16.03 (1.03)	14.85 (1.19)	15.87 (1.42)	15.35 (1.03)	14.38 (1.18)
Time	173.06 (18.61)	176.42 (17.56)	171.07 (24.89)	122.59 (15.39)	131.41 (14.53)	161.88 (20.59)	135.47 (15.93)	134.78 (15.03)	145.20 (21.30)

Prev. Exp.: Previous experience; Appro.: Appropriateness

information for diagnosis, medical students in the positive affect conditions did not appear to use faster, less methodical decision making processes, and medical students in the negative affect conditions did not appear to use slower, more considered decision making processes.

4.8.2.3 Time taken to list important facts for diagnosis

The mean scores and standard error for time illustrate that medical students in the positive affect condition took the longest time to list the facts they considered important for diagnosis and took an average of around 35 seconds longer than medical students in the negative affect condition. Medical students in the negative and neutral affect conditions had almost identical durations. The mean and standard error scores in Table 4.14 show that the longest duration for all scenarios occurred in the positive affect condition. A mixed design ANCOVA with mood as a covariate revealed that there was no significant interaction between condition and scenario for time, F (4, 138) = 0.67, p = .611. There was no significant main effect for condition, F (2, 69) = 1.60, p = .209, or scenario, F (2, 68) = 0.17, p = .844. Mood was not a significant covariate for condition, F (1, 69) = 0.08, p = .781, or scenario, F (2, 68) = 0.17, p = .841.

Although medical students in the positive condition took longer to describe important facts for diagnosis than medical students in the negative condition this was not statistically significant and therefore did not support the hypothesis. When gathering information for diagnosis, medical students in the positive affect conditions did not appear to use faster, less methodical decision making processes, and medical students in the negative affect conditions did not appear to use slower, more considered decision making processes.

4.9 Discussion

The aim of study 2 was to examine whether affective and emotional responses influenced appropriateness of important facts for diagnosis, and thoroughness of information gathering for diagnosis (e.g. number of words used and time taken to describe facts considered important for diagnosis). The study also examined differences between medical students' affective and emotional response to positive, neutral and negative clinical case presentations and to assess whether source of affect played a role in these responses.

4.9.1 General affective response to clinical scenarios

Both positive and negative anticipated affect were felt more strongly by medical students in the positive affect condition than those in either the negative or neutral affect conditions. While mean score differences were generally small across conditions for positive anticipated affect, they were more pronounced for negative affect. It would seem logical that patient cases which evoke a positive affective state (e.g. caring for a patient one has a rapport with, or working in a clinical team led by a consultant you respect and admire) might lead a medical student to consider that they would feel more positive anticipated affect due to making correct diagnostic and case management decisions, or more negative anticipated affect should these decisions be incorrect. It is also possible that this pattern reflects previous findings which have shown that positive affective states lead to a higher interest in a clinical case (Isen *et al.*, 1991). As higher interest in a case may also increase emotional involvement, it is likely that this would evoke a stronger emotional reaction to the potential positive and negative outcomes of decisions.

Although confidence in the most important facts chosen for diagnosis was higher for medical students in the negative affect condition this was not significant and did not support the hypothesis that higher confidence would arise from being in a more positive affective state. This finding may support research linking confidence in clinical decisions with higher

levels of clinical experience (Croskerry, 2009a, Woolley & Kostopoulou, 2013). While the experience of a large number of clinical encounters may enable senior doctors to be confident in using more pattern-based, and quick decision processes, the fact that medical students are novices in clinical decision making, may mean that confidence in clinical decisions comes from knowing that they have made judgements that are based on a more systematic consideration of the facts. As negative affective states are associated with a slower more rational thought process, this may account for the finding in this study.

4.9.2 Discrete positive and negative emotions in response to clinical scenarios

Categorizing affect into positive or negative responses has limitations and fails to build on previous work which has highlighted the complexity of affect-based reactions and shown that specific emotions appear to elicit different levels of arousal, guide evaluation of information, and determine behaviour (Lerner & Keltner, 2000; Pezza Leith & Baumeister, 1996; Van Kleef, Homan & Chesin, 2012). This viewpoint was supported by the findings that medical students had moderate levels of arousal for a number of discrete positive and negative emotions across all affective conditions. For example, across all conditions, the positive anticipatory emotions of alert, determined and attentive were all above the mid-point score of 3, while the emotion, nervous was the only negative anticipatory emotion to score above the scale point of two. Similarly all positive anticipated emotions were above the scale point of 5 across conditions. This suggests that these emotions may be important in a clinical context. Whether these emotions play a role in directing and regulating health professionals' clinical response, appraisal and performance should be further explored.

4.9.3 The influence of affect on appropriateness of important facts for diagnosis and thoroughness of information gathering

The results for all outcomes do not support the hypotheses that medical students in the positive affect condition would demonstrate faster, less methodical decision making and that

students in the negative affect condition would demonstrate slower more considered decision making. The similarity of mean scores for appropriateness of facts suggests that affect was not influencing medical students' choice of facts considered important for diagnosis. One explanation, which has already been discussed in section 4.9.1, is the role of experience in the use of faster, heuristic based processes (Croskerry, 2009a; Norman & Eva, 2010). The hypothesis in this study was based on the expectation that medical students in the positive condition would have a higher number of inappropriate facts due to basing choices on quick, if-then, less rational thinking, in comparison to medical students in the negative condition employing slower, and more considered reasoning. However, in order to apply heuristics to decisions, medical students would require a certain amount of clinical experience and knowledge in order for positive affect to exert an influence on the type of processing used. It is likely that Year 4 and Year 5 medical students have limited clinical experience and similar levels of knowledge. Therefore, it would be reasonable to suggest that in tasks based on clinical knowledge, none of the medical students would use the fast, intuitive processes of system 1, and would instead have to base responses on a slower and more systematic processing of the features of the case presentation. It is therefore possible, that when medical students were asked to select the 5 most important facts for diagnosis that the more cognitive-based processes of system 2 were overriding any potential influence of affect. One way of assessing whether this was occurring would be to compare the appropriateness of facts selected with medical students and experienced doctors.

Similarly, it was expected that due to heuristic-based thought processes, medical students in the positive condition would use less words and take less time to list important facts than medical students in the negative or neutral affect conditions. While it would seem that affect was not influencing whether heuristic-based or analytic-based information processing was used, it is possible that affect was still having an impact. As it has been found that positive affect increases interest in clinical cases (Isen *et al*., 1991) and enjoyment in stimulus-based

tasks (*Martin et al*, 1993), it may be that a higher number of words and longer duration for medical students in the positive affect condition was a reflection of interest and enjoyment rather than decision processes.

4.9.4 The role of specific sources of affect

Anticipatory and anticipated affect appeared to be influenced by the source of affect. Previous research that has highlighted the need to acknowledge and understand the affective reaction to team factors was further supported (Annett *et al*., 2000; Annett & Stanton, 2000). The negative team source of affect scenario evoked higher general negative, hostile and fear anticipatory affect, while fear was higher in both the team and previous experience source of affect. Seven of the ten discrete positive emotions were felt more intensely by medical students in the positive affect condition of the team scenario, and all of the discrete negative, hostile and fearful anticipatory emotions were felt more intensely in reaction to the negative team source of affect scenario. While anticipated regret was highest in the positive team source of affect, all anticipatory fear emotions had increased scores across the negative, positive and neutral versions of the team source of affect scenario. This would suggest that irrespective of the affective tone of the scenario, medical students associated interaction with a senior clinical colleague with feeling fear. As fear is an emotion that has been shown to cause low personal control and withdrawal from situations (Lerner & Keltner, 2000, 2001), this could clearly have implications in situations where a junior clinician has to urgently seek the advice of an unfriendly or hostile senior colleague in order to provide correct and urgent care, and is a finding worthy of further investigation.

There was some suggestion of unique affective reactions to the patient and previous experience source of affect scenarios. For example, anticipatory hostile emotions were more aroused in the negative patient source of affect scenario, while anticipatory fear emotions were more aroused in the negative previous experience source of affect scenario. With

regard to anticipated emotions, positive feelings were higher across all conditions for team and previous experience source of affect scenario, and negative anticipated emotions remained consistently moderate in both the positive and negative previous experience source of affect scenarios. This finding may suggest that as both the positive and negative previous source of affect scenarios involved information concerning the outcome of a similar case, this may have elicited a heightened consideration of anticipated affect in medical students who read these versions.

It is difficult to ascertain to what extent affective responses to individual scenarios influenced appropriateness, specificity and duration within each condition. For example, patient source of affect scenario generally received the highest scores for inappropriate facts across all conditions, the least amount of detail in the positive and neutral affect condition, and was the scenario in which medical students in the positive and negative condition used the most words when describing facts. In contrast, the previous source of affect scenario was the scenario that all students spent the most amount of time on when listing facts. While these findings may suggest that the patient source had an impact, the relatively small statistically non-significant mean score differences and the similarity of mean scores patterns would seem to support the suggestion that in general, medical students' responses may have been due to case complexity, knowledge and experience. The responses of the medical students may therefore have been based on the cognitive-based processes of system 2 rather than the affective-based processes of system 1.

4.9.5 Mood

Finally, there was no evidence that mood influenced affective responses or appropriateness, specificity or duration of the facts considered important for diagnosis. As medical students' mood was moderate across all conditions this was not a surprising finding. While a measure of both valence and arousal were included in the 2-item measure of mood, it is possible that

this was too simple a measure and may not have been sensitive enough to capture the subtle deviations in the way medical students were feeling before they read and responded to the clinical presentations.

4.10 Summary

In summary, study 2 provided preliminary evidence that specific emotions may be consistently activated during clinical interactions and performance, and indications that different sources of affect may generate unique affective responses. Team source of affect appeared to evoke the most intense affective reactions. While there was no clear evidence that affect caused heuristic or analytic based decision making in the choice of facts considered important for diagnosis, it is possible that affect had an impact in other ways.

The next chapter presents the final experimental study and describes how approaches were modified in light of knowledge gained from the first 2 experimental studies. The findings from Study 3 are discussed before reflecting on both the limitations and implications of the results from all three experimental studies.

CHAPTER 5

THE INFLUENCE OF AFFECT ON THOROUGHNESS AND ORDER OF INFORMATION GATHERING FOR DIAGNOSIS AND CASE MANAGEMENT

5.1 Introduction

The final experiment presented here was with a sample of NHS doctors and drew upon the knowledge gained from conducting the previous online studies with medical students and NHS doctors. The design and methods used were modified after considering both pragmatic and methodological issues in both of the earlier studies and are explained in the method section below.

As well as addressing barriers to recruitment, further consideration was given to the comparison of participants' responses to those of an expert panel. In study 2 it was impossible to achieve consensus across the expert panel about what facts were the most important for making a diagnosis. This suggested that there was no objective way of measuring what is a correct or incorrect response to a case presentation and that subjective judgements based on expert opinion are also problematic. It also suggested that a focus on diagnostic process (e.g. a set or sequence of actions to attain a diagnosis) rather than accuracy may be a more insightful and useful approach to better understand the factors that influence decision-based actions during diagnostic information gathering.

There is increasing evidence that omissions and deviations within the process of information gathering contribute widely to diagnostic error (Kostopoulou *et al*., 2008b; Reilly & Von Feldt, 2013; Zwaan, Thijs, Wagner, van der Wal, & Timmermans, 2012). For example, clinicians' omissions in gathering critical information has been found to hinder diagnostic accuracy and appropriate management (Kostopoulou *et al*., 2008b; Schiff *et al*., 2009; Zwaan *et al*., 2012), while the unnecessary ordering of tests and investigations to determine

the diagnosis has been linked with an increase in patient harm (Zwaan *et al.*, 2012). Whether or not a doctor takes a thorough patient history or performs a physical examination has been associated with diagnostic delay (Siminoff *et al.*, 2011), while differential diagnoses that are too narrow in scope have been found to lead to cases of missed diagnosis (Ely *et al.*, 2012). This suggests that the thoroughness and sequence in which doctors gather clinically relevant information may have important implications for whether a doctor will be on the right trajectory for making an accurate diagnosis. It is therefore critical to try and identify whether affective factors may play a role in thoroughness and order of information gathering for diagnosis.

The quicker, heuristic-based and more global thinking that may occur when individuals are feeling in a positive or confident affective state (Avramova & Stapel, 2008; Berner & Graber, 2008; Isen *et al.*, 1991, Park & Banaji, 2000), or the slower, analytical and more focused reasoning that may occur when individuals are in negative affective states (Park & Banaji, 2000) may play an important role in the thoroughness and order that doctors apply to their diagnostic decision-based actions. To examine this, an experimental approach was therefore taken to try and identify *where* and *what kind* of affect impacted the trajectory and timeliness of progression through further diagnostic decision stages.

5.2 Study 3

5.2.1 Aims

Study 3 drew upon all the elements of the distinct diagnostic stage of information gathering (e.g. activation, observation and identification), in order to assess how affect influenced the diagnostic decision making process in a sample of doctors. It also explored doctors' general affect and discrete emotions in response to positive or negative affect framed clinical case presentations. Where feasible, the results obtained from doctors here were compared with

those from study 2 with medical students to identify similarities and differences in affective response and processes of information gathering that might be related to experience.

The main objectives in this study were: 1). to examine whether affective cues presented in a clinical scenario influenced the thoroughness and order in which doctors gathered information for diagnostic decision making and case management; 2). to assess whether, and to what extent, different affective cues and specific sources of affect induced general affect and discrete positive and negative emotions in doctors.

5.2.2 Hypotheses

As positive affect has been associated with heuristic based thinking and negative affect with systematic thought processes, it was hypothesized that:

1. Doctors in the positive affect conditions would demonstrate faster, less methodical decision making and be less thorough when gathering information for diagnosis than doctors in the negative affect conditions.
2. Doctors in the negative affect conditions would demonstrate slower, more considered decision making and be more thorough when gathering information for diagnosis than doctors in the positive affect conditions.

To further explore the role of affect in the process of information gathering for diagnosis, an additional measure of order was included in this study. As positive affect has been associated with faster, less systematic thinking and negative affect with slower, systematic thought processes, it was therefore hypothesized that:

3. Doctors in the positive affect conditions would be less precise and follow a quicker, less systematic order when they gathered information for diagnosis than doctors in the negative affect conditions.

4. Doctors in the negative affect conditions would be more precise and follow a slower, more systematic order when they gathered information for diagnosis than doctors in the positive affect conditions.

As it is reasonable to assume that positive affect leads to greater confidence, it was also hypothesized that:

5. Doctors in the positive affect conditions would have higher ratings for measures of confidence than doctors in the negative affect conditions.

The current dearth of research on the role of positive and negative anticipatory and anticipated affect, discrete emotions, and specific sources of affect (e.g. patient factors, team factors) meant that an exploratory approach was taken for these measures, and therefore hypotheses were not generated.

5.3 Method

5.3.1 Participants

The sample[4] consisted of 77 doctors across all grades and specialties from two acute hospital trusts. There were 33 (42.9%) females and 44 (57.1%) males. Age ranged from 24 to 60 years with a mean of 38.52 (9.68 SD) years.

Participants were recruited through four main methods. After gaining relevant directorate and clinical lead permissions, the first method involved the study advert and questionnaire hypertext link (see appendix D) being distributed via email directly to all doctors in each clinical department. This was undertaken by a gatekeeper within the Trust in each clinical department. Clicking on the hypertext link took the doctor to the participant information

[4] With an alpha level of 0.05, effect size = 0.4, a sample size of 19 in each group gave 80% power to find a significant effect in an ANOVA test (G*Power).

sheet. The second method involved the researcher announcing brief details about the opportunity to participate in the study at the beginning or end of departmental meetings and distributing a paper copy of the study advert and link to any interested doctor. The third method involved the study advert and questionnaire hypertext link being displayed on the Trust intranet. Again, clicking on the hypertext link took the doctor to the participant information sheet (see appendix E). The final method involved displaying a paper copy of the study advert and study link on staff noticeboards in clinical departments.

5.3.2 Ethics

The ethical approvals obtained for this study have been described in Chapter 4, section 4.3.2.

5.3.3 Design

The design was a 2 (positive affect condition or negative affect condition) by 2 (patient source of affect scenario or team source of affect scenario) experimental design. The dependent variables were thoroughness of information gathering for diagnosis (e.g. number of choices listed, number of words used to describe choices, time taken to make choices), and order of information gathering for diagnosis (e.g. further patient history, performing a further physical examination, ordering investigations/tests).

Block randomisation was used to randomly allocate participants to one of the four conditions. This was used to balance potential extraneous variables across conditions and controlled for researcher bias in the recruitment process. Other than the final section assessing immediate feelings, the case presentation was provided in each section in case the doctor needed to refer to it to answer the questions. This controlled for any omissions that may have occurred due to memory lapses concerning the case presentation. In order to avoid response bias, the measure of anticipatory affect was at the end of the questionnaire.

5.3.4 Materials

5.3.4.1 Case presentations

As the recruitment of doctors from one Acute NHS Hospital Trust had been very low, further feedback was gathered from doctors who suggested that as it was likely that the questionnaire would be completed during breaks or lunch-time during the busy working day, they would find a questionnaire which took 20 minutes and required them to respond to 3 separate case presentations too time-consuming and onerous to complete. In general it was agreed that an online study which involved responding to one case study and took approximately 10 minutes to complete would be more likely to attain a higher number of participants. It was therefore decided that to reduce the burden of participation the present study would require doctors to respond to just one case presentation and the 10 item International Positive and Negative Affect Schedule (I-PANAS-SF: Thompson, 2007) would be used to measure doctors' anticipatory affect in response to reading the case presentation.

The case presentations for the positive and negative affect versions of the patient and team source of affect scenarios were the same as those used in the previous study. The only difference was that due to feedback from clinicians, some minor changes to the wording, or order of the wording in the presentations were made to reflect more precise clinical language. It was also decided that the previous experience source of affect scenario was the least successful manipulation of source and would be omitted. While the scenario did contain a reference to either the favourable or unfavourable outcome of the patient, it was questionable whether this could really tap a doctor's previous experience unless they had actually experienced a similar case themselves. The neutral affect condition was also omitted as Study 1 and Study 2 had found that the positive and neutral affect conditions had elicited similar affective responses and that there were no differences between the two conditions (see discussion in Chapter 4).

5.3.4.2 Online questionnaire

An online questionnaire was developed to allow for the measurement of thoroughness and order of information gathering for diagnosis. A consultant and junior doctor working in an Acute NHS Hospital Trust provided feedback concerning content and structure.

5.3.5 Measures

5.3.5.1 Affect

5.3.5.1.1 Mood

The mood measure was identical to that detailed in Study 1and 2 and is described in section 4.3.6.2.1.

5.3.5.1.2 Anticipatory affect

The 10 item International Positive and Negative Affect Schedule (I-PANAS-SF: Thompson, 2007) was used to measure doctors' anticipatory affect in response to reading the case presentation (e.g. "For each word below, click on the answer which best describes how you felt after you had first read the case presentation at the beginning of this questionnaire"). The two sub-scales of General Positive Affect (α = .83; e.g. alert, inspired, determined, attentive, active) and General Negative Affect (α = 49; e.g. upset, hostile, ashamed, nervous, afraid) each had 5 items. All items had a score range of 1 = very slightly or not at all, to 5 = extremely. Although this was a shorter version of the PANAS, this scale still included the emotions that were identified as important in Study 2 (see section 4.9.2 in Chapter 4).

5.3.5.1.3 Anticipated affect

The measure of anticipated affect was identical to that detailed in Study 2 described in Chapter 4. Cronbach's Alpha for positive anticipated affect was α = .81 and for negative anticipated affect was α = .82.

5.3.5.1.4 Confidence in most likely diagnosis

This measure contained 1 item (e.g. “Please indicate how confident you are that your most likely diagnosis for this patient is correct, by clicking on the most appropriate answer below”). This had a score range of 1 = not at all confident to 7 = extremely confident. Higher scores signified higher confidence in the facts chosen for making a diagnosis.

5.3.5.2 Thoroughness and order of information gathering

Thoroughness of information gathering in this study included a new measure of the number of choices doctors listed in 3 separate categories of diagnostic decision making and included measures of number of words and time for each of the 3 categories of decision making. Order of information gathering was a new measure in this study and focused on the sequence of choices that doctors made to gather information to make a diagnosis. The measures are described below.

5.3.5.2.1 Thoroughness of information gathering

5.3.5.2.1.1 Number of choices listed

This measured the number of choices that doctors listed for most important facts for making a diagnosis, differential diagnoses, and immediate actions. After reading the case presentation, doctors were asked questions concerning most important facts for making a diagnosis (e.g. “What do you consider to be the most important facts in this case for making a diagnosis?”), differential diagnoses (e.g. “Now list what you think might be the differential diagnoses in this case”), immediate actions (e.g. “What would be your immediate actions for the patient at this stage?”). Doctors were advised that they could list as many or as few items in the text space provided for each category (e.g. “You may list as many or as few important facts/differential diagnoses/immediate actions as you want, but please ensure that you only write one single immediate action in each space”). The score range in each category was 0 to 12, and higher scores indicated higher number of items listed.

5.3.5.2.1.2 Number of words used to describe choices

The number of words assessed how many words doctors used in the choices they provided in the three categories, most important facts for making a diagnosis, differential diagnoses, and immediate actions described in the measure above. Higher score indicated a higher number of words used. To ensure consistency across participants, a set of criteria for determining a word unit was followed and is included in appendix C.

5.3.5.2.1.3 Time taken to make choices

This measure was the number of seconds taken to complete the choices in each of the categories, most important facts for making a diagnosis, differential diagnoses and diagnostic confidence, and immediate actions. Higher score indicated a longer duration in seconds. While differential diagnosis also included a 1 item question for confidence in diagnosis, this was identical across all conditions. The time each participant took to complete the choices for most important facts for making a diagnosis, differential diagnoses and diagnostic confidence, and immediate actions were logged automatically by the online questionnaire once the section had been completed.

5.3.5.2.2 Order of information gathering

This measure drew upon the theoretically taught order to guide the diagnostic process and management plan described in figure 3.1, section 3.3.3 and supported through discussion with clinical colleagues. This measured the order in which the doctor chose to gather information for diagnosis and case management when doctors were asked to choose what further information they would want to gather for diagnosis after reading the case presentation. Doctors were presented with a choice of: “investigations/tests”, “further history”, “no further information needed at this stage”, and “further examination”. Doctors could select as few or as many choices as they wanted in any order, but each choice could only be selected once. The choices and the order in which they were made were collected for

each doctor by the online computer programme. Five separate choices of order were assessed: 1) whether a taught order was chosen (e.g. further history *then* further examination *then* investigations/tests); 2) whether all options irrespective of order were chosen (e.g. further history, further examination, investigations/tests); 3) whether first option was "further history"; 4) whether first option was "further examination" and; 5) whether first option was "investigations/tests". For each of the 5 separate choices, each doctor was either scored 1 = No or 2 = Yes. A score of 1 indicated that the doctor *did not* choose to gather information in the order assessed, while a score of 2 indicated that the doctor *did* choose to gather information in the order assessed.

5.3.5.3 Other

5.3.5.3.1 Demographics

Each participant indicated their age, sex, clinical grade, number of years in present grade, total number of year's postgraduate clinical experience and specialty.

5.3.6 Procedure

On attaining the directorate and clinical lead permissions, recruitment of participants began as described in section 4.3.1. After reading the on-line participant information sheet and completing the online consent form, doctors were randomly allocated to one of four conditions (positive patient, negative patient, positive team, negative team). Participants then provided an anonymous participant code and demographic information. Participants in all conditions were provided with identical instructions and were firstly asked to respond to two questions assessing their current mood before being asked to read one clinical scenario. After the clinical scenario, participants were then asked to provide a list of most important facts in the clinical scenario for making a diagnosis and to provide a list of differential diagnoses and rate their confidence in the most likely diagnosis they had listed.

Following this, they were asked to list the immediate treatments or actions they would carry out. All doctors were then asked to choose what further information they would want to gather for diagnosis, and were provided with a choice of categories which were, "further history", "further physical examination", "tests/investigations", or "no further information needed at this stage". Dependent on the category of further information chosen, participants were then asked to list the most important aspects for making a diagnosis. Participants were able to continue to select all further information categories, or could decide that the case presentation had provided them with enough of the required information for some, or all of the categories by choosing the option, "no further information needed at this stage". Participants were then asked questions assessing consideration of future feelings and then finally asked to provide a rating of their immediate feelings when they first read the case presentation. Other than the final section assessing immediate feelings, the case presentation was provided in each section in case the doctor needed to refer to it to answer the questions. On completion of the questionnaire, participants were invited to provide an email address so that they could be informed when the summary of results was available.

5.3.7 Analysis

The SPSS statistical software package (Version 19.0) was used for statistical analysis. Cronbach's Alpha was used to assess the reliability of each measurement. Differences for general affective response (positive and negative anticipatory affect, positive and negative anticipated affect, and confidence in most likely diagnosis), discrete emotions (positive and negative anticipatory emotions, positive and negative anticipated emotions), and thoroughness of information gathering for diagnosis (number of items, number of words, duration) were assessed by examination of mean scores. Two-way between-subjects MANCOVAs assessed whether differences were significant across conditions. Cohen's (1988) guidelines for eta squared were used to interpret the strength of partial eta squared.

Participants' baseline mood scores were used as the covariate in the analysis to control for mood. All additional tests of between-subjects effects and post-hoc comparisons controlled for Type 1 error by applying a Bonferroni correction for multiple analyses. In order to control for unexpected distractions which may have prolonged the time taken to complete the answers, extreme scores for duration were removed from the analysis for the measure of time.

Chi-square tests for independence were conducted to explore the relationship between order of information gathering (taught order, choosing all information gathering options, taking further history first, performing a further physical examination first, order of investigations first) and condition (positive and negative affect) for the patient and team source of affect scenarios. The expected frequency in cells was checked to be a minimum of 5 in all Chi-square tests to ensure assumption of minimum expected cell frequency was not violated. Where Chi-squares were found to violate this assumption, Fisher's Exact Probability Test was used. Yates' Continuity Correction values were used to assess significance of association in the remaining Chi-square tests.

5.4 Results

5.4.1 Affect

5.4.1.1 Mood

A one-way between-groups ANOVA demonstrated that there was a significant difference in baseline mood between doctors in the positive patient source of affect (M = 4.24, SD = 0.65), negative patient source of affect (M = 4.26, SD = 0.75), positive team source of affect (M = 4.82, SD = 1.17) and negative team source of affect (M = 5.30, SD = 0.96) conditions, F (3, 66) = 5.36, p = < 0.01. Post-hoc comparisons with a Bonferroni adjustment indicated that the baseline mood score for doctors in the negative team source of affect condition was

significantly higher than doctors in both the positive and negative patient source of affect condition.

5.4.1.2 General affective response to clinical scenarios

The mean and standard error for ratings of positive and negative anticipatory affect across conditions are presented in Table 5.1. The mean scores for positive and negative anticipatory affect in response to the scenarios were all below the mid-point score of 3 suggesting that arousal of anticipatory affect for the scenarios was low across all conditions. Positive anticipatory affect scores were at least 1 scale point higher than negative anticipatory affect scores across all conditions. While the pattern of negative anticipatory affect supported that manipulation of emotion had been successful (e.g. higher negative anticipatory affect scores in negative conditions), scores for positive anticipatory affect show that while the patient positive source of affect scenario had higher positive anticipatory affect ratings than the patient negative source of affect scenario, this pattern was not replicated for the team source of affect scenario.

Table 5.1 Mean (Std. Error) general affective response across conditions

	Pos. Patient	Neg. Patient	Pos. Team	Neg. Team
	N = 18	N = 18	N = 16	N = 17
Positive	2.76 (0.18)	2.58 (0.18)	2.54 (0.19)	2.69 (0.19)
Negative	1.26 (0.09)	1.37 (0.09)	1.25 (0.09)	1.47 (0.10)
Pos. Anticipated	4.66 (0.24)	4.36 (0.25)	4.86 (0.25)	4.54 (0.26)
Neg. Anticipated	3.19 (0.30)	4.15 (0.31)	3.73 (0.31)	4.60 (0.32)
Confidence	4.29 (0.22)	3.94 (0.23)	4.90 (0.23)	4.50 (0.23)

Pos. Patient: Positive patient; Neg. Patient: Negative patient; Pos. Team: Positive team; Neg. Team: Negative team; Pos. Anticipated: Positive anticipated affect; Neg. Anticipated: Negative anticipated affect

The mean scores for positive and negative anticipated affect showed that while mean score differences were small, doctors felt higher positive anticipated affect levels in both the positive patient and positive team conditions when compared to the negative patient and negative team conditions. In contrast, doctors in the negative patient and negative team condition felt higher levels of negative anticipated affect in comparison to doctors in the positive patient and positive team conditions. In both cases mean score differences were almost 1 scale point. Doctors were moderately confident in the likely diagnosis they had made. Doctors in the positive patient and team conditions were more confident that their most likely diagnosis for the patient was correct than doctors in the negative patient and team conditions.

A two-way between-groups MANCOVA was conducted to examine the impact of condition (positive vs. negative) and scenario (patient vs. team) on general affective response (positive affect, negative affect, positive anticipated affect, negative anticipated affect and confidence in most likely diagnosis). After adjusting for mood scores, there was no significant two-way interaction, F (5, 60) = 0.22, p = .953. There was a significant main effect for condition, F (5, 60) = 3.76, p = .005, with a large effect size (partial eta squared = .24), but no significant main effect for scenario, F (5, 60) = 1.54, p = .192. Mood was a significant covariate, F (5, 60) = 2.51, p = .040, with a large effect size (partial eta squared = .17).

With a Bonferroni adjusted alpha level of 0.01, the univariate effects for condition showed only negative anticipated affect to be significant, F (1, 64) = 9.32, p = .003, with a medium effect size (partial eta squared = .13). Doctors in the negative patient and team conditions had significantly higher negative anticipated affect than doctors in the positive patient and teams conditions. Mood was not a significant covariate at the adjusted alpha level of 0.01. At the 0.05 alpha level, mood was a significant covariate for general positive anticipatory affect, F (1, 64) = 5.46, p = .02, partial eta squared = .08. While doctors in the positive

patient and team conditions had higher mean scores for confidence that their most likely diagnosis for the patient was correct than doctors in the negative patient and team conditions, the difference was not significant and did not support the hypothesis that doctors in the positive affect conditions would have higher ratings for measures of confidence than doctors in the negative affect conditions.

5.4.1.3 Discrete anticipatory emotions in response to clinical scenarios

The mean and standard error for ratings of discrete positive and negative emotions across conditions are presented in Table 5.2. Other than the emotion, inspired, the discrete positive emotions were generally 1 scale point higher than the discrete negative emotions across all conditions. In general, all positive emotions other than 'inspired' were aroused across all conditions. The emotion alert was most highly aroused and scored above the mid-point of 3 across all conditions. The emotion inspired was the least aroused and scored within the scale point of 1 across all conditions. When compared to the negative affect versions of the scenarios, only the positive emotion inspired was highest in both the positive patient and team conditions, while determined and attentive were higher in the positive patient, but not the positive team condition. While the discrete negative emotions were lower in intensity than the discrete positive emotions, doctors in the negative team condition reported higher levels of all the negative emotions compared to doctors in the positive team condition. However, the emotions upset and ashamed had only marginal mean score differences. In contrast, while doctors in the negative patient condition scored more highly than doctors in the positive patient condition for the negative emotions, upset and hostile, doctors in the positive condition had marginally higher mean scores for the other negative emotions of ashamed, nervous and afraid. The largest differences between negative and positive conditions of the same scenario occurred in both the patient and team source of affect scenarios for the emotion hostile. Similarly to Study 2, the emotion, nervous was the only negative anticipatory emotion that showed consistency in arousal across all conditions.

Table 5.2 Mean (Std. Error) discrete positive and negative anticipatory emotions across conditions

	Pos. Patient N = 18	Neg. Patient N = 18	Pos. Team N = 16	Neg. Team N = 16
Gen. Pos.				
Alert.	3.23 (0.23)	3.44 (0.23)	3.08 (0.24)	3.03 (0.26)
Inspired	1.68 (0.21)	1.55 (0.22)	1.65 (0.22)	1.42 (0.24)
Determined	2.85 (0.27)	2.29 (0.27)	2.51 (0.28)	2.64 (0.30)
Attentive	3.34 (0.21)	2.86 (0.22)	2.92 (0.22)	3.22 (0.24)
Active	2.67 (0.24)	2.77 (0.25)	2.52 (0.25)	2.99 (0.27)
Gen. Neg.				
Upset	0.96 (0.11)	1.21 (0.11)	1.21 (0.11)	1.22 (0.12)
Hostile	1.13 (0.17)	1.66 (0.17)	1.15 (0.18)	1.78 (0.19)
Ashamed	1.06 (0.08)	1.01 (0.08)	1.12 (0.08)	1.17 (0.09)
Nervous	1.76 (0.21)	1.63 (0.22)	1.45 (0.22)	1.87 (0.24)
Afraid	1.40 (0.18)	1.35 (0.19)	1.31 (0.19)	1.48 (0.20)

Pos. Patient: Positive patient; Neg. Patient: Negative patient; Pos. Team: Positive team; Neg. Team: Negative team; Gen. Pos.: General positive affect; Gen. Neg.: General negative affect

A two-way between-groups MANCOVA was conducted to examine the impact of condition (positive vs. negative) and scenario (patient vs. team) on discrete anticipatory emotions (alert, inspired, determined, attentive, active, upset, hostile, ashamed, nervous, afraid). After adjusting for mood scores, there was no significant two-way interaction, F (10 54) = 0.91, p = .529. There was no significant main effect for condition, F (10, 54) = 1.72, p = .100, and no significant main effect for scenario, F (10, 54) = 0.35, p = .963. Mood was not a significant covariate, F (10, 54) = 1.80, p = .083.

5.4.1.4 Discrete anticipated emotions in response to clinical scenarios

The mean and standard error for ratings of discrete anticipated positive and negative emotions across conditions are presented in Table 5.3. In general, there were higher mean scores for discrete positive anticipated emotions than for discrete negative anticipated emotions. Positive emotions were above the mid-point of 4 indicating that doctors had moderate arousal of positive anticipated emotions. All anticipated positive emotions were higher in the positive affect than the negative affect conditions for both the patient and team source of affect scenarios. The highest positive emotion was confidence (M = 5.52, SE = 0.23) in the positive team condition. The emotion, proud tended to score the lowest across all conditions. The largest differences between negative and positive conditions of the same scenario occurred in the team source of affect scenario for the emotion confidence.

Table 5.3 Mean (Std. Error) discrete positive and negative anticipated emotions across conditions

	Pos. Patient N = 18	Neg. Patient N = 18	Pos. Team N = 17	Neg. Team N = 17
Pos. Antic.				
Proud.	4.45 (0.35)	4.08 (0.36)	4.28 (0.35)	4.10 (0.37)
Confidence	4.73 (0.23)	4.68 (0.23)	5.52 (0.23)	4.80 (0.25)
Self-respect	4.82 (0.24)	4.34 (0.25)	4.85 (0.25)	4.69 (0.26)
Neg. Antic.				
Regret	3.55 (0.36)	4.79 (0.37)	4.41 (0.36)	5.41 (0.38)
Shame	3.30 (0.39)	3.76 (0.40)	3.72 (0.39)	3.75 (0.41)
Guilt	2.84 (0.35)	4.09 (0.36)	3.57 (0.36)	4.33 (0.38)

Pos. Patient: Positive patient; Neg. Patient: Negative patient; Pos. Team: Positive team; Neg. Team: Negative team; Pos. Antic.: Positive anticipated emotions; Neg. Antic.: Negative anticipated emotions

The discrete anticipated negative emotions had more variation in mean scores across conditions than anticipated positive emotions. All emotions were felt with more intensity in the negative conditions for both the patient and team scenarios, however, mean score differences were smaller for the emotion, shame while both regret and guilt had larger mean score differences between the positive and negative conditions. The highest anticipated negative emotion was regret (M = 5.41, SE = 0.38) by doctors in the negative team condition. The lowest anticipated negative emotion was guilt (M = 2.84, SE = 0.35) in the positive patient condition. The largest differences between negative and positive conditions occurred in the patient source of affect scenario for the emotions regret and guilt.

A two-way between-groups MANCOVA was conducted to examine the impact of condition (positive vs. negative) and scenario (patient vs. team) on discrete positive and negative anticipated emotions (proud, confidence, self-respect, regret, shame, guilt). After adjusting for mood scores, there was no significant two-way interaction, F (6, 60) = 1.29, p = .275. There was a significant main effect for condition, F (6, 60) = 3.54, p = .005, with a large effect size (partial eta squared = .26), but no significant main effect for scenario, F (6, 60) = 1.66, p = .148. Mood was not a significant covariate, F (6, 60) = 0.79, p = .583.

With a Bonferroni adjusted alpha level of .008, the univariate effects for condition showed regret F (1, 65) = 10.14, p = .002, with a large effect size (partial eta squared = .14), and guilt, F (1, 65) = 8.13, p = .006, with a medium effect size (partial eta squared = .11), to be significant. Doctors in the negative patient and team conditions had significantly higher feelings of anticipated regret and guilt than doctors in the positive patient and teams conditions.

5.4.2 Thoroughness and order of information gathering for diagnosis

5.4.2.1 Number of choices listed

The mean and standard error scores for the number of choices that doctors listed are presented in Table 5.4. While doctors in the negative team condition listed more choices than doctors in the positive team condition for all 3 categories (e.g. important facts for diagnosis, differential diagnoses and immediate actions), doctors in the negative patient condition listed more choices than doctors in the positive patient condition for differential diagnoses and immediate actions but not important facts for diagnoses. While 'important facts for diagnoses' was the category with the largest mean difference between positive and negative conditions of each scenario, mean score differences were generally under 1 scale point and small.

A two-way between-groups MANCOVA was conducted to examine the impact of condition (positive vs. negative) and scenario (patient vs. team) on the number of items listed (important facts for diagnosis, diagnosis, differential diagnoses, and immediate actions). After adjusting for mood scores, there was no significant two-way interaction, F (3, 64) = 1.42, p = .244. There was not a significant main effect for condition, F (3, 64) = 0.08, p = .972, but there was a significant main effect for scenario, F (3, 64) = 6.16, p = .001, with a large effect size (partial eta squared = .22). Mood was not a significant covariate, F (3, 64) = 0.24, p = .871.

With a Bonferroni adjusted alpha level of .017, the univariate effects for scenario showed that none of the dependent variables were significant. However, at the 0.05 alpha level, differential diagnoses was significant, F (1, 66) = 4.79, p = .032, with a medium effect size (partial eta squared = .07) indicating that doctors in the positive or negative patient source of affect scenarios gave more differential diagnoses than doctors in the positive or negative team source of affect scenarios.

Table 5.4 Mean (Std. Error) scores for thoroughness of information gathering across conditions

	Pos. Patient N = 19	Neg. Patient N = 18	Pos. Team N = 17	Neg. Team N = 17
Choices				
Facts	5.88 (0.55)	4.91 (0.57)	5.64 (0.57)	6.83 (0.60)
Diagnosis	5.14 (0.44)	5.29 (0.42)	3.92 (0.44)	4.37 (0.47)
Actions	5.55 (0.52)	5.92 (0.54)	6.63 (0.54)	6.73 (0.57)
Words				
Facts	16.89 (2.89)	16.65 (3.03)	18.85 (3.02)	22.82 (3.19)
Diagnosis	10.37 (1.03)	10.23 (1.08)	8.16 (1.08)	9.77 (1.14)
Actions	18.55 (4.55)	26.24 (4.77)	21.35 (4.77)	25.54 (5.02)
Time†				
Facts	228.04 (30.70)	253.59 (28.34)	244.73 (29.08)	295.12 (30.80)
Diagnosis	134.44 (21.00)	171.81 (19.39)	119.32 (19.89)	162.57 (21.07)
Actions	114.94 (24.55)	144.35 (22.66)	159.19 (23.25)	183.48 (24.62)

Note that † = N = 14 (positive patient), N = 17 (negative patient), N = 16 (positive team), N = 14 (negative team). Pos. Patient: Positive patient; Neg. Patient: Negative patient; Pos. Team: Positive team; Neg. Team: Negative team

Although the mean score difference was in the hypothesized direction for the number of choices listed, the difference was not significant at the alpha level of .017 and therefore the hypotheses that when gathering information for diagnosis, doctors in the positive affect conditions would use faster, less methodical decision making processes, while doctors in the negative affect conditions would use slower, more considered decision making processes was not supported.

5.4.2.2 Number of words used to describe choices

The mean scores for the number of words used to describe choices showed that doctors in the positive team condition used fewer words than doctors in the negative team condition for all of the three categories. In the patient source of affect scenarios, doctors in the positive condition used marginally more words than doctors in the negative condition for facts important for diagnosis and differential diagnoses. As the number of words used is likely to be a reflection of the number of choices made in each of these categories, it is likely that differences in mean scores for facts important for diagnoses and differential diagnoses may be due to the number of choices made. However, for the immediate actions category, the number of choices made were similar for the positive and negative affect condition of each scenario. Here, the mean difference between the positive and negative conditions for the number of words used for the patient scenario was approximately 8 words and for the team scenario was approximately 4 words.

A two-way between-groups MANCOVA was conducted to examine the impact of condition (positive vs. negative) and scenario (patient vs. team) on the number of words used (important facts for diagnosis, differential diagnoses, and immediate actions). After adjusting for mood scores, there was no significant two-way interaction, F (3 64) = 0.60, p = .615. There was not a significant main effect for condition, F (3, 64) = 0.59, p = .624, or for scenario, F (3, 64) = 1.89, p = .140. Mood was not a significant covariate, F (3, 64) = 1.10, p = .358.

Although the mean scores between groups for the number of words used to describe choices for immediate actions were in the hypothesized direction, they were not statistically significant, and therefore the hypotheses that when gathering information for diagnosis, doctors in the positive affect conditions would use faster, less methodical decision making

processes, while doctors in the negative affect conditions would use slower, more considered decision making processes was not supported.

5.4.2.3 Time taken to make choices

The mean scores and standard error for time taken to make choices, illustrates that doctors in the positive conditions across both scenarios took less time than doctors in the negative conditions to list choices for information gathering and management of the patient. The greatest time difference occurred in the team source of affect scenario for important facts for diagnosis, with doctors in the negative affect condition taking over 50 seconds longer to make choices than doctors in the positive affect condition. Conversely, the shortest time difference occurred in the patient source of affect scenario for the same category, with doctors in the negative affect condition taking just under 26 seconds longer to make choices than doctors in the positive affect condition. Doctors in both conditions of the patient source of affect scenario took longer than doctors in the corresponding conditions of the team source of affect scenario to make choices for differential diagnoses, whilst the opposite occurred for important facts for diagnosis and immediate actions.

A two-way between-groups MANCOVA was conducted to examine the impact of condition (positive vs. negative) and scenario (patient vs. team) on the time taken to list choices (important facts for diagnosis, differential diagnoses, and immediate actions). After adjusting for mood scores, there was no significant two-way interaction, F (3 54) = 0.60, p = .980. There was not a significant main effect for condition, F (3, 54) = 1.60, p = .200, or for scenario, F (3, 54) = 1.95, p = .133. Mood was not a significant covariate, F (3, 54) = 1.80, p = .157.

Although the mean scores between groups for time taken to make choices were in the hypothesized direction, they were not statistically significant, and therefore the hypotheses

that when gathering information for diagnosis, doctors in the positive affect conditions would use faster, less methodical decision making processes, while doctors in the negative affect conditions would use slower, more considered decision making processes was not supported.

5.4.3 Order of information gathering for diagnosis

As illustrated in Table 5.5, Chi-square tests for independence were conducted to explore the association between order of information gathering (taught order, choosing all information gathering options, taking a further history first, performing a further physical examination first, ordering investigations first) and condition (positive and negative affect) for both the patient and team source affect scenarios. The expected frequency in cells was checked to be a minimum of 5 in all Chi-square tests to ensure assumption of minimum expected cell frequency was not violated. Chi-squares that violated this assumption were the test of association between performing information gathering in a taught order and affect and selecting further history first and affect in both the patient and team source of affect scenarios. The assumption was also violated in the team source of affect for the test of association between selecting a further examination first and affect. In these cases, Fisher's Exact Probability Test was used. Yates' Continuity Correction values were used to assess significance of association in the remaining Chi-square tests.

An examination of whether doctors selected a taught order (e.g. taking a further patient history, performing a further physical examination, *then* ordering tests) when gathering information for diagnosis, showed that the proportion of doctors in the patient source of affect scenario who selected a taught order for information gathering consisted of 60.0% of doctors in the negative affect condition and 40.0% of doctors in the positive affect condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between performing information gathering in a taught order

Table 5.5 Relationship between positive and negative affect and order of information gathering

	PATIENT SOURCE		TEAM SOURCE	
	Negative affect (N = 18)	Positive affect (N = 19)	Negative affect (N = 17)	Positive affect (N = 17)
Taught order				
No	15 (46.9%)	17 (53.1%)	15 (50.0%)	15 (50.0%)
Yes	3 (60.0%)	2 (40.0%)	2 (50.0%)	2 (50.0%)
	$X^2 = 0.00$, $p = .66$		$X^2 = 0.00$, $p = 1.00$	
All options selected				
No†	6 (37.5%)	10 (62.5%)	9 (56.3%)	7 (43.8%)
Yes	12 (60.0%)	8 (40.0%)	8 (44.4%)	10 (55.6%)
	$X^2 = 1.01$, $p = .31$		$X^2 = 0.12$, $p = .73$	
Further History first				
No	14 (48.3%)	15 (51.7%)	14 (48.3%)	15 (51.7%)
Yes	4 (50.0%)	4 (50.0%)	3 (60.0%)	2 (40.0%)
	$X^2 = 0.00$, $p = 1.00$		$X^2 = 0.00$, $p = 1.00$	
Further Exam first				
No	8 (34.8%)	15 (65.2%)	13 (44.8%)	16 (55.2%)
Yes	10 (71.4%)	4 (28.6%)	4 (80.0%)	1 (20.0%)
	$X^2 = 3.33$, $p = .07$		$X^2 = 0.94$, $p = .34$	
Investigations first				
No	14 (63.6%)	8 (36.4%)	7 (63.6%)	4 (36.4%)
Yes	4 (26.7%)	11 (73.3%)	10 (43.5%)	13 (56.5%)
	$X^2 = 3.51$, $p = .06$		$X^2 = 0.54$, $p = .46$	

Note that discrepancies in N are due to missing data. † = N = 18 for positive affect in patient source

and affect, X^2(1, N = 37) = 0.00, p = .66, *phi* = -.09. The proportion of doctors in the team source of affect scenario who selected a taught order for information gathering consisted of 50.0% of doctors in the negative affect condition and 50.0% of doctors in the positive affect condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between performing information gathering in a taught order and affect, X^2(1, N = 34) = 0.00, p = 1.00, *phi* = .00.

An examination of how many doctors selected all available options for gathering information for diagnosis (e.g. taking a further patient history, performing a further physical examination and ordering tests), showed that in the patient source of affect scenario the proportion of doctors who selected all available options for information gathering consisted of 60.0% of doctors in the negative affect condition and 40.0% of doctors in the positive affect condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between selecting all options for information gathering and affect, X^2(1, N = 36) = 1.01, p = .31, *phi* = -.22. The proportion of doctors who selected all available options for information gathering in the team source of affect scenario consisted of 44.4% of doctors in the negative affect condition and 55.6% of doctors in the positive affect condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between selecting all options for information gathering and affect, X^2(1, N = 34) = 0.12, p = .73, *phi* = .12.

An examination of how many doctors selected to take a further patient history first, showed that in the patient source of affect scenario the proportion of doctors who selected to take a further patient history first consisted of 50.0% of doctors in the negative affect condition and 50.0% of doctors in the positive affect condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between selecting to take a further patient history first and affect, X^2(1, N = 37) = 0.00, p = 1.00, *phi* = -.01. The

proportion of doctors who selected to take a further patient history first in the team source of affect scenario consisted of 60.0% of doctors in the negative affect condition and 40.0% of doctors in the positive affect condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between selecting to take a further patient history first and affect, $X^2(1, N = 34) = 0.00$, $p = 1.00$, $phi = -.08$.

An examination of how many doctors selected to perform a further examination first, showed that in the patient source of affect scenario the proportion of doctors who selected to perform a further examination first consisted of 71.4% of doctors in the negative affect condition and 28.6% of doctors in the positive affect condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between selecting to perform a further examination first and affect, $X^2(1, N = 37) = 3.33$, $p = .07$, $phi = -.36$. The proportion of doctors who selected to perform a further examination first in the team source of affect scenario consisted of 80.0% of doctors in the negative affect condition and 20.0% of doctors in the positive affect condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between selecting to perform a further examination first and affect, $X^2(1, N = 34) = 0.94$, $p = .34$, $phi = -.25$.

An examination of how many doctors chose to order investigations first, showed that in the patient source of affect scenario the proportion of doctors who chose to order investigations first consisted of 26.7% of doctors in the negative affect condition and 73.3% of doctors in the positive affect condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between selecting to perform a further examination first and affect, $X^2(1, N = 37) = 3.51$, $p = .06$, $phi = .36$. The proportion of doctors who chose to order investigations first in the team source of affect scenario consisted of 43.5% of doctors in the negative affect condition and 56.5% of doctors in the positive affect

condition. A Chi-square test for independence (with Yates Continuity Correction) indicated that there was no significant association between selecting to perform a further examination first and affect, $X^2(1, N = 34) = 0.54$, $p = .46$, $phi = .19$.

5.5 Discussion

The aim of Study 3 was to explore doctors' general affective and discrete emotions in response to positive or negative affect framed clinical case presentations. It drew upon all processes in the diagnostic stage of information gathering in order to identify whether types (mood, anticipatory affect, anticipated affect) and sources (patient factors and team factors) of affect influenced the thoroughness and order in which doctors gathered information for diagnostic decision making and case management. Findings were also considered in light of results obtained with medical students.

5.5.1 General affective response to clinical scenarios

Doctors' mean score ratings for positive general anticipatory affect were similar across all conditions and were higher in the positive patient condition but not the positive team condition. In contrast, general negative affect was higher in all negative affect conditions, although the differences in mean scores were low and statistically non-significant. The fact that there were not greater mean score differences between conditions, and the fact that mean scores for anticipatory affect was generally low, may be because the 10 item I-PANAS-SF (Thompson, 2007) lacked the sensitivity to capture arousal of general anticipatory affect, or it may be that doctors did not have a strong enough anticipatory reaction to the case presentations. While the general positive feelings experienced by doctors in the positive patient condition were slightly higher than those experienced by medical students for the same scenario, doctors in the negative team condition had almost a 1 scale point lower score for negative feelings than medical

students in the same scenario. This would seem to suggest that clinical experience involving patients and colleagues played a role in determining the level of affective response.

Doctors in the positive affect conditions gave statistically non-significant higher scores for general positive anticipated affect, while doctors in the negative affect conditions felt significantly more general negative anticipated affect. This finding would seem to support evidence that there is congruence between an individual's present affective state and their judgement of the valence of likely future occurrences (Waters, 2008). In this case it may be that the doctor's present feelings make congruent future feelings more salient. Therefore, while doctors in a more positive affective state focus on their positive future feelings, doctors in a more negative affective state may be more likely to focus on their negative future feelings. An alternative explanation may be strengthened by the contrasting finding that medical students in the positive condition had higher feelings of negative anticipated affect.

While medical students' inexperience in clinical situations may cause them to base any consideration of future feelings on their immediate response to the patient, colleague or situation, doctors' experience of managing difficult patients or working with rude and hostile clinical colleagues, may make them more likely to base any consideration of future feelings on a more reflective feedback of previous feelings from similar outcomes (Baumeister, *et al*., 2007b). It is feasible to suggest that negative clinical situations may result in stronger negative feelings and worse outcomes. Therefore, the higher ratings of anticipated negative emotions in negative conditions may be indicative of the doctors' own reflection of the feelings they have experienced following the decisions they have made for diagnosis and case management in similar real-life clinical situations.

In comparing doctors' confidence in the most likely diagnosis in the positive and negative conditions the trends in the means may imply that higher confidence was a result of being in a more positive affective state, although this difference was not statistically significant. However,

as it is proposed that the higher confidence in facts chosen by medical students in a negative affective state was due to the retrieval of knowledge rather than experience, this suggestion supports the notion that both positive affect and confidence make heuristic-based processes more likely in diagnosis and supports research that links faster heuristic or intuitive-based decision processes with higher levels of clinical experience (Croskerry, 2009a, Woolley & Kostopoulou, 2013).

5.5.2 Discrete positive and negative emotions in response to clinical scenarios

With the exception of the emotions, alert, active and ashamed, non-significant mean score differences may suggest that doctors in the positive affect conditions had higher discrete positive anticipatory emotions, while doctors in the negative affect conditions had higher negative anticipatory emotions. The suggestion in the study with medical students that certain emotions appear to span affective valance and source in a clinical context was further supported in this study. In particular, the positive emotions, alert and attentive were again near or over the mid-scale point of 3, while determined and active showed lower but consistent arousal across conditions. Furthermore, the negative emotion, nervous, was again the most consistently highest scoring negative feeling across all conditions. This again emphasises the importance of gaining knowledge about the role of discrete emotions in decision making (Lerner & Keltner, 2000; Van Kleef, 2009; Van Kleef, De Dreu, & Manstead, 2010) and in understanding to what extent the specific emotions identified in these experimental studies may direct and regulate individual clinical performance.

On the whole, doctors' anticipatory and anticipated responses were lower than those found in the medical student study. As there is evidence that empathy declines throughout medical training (Bellini, Baime, & Shea, 2002; Neumann *et al*., 2011) it is possible that anticipatory and anticipated affective responses to situations in clinical settings also declines.

5.5.3 The influence of affect on thoroughness and order of facts for diagnosis

Although not significant, the mean score differences for measures of thoroughness of information gathering for diagnosis may imply that when gathering information for diagnosis, doctors in the positive affect conditions used faster, less methodical decision making processes, while doctors in the negative affect conditions used slower, more considered decision making processes. However, whilst this was a consistent pattern in the team source of affect scenario, data did not always support the hypothesized difference in the patient source of affect scenario. This finding suggests that the source of affect may play a role in the processes used when gathering information to make diagnostic decisions.

There may have been some support that affect was influencing whether heuristic-based or analytic-based decisions were being made. Although non-significant, the finding that doctors in the positive affect conditions had higher confidence in their most likely diagnosis and higher anticipated confidence, while doctors in the negative affect conditions had significantly higher anticipated regret and guilt, may imply that doctors in the positive affect conditions may have been less thorough and taken less time in information gathering, due to faster if-then judgements based on higher feelings of confidence. In contrast, doctors in the negative affect conditions may have been more thorough and taken more time in information gathering due to making more considered choices to avoid negative anticipated emotions.

The hypothesis that doctors in a negative affective state would be more precise and follow a slower, more systematic order when they gathered information for diagnosis than doctors in a positive affective state may have been supported in some of the measures of order of information gathering. A statistically non-significant higher percentage of doctors in the patient source of affect negative affect condition gathered information in a taught order and selected all options, however, the number of doctors that the percentage difference represented was very small and accounted for a difference of only 1 to 4 doctors between conditions. The

relationship between affect and whether doctors chose to perform a further physical examination or to order investigations and tests first was also non-significant. However, the fact that doctors in the patient source of negative affect scenario and to a lesser extent, in the team source of negative affect scenario had a higher percentage who chose to perform a further physical exam first, suggests that doctors in the negative affect conditions may have been motivated to base diagnostic and case management decisions on information that was derived from more focused and precise further physical assessment of the patient, in order to avoid negative anticipated emotions.

It is also noteworthy that doctors in the negative conditions felt more hostility than doctors in the positive conditions. As hostility and anger have been associated with approach, rather than avoidance behaviours (Lerner & Keltner, 2000, 2001), it is interesting to note that doctors who were feeling more hostile in the negative affect conditions, elected to approach and examine the patient first. In contrast, doctors in the positive affect conditions who had a higher percentage who chose to order investigations and tests first may have been motivated by the higher confidence that they had in their initial diagnosis. Lerner and Keltner (2000, 2001) also associate hostility with risk-taking, rather than risk-averse behaviour. Whilst further examination of a patient *before* ordering investigations would appear to reflect risk-aversion, it could be argued that doctors may have perceived risk examining the patient. For example, in the negative patient condition doctors may have regarded examining an abusive and angry patient as a risk to their own safety, and doctors in the negative team condition may have regarded the examination of the patient as part of a risky strategy of having to manage the patient's uncertain symptoms for up to an hour on their own before a clinical colleague is able to assist.

5.5.4 The role of specific sources of affect

There was some evidence that team source of affect evoked stronger affective responses than patient source of affect, and further supports the need to gain a better understanding of how

team affective factors impact judgement and behaviour (Annett *et al*., 2000; Annett & Stanton, 2000). The highest scores for confidence in most likely diagnosis and anticipated confidence were from doctors in the positive team condition. Doctors in the negative team condition had the highest ratings for anticipated future regret and discrete negative anticipatory emotions, although some of the mean score differences were small. The finding that anticipated regret and guilt were higher in the negative team condition, may again be due to more reflective feedback of previous feelings from similar outcomes (Baumeister, *et al*., 2007b) and has been discussed in more detail in section 5.5.1. As it has been found that differential diagnoses that are too narrow in scope lead to cases of missed diagnosis (Ely *et al*., 2012), the finding that doctors in both the positive and negative patient source of affect scenarios provided more differential diagnoses than doctors in both the positive and negative team source of affect scenario merits further investigation.

5.5.5 Mood

Finally, there was no evidence that mood influenced affective responses or thoroughness or order of information gathering for diagnosis. As discussed in section 4.9.5 of Chapter 4, this may be due to the fact that the 2-item measure of mood was not sensitive enough to capture subtle deviations in the way doctors were feeling before they began reading and responding to the clinical presentation.

5.5.6 Limitations

There are limitations to the experimental studies presented in Chapters 4 and 5. Although the scenarios attempted to replicate realistic clinical presentations and contexts in which diagnostic judgements are made, the fact that affect and diagnostic decision making were measured in response to written case presentations may mean that this did not capture the context in which clinical decisions are made. Although the ability to choose the information gathering sequence in Study 3 attempted to replicate the key choices of this diagnostic stage, the fact that the

questionnaire did not allow for progression or feedback from the information integration or information implementation stage, meant that it did not fully capture the dynamic nature of diagnostic decision making (Schiff *et al*, 2009; Wear, 2009). It may also be possible that cues contained within the different scenario conditions influenced the order that information was gathered.

While the generally low arousal of anticipatory affect may reflect the lack of real-life clinical settings, the moderate to moderately high elicitation of anticipated affect suggests that both medical students and doctors did engage with how the case presentations made them feel. The use of the 10 item International Positive and Negative Affect Schedule (I-PANAS-SF: Thompson, 2007) due to issues with recruitment meant that the exploration of discrete emotions was restricted in study 3. It is also possible that the completion of the I-PANAS-SF at the end of the questionnaire may not have captured the intensity of feeling upon first reading the case presentation. The scale resulted in a low level of reliability for the measure of anticipatory negative affect, therefore a similar future study would be strengthened by a using a longer version of the PANAS (Watson, Clark, & Tellegen, 1988) and asking the question about participants' feelings immediately after reading the case presentation. While some findings were in the hypothesized direction, they were often not statistically significant. As the experiments were only powered to detect medium to large effect sizes it is important that future studies should be powered to detect smaller effect sizes.

The fact that the study was conducted online meant that the experimental environment could not be controlled, and therefore factors which may have caused distractions could not be removed. Furthermore, online studies cannot guarantee the identity of participants. To mitigate this, care was taken to target doctors as directly as possible and to ensure that all study adverts clearly stated who the study was aimed at. However, the fact that the questionnaire was completed

anonymously at a time and location that suited each medical student and doctor may have removed any social desirability pressures which may have been reflected in their responses.

Finally, it is also possible that findings for the number of words used to describe important facts for diagnosis or to describe choices and the time taken to make choices were influenced by other factors. For example, medical students and doctors may have naturally differed in their level of verbosity, the time they took to read the case presentations or in the speed in which they typed their answers on a computer keyboard. Furthermore, the difference in times between the patient and team scenario may have been a reflection of case complexity and clinical knowledge (Croskerry & Tait, 2013) rather than the influence of source of affect.

5.6 Summary

In summary, while findings were non-significant, the direction of results in study 3 may suggest that affect influenced the thoroughness of the information gathered for diagnosis, and the order in which doctors chose to gather diagnostic information. Findings also further supported the importance of team factors in affective responses, and reinforced an earlier finding that clinical interactions and performance may evoke consistent emotions which may be used as a feedback for clinical decision making. The implication of these findings will be addressed in the discussion of the studies presented in this thesis in Chapter 8.

While this and the previous chapter focused on decision making made by individual doctors in isolation, it is important to recognise that in many clinical contexts, diagnostic judgements and management of the patient are often made when working within multi-professional teams. The study presented in the next chapter attempts to explore and understand the role that affect plays in doctors' and nurses or allied health professionals' perceptions of individual and team communication performance.

CHAPTER 6

DOES AFFECT PLAY A ROLE IN PERCEPTIONS OF COMMUNICATION BEHAVIOUR AND TEAM EFFECTIVENESS DURING CRITICAL INCIDENTS?

6.1 Introduction

Clear and effective communication of clinical information and patient symptoms within clinical teams is pivotal to efficient diagnosis and appropriate case management in healthcare settings (Christensen *et al*., 2000; Greenberg, *et al*., 2007). When breakdowns in communication occur, patient safety is compromised and can result in negative patient outcomes (Greenberg *et al*, 2007; Sutcliffe, Lewton, & Rosenthal, 2004).

In recognition of the pivotal role that optimal inter-professional interaction plays in providing safe patient care, programmes focusing on teamwork have been developed and introduced into healthcare settings and organisations (Flin *et al*., 2008). These include simulation-based training using crew resource management (CRM) and behavioural rating tools to assess 'non-technical' skills (NTS) such as communication, decision making and situation awareness (Yule *et al*, 2006), and surgical team checklists (Haynes *et al*., 2009). These approaches have highlighted the importance of cognitive processes in communication and decision making in multi-professional clinical teams. However, very little is known about the specific role of affect in teams involving doctors and nurses or allied health professions, despite research suggesting that affective factors such as emotional climate (Nurok *et al*., 2011) and interpersonal interactions (Edmondson, 1999) may impact individual and team communication behaviour.

Affective factors such as aggression and disagreement (Coe & Gould, 2007), rudeness (Flin, 2010), intergroup competition (Hewett *et al*., 2009) and tension (Lingard, Reznick, Espin, Regehr, & DeVito, 2002) between health professional groups have been shown to foster a tone of conflict and to negatively impact communication and collaboration. Furthermore, inter-professional boundaries and conflict have been found to contribute to breakdowns in collaborative working and the verbalisation of clinical information (Dewitt, Baldwin, & Daugherty, 2008; Finn, 2008; Greenberg *et al*., 2007; Powell & Davies, 2012). Work which has examined multi-professional clinical teams has found that strain between team members may be due to differences between professions in their perceptions of roles, responsibilities, hierarchy and goals (Allen, 1997; Greenberg *et al*., 2007; Salhani & Coulter, 2009). It is therefore possible those professional boundaries elicit different affective responses in doctors and nurses and allied health professions during teamwork tasks and that these feelings are related to their perception of team communication and effectiveness. As affect can influence the level of communication between team members (Edmondson, 1999; Kish-Gephart, Detert, Trevino & Edmondson, 2009; Lingard *et al*., 2002), and information sharing is pivotal in diagnostic and treatment decisions, it is important to understand the role that differences in affective response may play in the perception of teamwork.

While dual process theories emphasise the impact of individual feelings on decision making and behaviour, clinical teams involve judgements and actions which stem from a collaborative reaction to, and assessment of, a clinical presentation or situation. The emerging Emotions as Social Information Model (EASI: Van Kleef, 2009; Van Kleef, *et al*., 2010), posits that as well as individual responses to stimuli, group-based social interaction involves the observation of emotion in others. The emotional display of one or a group of individuals may subsequently influence the judgements and actions of another individual. Van Kleef (2009) argues that this may occur through two different processes; inferential mechanisms (e.g. a registrar's anxiousness alerts you to the fact that they regard the case as urgent which causes you to collect

the blood test results yourself) or affective responses (e.g. a registrar's nervousness about the case makes you anxious and urges you to seek the advice of another senior colleague).

As clinical teams involve individuals working together and making diagnostic and treatment decisions, it is likely that both individual and team affective factors play a role in how health professionals respond to, and function within, clinical teams which they perceive to be hostile and intimidating or cooperative and supportive. As inter-professional factors have been associated with failures in clinical team communication, it is important to understand how and what type of affect influences specific health professional groups when they work in clinical teams, and what role these affective factors have on their perception of how the team performs.

6.2 Study 4

6.2.1 Aims

The aim of study 4 was to replicate the real-life contexts and settings in which clinical communication and decisions are made and explore the role of affect in the perceptions that healthcare professionals have about individual and team communication behaviour, and team effectiveness during a simulation of a critical incident.

6.2.2 Objectives

The main objectives of this study were: 1) to examine differences in individual and team emotions in doctors and nurses or allied health professions during simulation; 2) to examine differences in perceptions of communication behaviour and team effectiveness in doctors and nurses or allied health professions, and assess the role that affect plays in these perceptions; 3) to assess whether health professionals' ratings of affect predict their ratings of communication behaviour and team effectiveness.

6.3 Method

6.3.1 Participants

Seventy-two junior healthcare professionals, who were registered to attend a patient safety simulation course in groups of 12, were invited to participate in the study. Sixteen healthcare professionals declined. Two healthcare professionals who did consent to participate were unable to take part due to the programme schedule. The two healthcare professionals did not complete the post-simulation questionnaire and took no further part in the study. The final sample consisted of 54 participants 50% (n = 27) F1 doctors and 50% (n = 27) nurses or allied health professions (19 Grade 5 nurses, 6 student nurses and 2 physiotherapists) across all departments from one NHS Hospital Trust. All participants were recruited while attending one of 6 identical NHS Hospital Trust simulation courses. There were 40 (74%) females and 14 (26%) males. Age ranged from 19 to 53 years with a mean of 28.83 (SD = 7.51).

The study information sheet and consent form was included with the pre-course material which was sent out to all registered participants approximately 1 week prior to attending the simulation course. This ensured that all registered participants were aware of the opportunity to participate in the study alongside participating in the Simulation Course and would have time to provide informed consent. No incentive for participation was offered.

6.3.2 Ethics

Approval to undertake research with NHS health professionals was granted by the University of Leeds' Institute of Psychological Sciences' Research Ethics Committee (Ref: 11-0192) and the Trust Research and Development Department. Care was taken to address all potential ethical issues in the Participant Information Sheet and to remind participants of their right to withdraw at any time. Both participants and course staff were assured that the study would run alongside the course in order to minimise disruption to the timing and delivery of the simulation course. To protect anonymity, codes made up of letters and numbers were used on all completed

questionnaires. All participants were asked to consent to video recordings of the simulation they took part in to be used for the purpose of analysis as part of the research, and were assured that the video recordings would only be viewed in a private room within the trust and would remain on Trust premises. They were also informed that any observer viewing the video footage had agreed to the NHS Confidentiality Code of Practice.

6.3.3 Design

The study employed a cross-sectional design. Steps were taken to control for confounding variables. The inclusion of the study information and consent form with pre-course material and the allocation of participants to pairs and scenario by course staff controlled for researcher and selection bias. The questionnaire was completed individually by health professionals in an identical setting and all items were administered in the same order.

6.3.4 Materials

6.3.4.1 Critical care scenarios

Three 15 minute simulations of critical care scenarios were developed by simulation course staff and health professionals as part of a simulation course aimed at improving patient safety in junior doctors, nurses and allied professions. Scenarios were conducted by participants in pairs (doctor and nurse/physiotherapist) and were based on real critical care incidents which comprised of either post-operative bleeding, head injury or respiratory failure. All scenarios involved a manikin and simulation course staff role-playing additional members of the healthcare team. To facilitate learning and aid reflection, the simulated scenarios were video-recorded as part of the simulation course. This provided the opportunity for retrospective observer rating, which is not reported here. While role-playing additional members of the clinical team, course staff provided information and assistance in response to requests from participants, but they did not lead health care decisions or actions. There was no pre-determined

manipulation of affect in any of the scenarios and the type of clinical incident varied between participant pairs.

6.3.5 Measures

6.3.5.1 Post Simulation Questionnaire

A post simulation questionnaire was developed for this study (see appendix F) and consisted of the following measures:

6.3.5.1.1 Team affect

6.3.5.1.1.1 Team Functional Emotions Climate

Team Functional Emotions Climate during the clinical scenario was measured using a scale with 2 items utilised in previous research (Nurok., *et al*., 2011). Both items had a score range of 1-5. The first item measured level of team engagement (e.g. "Did team members seem engaged (e.g. interested, attentive, alert) or disengaged (e.g. bored, inattentive, distracted) throughout the simulation?"). This was rated 1 = disengaged, to 5 = engaged. The second item measured the appropriateness of the level of feeling tense within the team (e.g. "For what was happening in the case during the simulation, were the team…"). This was rated 1 = inappropriately tense, to 5 = appropriately tense. A lower score indicated that climate was less emotionally functional (e.g. members of the team were not attentive, disinterested and inappropriately anxious), while a higher score indicated a more emotionally functional climate (e.g. members of the team appeared attentive, alert and appropriately anxious).

6.3.5.1.1.2 Team Cooperative Climate

The perception of Team Cooperative Climate was assessed with one item (e.g. "Was there a cooperative climate in the team during the simulation?"). The item was scored on a five point scale of 1 = not at all, to 5 = very much so. A higher score indicated the perception that was a higher cooperative climate within the team during the simulation.

6.3.5.1.1.3 Team Competitive Climate

The perception of Team Competitive Climate was assessed with one item (e.g. "Was there a competitive climate in the team during the simulation?"). The item was scored on a five point scale of 1 = not at all, to 5 = very much so. A higher score indicated the perception that was a higher competitive climate within the team during the simulation.

6.3.5.1.2 Individual affect

6.3.5.1.2.1 Individual affective response

The 10 item International Positive and Negative Affect Schedule (I-PANAS-SF: Thompson, 2007) has been shown to be a reliable and valid brief measure of positive and negative affect and was used to measure participants' feelings during the clinical simulation. The two sub-scales of General Positive Affect (α = .71; e.g. alert, inspired, determined, attentive, active) and General Negative Affect (α = .62; e.g. upset, hostile, ashamed, nervous, afraid) each had 5 items. All items had a score range of 1 = very slightly or not at all, to 5 = extremely. A higher score indicated a higher feeling of that emotion during the scenario.

6.3.5.1.2.2 Individual Functional Emotions Climate

Individual Functional Emotions Climate during the clinical scenario was measured using the same 2 item scale to measure Team Functional Emotions Climate. The only difference was that the two items were adapted to measure the level of individual engagement ("Were you engaged (e.g. interested, attentive, alert) or disengaged (e.g. bored, inattentive, distracted) throughout the simulation?") and the appropriateness of the level of feeling tense for the individual (e.g. "For what was happening in the case during the simulation, were you…"). A lower score indicated that climate was less emotionally functional (e.g. individuals were not attentive, disinterested and inappropriately anxious), while a higher score indicated a more emotionally functional climate (e.g. individuals appeared attentive, alert and appropriately anxious).

6.3.5.1.3 Communication and effectiveness

6.3.5.1.3.1 Team Communication Behaviour

A 5 item Team Communication Behaviour scale (α = .82) was developed using the behavioural elements of observed clinical team communication skills from previous research (Nurok *et al*., 2011). All items were scored on a five point scale of 1 = not at all, to 5 = very much so. Participants could also indicate an answer of "Not applicable" if they felt that the behaviour or action was not appropriate or necessary to the simulation they had participated in. The items assessed perceptions of team collaboration and information sharing (e.g. "Was there a tone of collaboration and information sharing in the team which created an atmosphere of safety to speak up?"); the sharing of clinical information and shared understanding (e.g. "Did the team talk openly about ideas, plans and concerns and discuss important clinical information so that they had a shared understanding of how to manage the case and were clear about what each team member needed to do?'); the use of verbal responses (e.g. "Did the team use verbal responses to requests so that team members were confident that requests had been heard correctly and were being acted upon?"); and the assertion of ideas and escalating concerns (e.g. "Did all team members assert their ideas and escalate concerns?"). The fifth item, which asked participants to assess the negotiation and resolution of conflicts within the team (e.g. "Were conflicts within the team appropriately negotiated and resolved?"), was omitted from the final analysis due to the majority of participants indicating that this item was not applicable to their scenario. This resulted in the final analysis being conducted using a 4 item communication behaviour scale. A higher score indicated a perception of higher engagement in team communication behaviour.

6.3.5.1.3.2 Individual Communication Behaviour

The Individual Communication Behaviour scale (α = .86) included the same 4 items used in the team communication behaviour scale but was adapted to assess health professionals' perceptions of their own individual communication behaviour. For example, the item, "Did all

team members assert their ideas and escalate concerns?" was changed to, "Did you contribute to all team members being able to assert their ideas and escalate concerns?" A higher score indicated a perception of higher engagement in individual communication behaviour.

6.3.5.1.3.3 Team Effectiveness

A 4 item measure of Team Effectiveness (α = .70; Lemieux-Charles *et al*, 2002) was used to assess how effective health professionals perceived the team was. All items were scored on a five point scale of 1 to 5. The first item assessed whether expectations were met (e.g. "Did your team's overall performance meet your expectations?"). The scale for this item was 1 = not at all met, to 5 = completely met. The second item measured satisfaction (e.g. "Were you satisfied with your experience as a team member?"). The scale for this item was 1 = not at all satisfied, to 5 = extremely satisfied. The third item assessed feelings (e.g. "How do you feel about your experience?"). The scale for this item was 1 = negative, to 5 = positive. The final item assessed willingness to work with team again (e.g. "Would you be willing to work on a similar team in the future?"). The scale for this item was 1 = not at all willing, to 5 = extremely willing. A higher score indicated a perception of higher team effectiveness.

6.3.5.1.3.4 Familiarity with team members

Two separate items assessing familiarity with team members were included in the questionnaire. The first item assessed how well health professionals knew members of the team (e.g. "How well do you know any members of the team?"). The scale for this item was, 1 = not at all, to 5 = extremely well. The second item assessed how often they had worked with any member of the team (e.g. "How often do you work with any members of the team?"). The scale for this item was, 1 = never, to 5 = all the time. Higher scores indicated that the health professional was more familiar with a member of the team.

6.3.5.1.4 Other

6.3.5.1.4.1 Demographics

Each participant indicated their age, sex, clinical grade, length of time in present grade, total number of year's postgraduate clinical experience and specialty by either ticking the appropriate answer from a choice of responses, or writing the relevant answer in the text space provided.

6.3.6 Procedure

All activities took place during 6 separate days over a period of 6 months in the simulation centre where the patient safety simulation course was taking place. Before the course commenced, written consent was obtained and collected from each course participant and course staff. Following consent each participant completed the demographics questionnaire and was allocated a unique participant code.

On each of the 6 separate days, as part of the simulation course, participants were divided into pairs by the simulation course staff for the short 15 minute critical incident simulations. Where possible, pairs consisted of a junior doctor and nurse or allied health profession. This replicated the multi-professional nature of clinical teams and ensured that the doctor, nurse or allied health professional would assume the role and responsibilities they would usually take in real-life critical incidents. Half of the course participants completed the critical incident simulations during the first half of the course day and half completed the critical incident simulations during the second half of the course day.

After completing the simulation, participants immediately completed the questionnaire while sitting at separate tables in a corridor within the simulation centre and directly outside the simulation room. At the end of the course day, participants were debriefed and provided with the opportunity to ask further questions.

6.3.7 Analysis

The SPSS statistical software package (Version 19.0) was used for statistical analysis. Cronbach's Alpha was used to assess the reliability of each measurement. Differences between doctors and nurses or allied health professions for individual (positive affect, negative affect, individual functional emotions climate) and team (cooperative climate, competitive climate, team functional emotions climate) affective response, discrete positive and negative anticipatory emotions (alert, inspired, determined, attentive, active, upset, hostile, ashamed, nervous, and afraid), communication behaviour and team effectiveness were assessed by examination of mean scores. Between-subjects MANCOVAs assessed whether differences between health professional groups were significant. All additional tests of between-subjects effects and post-hoc comparisons controlled for Type 1 error by applying a Bonferroni correction for multiple analyses. Cohen's (1988) guidelines for eta squared were used to interpret the strength of partial eta squared.

To assess whether health professionals' ratings of affect predicted their ratings of communication behaviour and team effectiveness, relationships between affect dimensions and communication behaviour were examined using Pearson's Correlation Coefficients. A series of hierarchical multiple regressions were used to examine the predictive value of perceptions of individual and team affect on perceptions of individual and team communication behaviour and team effectiveness. They were also used to investigate whether profession moderated the relationship between affect and communication behaviour, and team effectiveness. At Step 1, the affective dimensions that demonstrated a significant relationship with Pearson's Correlation Coefficient with individual or team communication behaviour, and team effectiveness were entered into the regression. To determine the unique contribution of health profession group, profession was entered at step 2. At step 3, interaction terms were included for each of the affective dimensions and profession, and a stepwise regression was used to assess whether profession moderated the predictive value of any of the affective dimensions.

6.4 Results

6.4.1 Differences in individual and team affect, Communication Behaviour and Team Effectiveness

The mean scores and standard deviations for perceptions of affect, communication behaviour and team effectiveness are presented in Table 6.1. Both groups of health professionals had mean scores above the mid-point of 3 for Individual Positive Affect, Individual and Team Functional Emotions Climate, and Cooperative Climate, which suggested that they perceived that these affective dimensions to be high. Conversely, Individual Negative Affect and Competitive Climate were both below the mid-point of 3, indicating that both health professional groups perceived their own negative feelings and competition within the team to be low.

The mean scores did demonstrate some differences between the two groups for perceptions of individual and team affect. Nurses or allied professions had higher mean scores for both Individual Positive and Negative Affect, and Team Cooperative Climate than doctors. However, this was reversed for both Individual and Team Functional Emotions Climate and the team affect scale of Competitive Climate, for which doctors had higher mean scores than nurses or allied health professions.

Ratings for Individual and Team Communication Behaviour, and Team Effectiveness were above the mid-point of 3 for both groups. This suggests that both doctors and nurses or allied health professions perceived engagement in communication, and the effectiveness of the team to be high. Mean scores show that nurses or allied health professions gave slightly higher scores than doctors for Individual Communication Behaviour and Team Effectiveness. However, there was a larger difference between the two groups for Team Communication Behaviour with nurses or allied health professions perceiving that there was a higher level of communication behaviour in the team than doctors did.

A between groups MANOVA revealed that there was a statistically significant multivariate difference between doctors and nurses or allied health professions, F (9, 43) = 2.88, p = .009, with a large effect size (partial eta squared = .38). With a Bonferroni adjusted alpha level of 0.006, the univariate analysis revealed that the only significant difference between doctors and nurses or allied professions was for Team Cooperative Climate, F (1, 51) = 13.86, p = <.001, with a large effect size (partial eta squared = .21). Nurses or allied health professions provided higher ratings for cooperation in the team than doctors did. At the 0.05 alpha level, negative anticipatory affect was marginally non-significant, F (1, 51) = 3.74, p = .059, partial eta squared = .07. Nurses or allied health professions reported feeling marginally higher ratings for individual negative affect than doctors did during the simulation.

Table 6.1 Mean (SD) for affect, Communication Behaviour and Team Effectiveness for health professionals

	Doctor (N = 26)	Nurse (N = 27)
Individual		
Positive Affect	3.49 (0.57)	3.61 (0.71)
Negative Affect	2.13 (0.53)	2.45 (0.67)
Individual Climate	4.37 (0.58)	4.22 (0.90)
Individual Communication	3.75 (0.83)	3.88 (0.90)
Team		
Cooperative Climate	4.19 (0.69)	4.78 (0.42)
Competitive Climate	2.23 (1.39)	2.15 (1.68)
Team Climate	4.42 (0.50)	4.41 (0.71)
Team Communication	3.95 (0.84)	4.32 (0.69)
Team Effectiveness	3.88 (0.55)	3.96 (0.78)

6.4.2 Differences in discrete positive and negative anticipatory emotions

Within the health professional group, Table 6.2 demonstrates that doctors' highest positive emotion rating was alert, while nurses or allied health professions' was determined. The lowest positive emotion score for both professions was inspired. This, alongside the finding that the negative emotions of nervous and afraid were the two highest scores, and hostile was the lowest for both professions, suggests that there was some correspondence between the professions for the type of emotions they experienced during the simulation.

Table 6.2 Mean (SD) for discrete individual emotions for health professionals

Emotions	Doctor (N = 26)	Nurse (N = 27)
Positive		
Alert	4.00 (0.94)	3.81 (1.04)
Inspired	2.42 (1.14)	3.19 (1.18)
Determined	3.46 (1.03)	3.93 (0.92)
Attentive	3.63 (0.66)	3.67 (0.96)
Active	3.62 (0.75)	3.44 (1.05)
Negative		
Upset	1.35 (0.56)	1.67 (1.04)
Hostile	1.31 (0.68)	1.26 (0.66)
Ashamed	1.69 (0.93)	1.85 (1.26)
Nervous	3.73 (0.96)	4.26 (0.94)
Afraid	2.62 (0.94)	3.22 (1.37)

However, mean scores for positive emotions show that nurses or allied health professionals gave higher ratings than doctors for inspired, determined and attentive, but lower ratings than doctors for alert and active. A comparison of mean scores for negative emotions also showed that while doctors had a slightly higher rating than nurses for the emotion hostile, nurses gave

higher ratings than doctors for upset, ashamed, nervous and afraid. This indicates that in general, nurses or allied health professionals appear to have felt emotions more intensely than doctors did during the simulation. A between groups MANOVA revealed that there was no multivariate difference between doctors and nurses or allied health professions across the discrete emotions F (10, 42) = 1.81, p = .088.

6.4.3 Relationships between dimensions of affect

The relationship between the dimensions of affect for health professionals were examined using Pearson's Correlation Coefficients (see Table 6.3). Of particular note, higher ratings of Individual Positive Affect and lower ratings of Individual Negative Affect were associated with higher Individual Functional Emotions Climate. A higher rating of Team Cooperation was associated with increased scores for Team Functional Emotions Climate. Team Competitive Climate did not have a significant relationship with any of the affect dimensions, but was related to familiarity with team members. The better that health professionals knew, or the more that they had worked with members of the team, the more that they felt there was a competitive climate in the team during the simulation.

6.4.4 Relationship between affect and Communication Behaviour

The relationship between the dimensions of affect and Communication Behaviour for health professionals were also examined using Pearson's Correlation Coefficients (see Table 6.3). Higher Individual Positive Affect, lower Individual Negative Affect, increased Individual and Team Functional Emotions Climate, and higher ratings of a Cooperative Climate in the team were associated with higher ratings of Individual Communication Behaviour. Higher ratings of Team Communication Behaviour in health professionals were related to higher ratings of Individual Positive Affect, higher Functional Emotions Climate in the team and higher ratings of a Cooperative Climate in the team. Familiarity with team members was not associated with

Table 6.3 Mean (SD) and Pearson's correlations between affect dimensions and Communication Behaviour and Team Effectiveness for health professionals

Scales		1	2	3	4	5	6	7	8	9	10	11
1. Positive Affect	3.52 (0.67)	-										
2. Negative Affect	2.29 (0.62)	-.26	-									
3. Individual Climate	4.30 (0.75)	.37**	-.29*	-								
4. Team Climate	4.42 (0.60)	.23	-.05	.17	-							
5. Cooperative Climate	4.50 (0.64)	.19	-.11	.14	.28*	-						
6. Competitive Climate	2.17 (1.53)	-.16	.09	-.09	.07	-.15	-					
7. Ind. Communication	3.82 (0.84)	.47***	-.41**	.54***	.32*	.51***	.07	-				
8. Team Communication‡	4.14 (0.78)	.29*	-.06	.22	.48***	.46***	.15	.65***	-			
9. Team Effectiveness	3.94 (0.68)	.31*	-.39**	.26	.33*	.49**	.05	.66**	.45**	-		
10. Know members	1.93 (1.37)	.08	.09	-.12	.15	.04	.57***	.22	.22	.18	-	
11. Work with members	2.13 (1.54)	.16	.03	.02	.16	.14	.38**	.22	.18	.13	.74***	-

Note. N = 54 unless ‡ N = 53. * p = < .05 ** p = < .01 ***p = ≤ .001. Ind. Communication: Individual Communication Behaviour

perceptions of Individual or Team Communication Behaviour. Individual Communication Behaviour was also positively and strongly correlated with Team Communication Behaviour.

6.4.5 Relationship between affect and Team Effectiveness

The relationship between the dimensions of affect and Team Effectiveness for health professionals were also examined using Pearson's Correlation Coefficients (see Table 6.3). Higher Individual Positive Affect, lower Individual Negative Affect, increased Individual and Team Functional Emotions Climate, and higher ratings of a Cooperative Climate in the team were associated with higher ratings of Team Effectiveness. Familiarity with team members was not associated with perceptions of Team Effectiveness. Higher Individual and Team Communication Behaviours were also positively correlated with Team Effectiveness.

6.4.6 Predicting perceptions of Individual Communication Behaviour

Hierarchical multiple regression was used to examine whether affect predicted health professionals' perceptions of their own individual communication behaviour. Individual Positive and Negative Affect, Individual Functional Emotions Climate, Team Cooperative Climate and Team Functional Emotions Climate were entered into the Model at the first step. As demonstrated in Table 6.4, Model 1 was significant in predicting Individual Communication Behaviour explaining 58% (adj. R^2 = 54%) of the variance, F (5, 48) = 13.47 p < .001. In this model, Team Cooperative Climate (β = .38, p = < .001), Individual Functional Emotions Climate (β = .33, p = .002) and Individual Negative Affect (β = -.22, p = .033) were significant predictors of Individual Communication Behaviour. The higher the perception that there was a cooperative climate in the team and increased individual functional emotions, and the lower the feeling of experiencing negative feelings, the more health professionals believed that they engaged in individual communication behaviour during the simulation.

Table 6.4 Hierarchical regression of affect and Individual Communication Behaviour for health professionals

	Individual Communication Behaviour		
Predictor	*B*	*SE* of *B*	β
Step 1			
Constant	- 0.81	0.93	-
Positive Affect	0.24	0.13	.19
Negative Affect	- 0.30	0.14	- .22*
Individual Climate	0.37	0.12	.33**
Cooperative Climate	0.50	0.13	.38***
Team Climate	0.14	0.14	.10
Step 2			
Constant	- 0.84	0.94	-
Positive Affect	0.25	0.14	.20
Negative Affect	- 0.28	0.15	- .21
Individual Climate	0.36	0.12	.33**
Cooperative Climate	0.52	0.15	.40***
Team Climate	0.13	0.14	.10
Profession	- 0.06	0.19	- .03

Note. N = 54. For Individual Communication Behaviour: Step 1 ΔR^2 = .58, *F* change (5, 48) = 13.47, p = < .001; Step 2 ΔR^2 = .00, *F* change (1, 47) = 0.08, p = .776

* p = < .05 ** p = < .01 ***p = ≤ .001

The addition of profession at the second step did not explain any significant incremental variance (p = .776). However, Team Cooperative Climate (β = .40, p = .001) and Individual Functional Emotions Climate (β = .33, p = .003) remained significant predictors in Model 2. Stepwise regression with the inclusion of interaction terms did not compute a third model, indicating that profession did not moderate the predictive value of any affective dimensions.

6.4.7 Predicting perceptions of Team Communication Behaviour

A second hierarchical multiple regression was used to examine whether affect predicted health professionals' perceptions of Team Communication Behaviour. Individual Positive Affect, Individual Functional Emotions Climate, Team Cooperative Climate and Team Functional Emotions Climate were entered into the Model at the first step. As demonstrated in Table 6.5,

Table 6.5 Hierarchical regression of affect and Team Communication Behaviour for health professionals

	Team Communication Behaviour†		
Predictor	*B*	*SE* of *B*	β
Step 1			
Constant	- 0.27	0.85	-
Positive Affect	0.17	0.14	.14
Cooperative Climate	0.41	0.15	.33**
Team Climate	0.45	0.16	.35**
Step 2			
Constant	- 0.33	0.85	-
Positive Affect	0.16	0.14	.14
Cooperative Climate	0.57	0.06	.28*
Team Climate	0.47	0.16	.37**
Profession	0.17	0.20	.11

Note. N = 54 unless † N = 53. For Team Communication Behaviour:
Step 1 ΔR^2 = .36, *F* change (3, 49) = 9.20, p = < .001; Step 2 ΔR^2 = .01, *F* change (1, 48) = 0.70, p = .406
* p = < .05 ** p = < .01 ***p = < .001

Model 1 was significant in predicting Team Communication Behaviour explaining 36% (adj. R^2 = 32%) of the variance, *F* (3, 49) = 9.20 *p* < .001. In this model, the affective dimensions of Team Functional Emotions Climate (β = .35, p = .006) and Team Cooperative Climate (β = .33, p = .008) were significant predictors of Team Communication Behaviour. The higher the perception of team functional emotions and the increased belief that there was a cooperative

climate in the team, the more health professionals believed that the members of the team engaged in team communication behaviour during the simulation.

The addition of profession at the second step did not explain any additional significant variance (p = .406). However, Team Functional Emotions Climate (β = 37, p = .005) and Team Cooperative Climate (β = .28, p = .043) remained significant predictors in Model 2. The inclusion of interaction terms in the stepwise regression at step 3, did not compute a third model, indicating that profession did not moderate the predictive value of any of the affective dimensions.

6.4.8 Predicting perceptions of Team Effectiveness

A third hierarchical multiple regression was used to examine whether affect predicted health professionals' perceptions of Team Effectiveness. Individual Positive Affect, Individual Negative Affect, Team Functional Emotions Climate and Team Cooperative Climate were entered into the Model at the first step. As demonstrated in Table 6.6, Model 1 was significant in predicting Team Effectiveness explaining 40% (adj. R^2 = 35%) of the variance, F (4, 49) = 8.23 $p < .001$. In this model, the affective dimensions of Individual Negative Affect (β = - .31, p = .008) and Team Cooperative Climate (β = .38, p = .002) were significant predictors of Team Effectiveness. The less the health professional was feeling negative affect and the more that they felt that there was a cooperative climate in the team, the more health professionals believed that the team was effective during the simulation.

The addition of profession at the second step did not explain any additional significant variance (p = .449). However, Individual Negative Affect (β = - .28, p = .031) and Team Cooperative Climate (β = .44, p = .002) remained significant predictors in Model 2. The stepwise regression with the inclusion of interaction terms at step 3 did not compute a third model, indicating that profession did not moderate the predictive value of any of the affective dimensions.

Table 6.6 Hierarchical regression of affect and Team Effectiveness for health professionals

	Team Effectiveness		
Predictor	*B*	*SE* of *B*	β
Step 1			
Constant	1.62	0.83	-
Positive Affect	0.11	0.12	.11
Negative Affect	- 0.35	0.13	- .31**
Cooperative Climate	0.41	0.13	.38**
Team Climate	0. 20	0.13	.18
Step 2			
Constant	1.51	0.84	-
Positive Affect	0.13	0.12	.13
Negative Affect	- 0.31	0.14	- .28*
Cooperative Climate	0.47	0.15	.44**
Team Climate	0.18	0.14	.16
Profession	- 0.14	0.18	- .10

Note. N = 54. For Team Effectiveness: Step 1 ΔR^2 = .40, *F* change (4, 49) = 8.23, p = < .001; Step 2 ΔR^2 = .01, *F* change (1, 48) = 0.58, p = .449

* p = < .05 ** p = < .01 ***p = < .001

6.5 Discussion

The aim of study 4 was to explore whether doctors and nurses or allied health professions experienced different individual and team affect during simulation of a critical incident and whether they had different perceptions of Communication Behaviour and Team Effectiveness. It also assessed whether individual and team affect predicted perceptions of Communication Behaviour and Team Effectiveness.

6.5.1 Differences in perceptions of individual and team affect during simulation

Doctors and nurses or allied health professionals demonstrated identical patterns in their ratings of affect giving higher and lower scores to the same affect dimensions. While Individual

Negative Affect and Team Competitive Climate were perceived to be low, both groups of health professionals perceived that Individual Positive Affect, Individual and Team Functional Emotions Climate, and Cooperative Climate were high. These high ratings of affect may have been a reflection of health professionals being in a simulation of a critical incident which increased visceral arousal through active involvement (Martinez *et al*., 2009) or heightened affective arousal through being in a *hot* state (Ariely & Loewenstein, 2006; Nordgren *et al*., 2009). This suggests that during team-based tasks, both doctors and nurses or allied health professions experience a high intensity of both individual and team affect.

Doctors' higher rating of individual engagement and tenseness, and team competitiveness, and lower individual anticipatory response suggested that they focused on affective indicators of clinical performance. Nurses or allied health professionals had a more intense individual anticipatory response during the simulation, and suggested that they focused on individual feelings. While some of the differences between the two groups in their perceptions of individual and team affect were small, it is crucial that more work is undertaken to examine why and whether different health professionals focus on different affective cues when they are working together on the same clinical task. In particular, it is important to establish whether different aspects of affect during team communication provide role-specific feedback. It is also important to understand whether a focus on different affective cues enhances situational awareness and broadens the clinically relevant information that is gathered and shared in a clinical team, or whether divergences in the salience of affective cues hinders team cohesiveness and a sense of shared goals.

6.5.2 Differences in perceptions of discrete positive and negative emotions

Health professionals showed general correspondence in the pattern of their ratings of discrete emotions. All positive emotions other than inspired for doctors were perceived to be moderate to high, while all negative emotions, other than nervous for both groups and afraid for nurses

were perceived to be low. As found in study 2 and study 3, in Chapters 4 and 5 respectively, the positive emotions, alert, determined, attentive and the negative emotion of nervous appear to be important emotions in clinical judgement and performance. In this study, these emotions showed consistent arousal across both doctors and nurses or allied health professions. However, there were differences in discrete emotional responses. Although not statistically significant, nurses or allied health professions felt more inspired and determined and less alert and active than doctors. They also felt most negative emotions more intensely than doctors during the simulation. The only exception was that doctors did report feeling higher ratings of hostility, but the mean score difference was very small.

These findings appear to further support the notion that different emotional responses may be due to perceptions of professional roles and responsibilities. The facts that doctors had a higher feeling for the emotions alert and active imply a more immediate, transient response state that is required for instantaneous decision-based actions and performance, while the feelings of inspired, determined, upset, ashamed, experienced more intensely by nurses or allied health professions, indicate a more considered, and emotionally burdensome response during the simulation. This finding supports research on emotional labour (James, 1989; Smith, 1992) and the hostess role (Timmons & Tanner, 2005) in the work of nurses. In a study involving observations and interviews with operating theatre nurses, Timmons and Tanner (2005) found that nurses engaged in behaviour and displays that were juxtaposed to actual feelings in order to maintain equanimity in the mood of the surgeons they worked with. Therefore, it is possible that the nurses observed were carrying out the hostess role and that during team scenarios, they were acting as a team emotion gauge and were therefore more likely to be more acutely aware of, and report, the emotions they were feeling.

Future research should examine whether, and to what extent, emotional labour and the "hostess role" in nurses compete with the awareness of other affective cues that are important for

diagnosis and treatment during a team-based task. It should also try to establish whether emotional labour assists or hinders nurses' verbalisation of information they feel is clinically relevant to the rest of the team.

While the negative emotions of nervous and afraid were increased in both professional groups, they were again more aroused in nurses or allied health professions. As both anxiety and fear have been associated with low personal control and aversive behaviour (Lerner & Keltner, 2000, 2001), increased nervousness and fear in health professionals may reduce the level of communication within a team context (Kish-Gephart *et al*, 2009). In a clinical team context, this could hinder or delay the sharing of important diagnostic and treatment information. Further research should examine differences in the expression of anxiety and fear in multi-professional clinical teams, and assess how quickly and accurately these emotions are gauged by other members of the team. This would aid the development of team strategies to mitigate omissions or errors caused by emotion-based avoidance behaviour. These findings further support the need to develop a better understanding of the role that specific emotions play in decisions and behaviour in applied settings (Van Kleef *et al*., 2012).

6.5.3 Differences in perceptions of Communication Behaviour and Team Effectiveness

The fact that Communication Behaviour at both an individual and team level, and Team Effectiveness were perceived to be high may be due to the fact that the high level of positive affect that health professionals were feeling led to the perception that more positive behaviour (e.g. more use and engagement in communication behaviour) occurred. It is possible that this reflected congruence between present affective state and outcomes which require judgement (Waters, 2008). This is further supported by the fact that nurses or allied health professions who reported higher positive feelings and a higher perception of cooperation within the team also gave higher ratings for Communication Behaviour and Team Effectiveness than doctors. This implies that perceptions of Communication Behaviour and Team Effectiveness are

influenced by the intensity of positive affect experienced during simulation. An alternative explanation is that the high levels of positive affect may have been due to emotional contagion (Barsade, 2002). As the perception of positive emotions has been linked to cooperation (Barsade, 2002; Van Doorn, Heerdink, & Van Kleef, 2012) and cooperation is a key component of effective teamwork (Flin *et al*., 2008), it is important to now examine the role that cooperation plays in the quantity and quality of verbalisation and exchange of information for diagnosis and case management in clinical team contexts.

6.5.4 The relationship between individual and team affect

Health professionals did not associate individual and team affect with each other. While they related their own high individual positive and low individual negative feelings with how engaged and appropriately tense they themselves felt during the simulation, they did not associate any individual affective response with team affect. Likewise, they associated a perception that the team was engaged and appropriately tense with a sense of cooperation in the team, but not with any feelings concerning their own affective response. This may suggest that during clinical tasks that require teamwork, affect-based information may be derived from 2 distinct affective phenomena. This may involve individual affect which is gauged through visceral feelings, and team affect which is assessed through team members' social displays and expressions of emotions (Van Kleef, 2009).

The finding that health professionals related more familiarity with members of the team with a perception that competitiveness in the team was higher, may have reflected the junior level of the participants' and a focus on establishing themselves as competent professionals. It may also have been due to the knowledge that their performance was being viewed by their peers. Further studies exploring the role of competitiveness in junior health professionals and established clinical teams would help to clarify whether this finding was context and sample-specific and whether it hinders or facilitates communication behaviour and team effectiveness.

6.5.5 The relationship between affect and Communication Behaviour and Team Effectiveness

Although health professionals related both levels of Communication Behaviour with both individual and team affect, individual affect was more strongly associated with Individual Communication Behaviour, and team affect was more strongly associated with Team Communication Behaviour. While this may partly support the notion that individual and social affect exert their influence in distinct ways (Van Kleef, 2009), it also indicates that perceptions of team performance are influenced by both individual and team affect. This is further supported by the finding that Team Effectiveness was related to both types of affect. It is now important to gain further knowledge about how individual and team emotions interrelate and how this influences the feedback of relevant diagnostic and treatment information during team-based clinical tasks.

6.5.6 Affective predictors of ratings of Communication Behaviour and Team Effectiveness

While the pattern described in section 6.5.5 above was generally supported in the affective predictors of Communication Behaviour and Team Effectiveness, it emerged that low individual negative affect was an important factor in the perception of Individual Communication Behaviour and Team Effectiveness. Moreover, the finding that a higher perception of cooperation in the team predicted all 3 outcomes further supports the growing literature which suggests that cooperation is an important social affective factor in fostering effective team communication and behaviour (Van Doorn *et al*., 2012; Van Kleef, 2009).

6.5.7 Limitations

There are limitations to this study. Although the study attempted to replicate realistic contexts and settings in which clinical communication and decisions are made, the fact that affect was measured within a simulated environment, raises issues concerning generalizability of the findings into real clinical practice. Furthermore, as the study was run alongside a simulation training course, it is unclear whether health professionals' ratings of affect were a true reflection

of their perceptions of the simulated scenario or whether they were influenced by high arousal states due to the stress of participating in a training programme.

While on one hand health professionals had a high rating for feeling nervous and an elevated score for feeling afraid, they also indicated that they felt highly positive for four of the five discrete positive emotions, and for all of the main affect dimensions other than individual negative affect and team competitive climate. One explanation for the pattern of high ratings across all positive affect dimensions may be that the act of completing a questionnaire about feelings, made health professionals' current mood due to participating in the simulation, more salient. Previous research suggests that in order to regulate mood, an individual will make appropriate choices (Caruso & Shafir, 2006). Therefore, in this situation it is possible that those that felt positive after the simulation continued to indicate positive affect to correspond with their mood, while those who felt negative after the scenario indicated more positive feelings in an attempt to regulate their mood. As the questionnaire was completed during a training course which included colleagues and senior health professionals, health professionals may have felt social desirability pressures which may have been reflected in their responses.

The context and time limits within which the study was carried out also restricted the measures which could be collected. The low Cronbach Alpha level of the general negative affect sub-scale of the 10 item International Positive and Negative Affect Schedule (I-PANAS-SF: Thompson, 2007) meant that the measure of negative affect may not be reliable. Furthermore the use of the I-PANAS-SF also meant that the exploration of discrete emotions was restricted, and the measure of communication behaviour focused on perceptions, and did not include an objective assessment of the quantity or quality of individual or team communication from a clinical or technical skills perspective.

While this study indicates that information from both individual and social affect played a role in the perception of individual and team communication behaviour, being cross-sectional it is not able to disentangle the nature of the relationship between these different types of affect. Therefore, it is not possible to comment on whether individual affect influenced the nature and degree of team affect or whether team affect had an impact on the direction and intensity of individual affect.

This study, and the studies in Chapters 4 and 5 have provided evidence that both individual and social affect play a role in the process of diagnostic and case management decisions. The study presented in the next chapter presents the findings from in-depth interviews with 16 junior and senior Accident and Emergency and Anaesthetics doctors in which the features and interplay between the types and sources of affect involved in diagnostic and case management decisions were explored and identified.

CHAPTER 7

DO AFFECTIVE INFLUENCES FEATURE IN DIAGNOSTIC AND CASE MANAGEMENT DECISION MAKING IN EMERGENCY CARE? A QUALITATIVE APPROACH

7.1 Introduction

The previous 3 chapters described the quantitative approaches used to examine the role of affect in diagnostic decision making and case management in emergency care. As discussed in Chapter 3, research examining the role of affect in diagnostic and case management decision making should acknowledge that doctors make clinical judgements and perform clinical tasks individually and within teams amidst a plethora of concrete and abstract clinical and non-clinical factors. Due to this, a programme of work which uses only quantitative methods deduced from existing theory was unlikely to attain a comprehensive knowledge of a complex feature of clinical practice without eliciting and understanding the role of the social and contextual settings in which it occurs (Armitage & Hodgson, 2004).

The Naturalistic Decision Making research approach (NDM: Klein *et al*., 1993) asserts that to understand thought processes, research should be conducted with those who have experience of the phenomena of interest and reflect their real life situations and settings. A number of studies have followed a NDM research approach in semi-structured interviews with doctors in order to understand the cognitive components and processes that are important in clinical decision making (Fackler *et al*., 2009; Woolley & Kostopoulou, 2013). It was therefore decided that a NDM approach would be utilised in this study and semi-interviews were used to draw on doctors' real-life accounts of the decisions they made during emergency care incidents. This would elicit meaningful data which would provide knowledge of the sources and types of affect that feature in diagnostic and case management decision making and would allow for the assessment of their role.

Obtaining narratives from doctors who are making diagnostic and case management judgements on a daily basis would provide rich and extensive data that may assist in providing explanations for the findings from the quantitative studies in this thesis. It was also hoped that this method would provide data that might indicate whether current theoretical perspectives are supported, or require further development to aid the understanding of the role of affect in diagnostic and case management decision making (Barbour, 2000).

7.2 Study 5

7.2.1 Aims

The aim of this study was to elicit doctors' own accounts of decision making strategies used in real-life clinical incidents to identify the emotional processes which influence diagnostic and case management judgements in emergency care. The study also assessed whether doctors felt that affect influenced the decisions they made and explored the role it played. The research questions were:

1). What are the sources of affect that feature in emergency care decision making?

2). What are the types of affect that feature in emergency care decision making?

3). What discrete emotions feature in emergency care decision making?

4). To what extent are affective factors perceived to influence decision making in emergency care and what is their role?

7.3 Method

7.3.1 Participants

The sample consisted of 16 junior and senior doctors working in Accident and Emergency (N = 9) or Anaesthetics Departments (N = 7) in 2 NHS Trusts. The mean number of years practice was 14.47 years (SD = 9.08). There were 6 females and 10 males with a mean age of 38.44 (8.54 SD) years.

There were 2 criteria for participation. Firstly, doctors had to be working in the specialties of Accident and Emergency or Anaesthetics in an acute hospital setting. This was to allow for an in-depth exploration of the features of diagnostic and case management decision making with doctors who had experience of making decisions in emergency care in an acute care setting. Secondly, doctors must have completed 3 months of working in the department. This formed part of the ethical requirements and is discussed in more detail in section 7.3.2.

All participants were recruited using the same method. After gaining relevant directorate and clinical lead permissions, eligible doctors in each department were sent a study invitation letter (see appendix G) along with a study information sheet. This was undertaken by a gatekeeper within the Trust in each clinical department. A study invitation reminder letter was sent 2 weeks later after which no further contact was made. Doctors were informed that interviews must take place in their own free time. No incentive for participation was offered. Doctors who were interested in participating were invited to contact the researcher by email or telephone to arrange a convenient time and place to conduct the interview.

7.3.2 Ethics

Approval to undertake research with NHS health professionals was granted by the NHS Research Ethics Committee (Ref: 11/YH/0082) and the Trust Research and Development Department. Care was taken to address all potential ethical issues in the Participant Information Sheet and to remind participants of their right to withdraw at any time. To reduce the risk of psychological harm, ethical approval was granted on condition that doctors recruited to the study must have completed 3 months of working in the department. These conditions were put in place to minimise any distress that the most junior staff may experience due to participating in the study and to ensure that the interview schedule was appropriate for their level of practice and clinical experience. A protocol for the occurrence of any distress either during or after the interview was developed and following the interview each participant was provided with a

debrief sheet which provided details of sources of psychological support if required. To further avoid the possibility of distress, the information sheet included advice that if the potential participant was likely to be particularly distressed by the discussion of a critical incident they should avoid participation.

A further condition of ethical approval was that a clear disclosure procedure was in place should doctors disclose any information of a criminal or violent nature, or instances of professional negligence, or if individuals had suffered harm. Participants were made fully aware of the disclosure procedure as this was included in the Participant Information Sheet.

Issues of confidentiality and anonymity are paramount in qualitative research in which participants trust the researcher with the divulgence of personal and sensitive information (Murphy, Dingwall, Greatbatch, Parker, & Watson, 1998). All participants were asked to consent to audio recordings of the interview to be used for the purpose of analysis as part of the research. They were informed that transcription would be carried out solely by the researcher. Participants were also assured that the interview data would be stored securely in a locked cabinet at the researcher's university office, and that any electronic versions of the audio recordings would be stored on the university's password protected computer system. To protect anonymity, codes made up of letters and numbers were used on all study materials and participants were assured that any identifying name or place would be removed from research reports, journal articles or conference papers. As the interview extracts across sources, themes, and specific answers to questions would involve segments of accounts from the same respondent, it was also decided that no identifying respondent specialty or code would be included with the data extracts to help maintain confidentiality and anonymity. Participants were also informed that care would also be taken to ensure that any identifying clustering of features from incidents would be avoided in any published material.

7.3.3 Design

The study was a two-centred exploratory design and used the semi-structured interview technique of Critical Decision Method (CDM: Klein, Calderwood & MacGregor, 1989). This interview technique uses a methodical strategy to elicit accounts of non-routine, domain-based incidents and establishes the contextual and environmental determinants and thought processes that informed key decisions through a set of cognitive probes. CDM includes 5 distinct stages to the interview. As recommended by Klein *et al.* (1989), the stages were adapted to meet the aims of the research and are presented below:

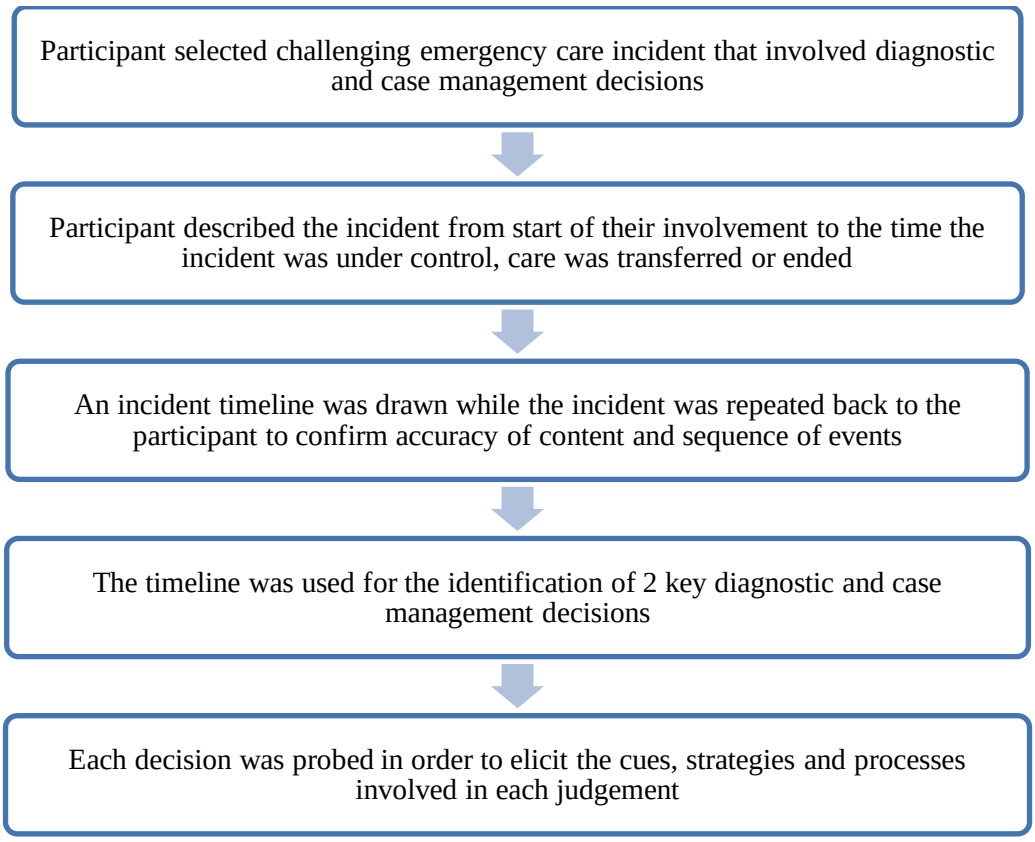

Figure 7.1 Procedure used in Critical Decision Method (adapted from Klein *et al.*, 1989)

CDM can be used to specifically compare the decision making strategies of those with more or less field experience, but is also a valuable method for gaining knowledge about the cognitive processes that underlie judgements. As the focus of this study was to identify the sources and

types of affect that typically featured in diagnostic and case management decision making, it was important to include accounts from both junior and senior doctors, but equal numbers were not essential.

Due to time constraints, doctors were asked to select only 1 emergency care incident but were asked to identify 2 key diagnostic and case management decision points (e.g. a choice was made from a number of possible courses of action) within that incident. As discussed in Chapter 3 (see section 3.3.4) case management is included as a distinct sub-category of diagnostic decision making in this thesis and therefore, case management decisions (e.g. What were the treatment options? Where should the patient be treated?) were included in this study. Each decision was then probed in the sequence in which they occurred during the incident described.

7.3.4 Materials

7.3.4.1 Interview schedule

The interview schedule (see appendix H) included the 5 stages described in Figure 7.1. The fifth stage included probes commonly used in CDM (Klein *et al.*, 1993), which focus on the cognitive interpretation of information used in the decision making. However, in order to extract information about affective features that informed decision making during the incidents, additional probes which explicitly explored the emotions that were experienced during the point of decision making were developed and included in the decision probing stage. This would allow for the experience of emotion to be matched with specific cognitive processing of information, and would also assist in identifying the conscious and less conscious impact of affect. It also explored the extent to which doctors were able to reflect on the role that affect may have had on the decisions they made.

The interview schedule was piloted on one occasion with a consultant who represented the sample criteria. The consultant advised that an acceptable duration of the interview would be

approximately 1 hour, therefore the time taken for completion was noted. Feedback was also attained regarding structure and comprehensibility of the questions. The interview schedule was also assessed to ensure that the questions facilitated the collection of broad and meaningful data in terms of the research questions.

7.3.5 Measures

7.3.5.1 Demographics

Each doctor indicated their age, sex, clinical grade, year in present grade, clinical experience in years and specialty.

7.3.6 Procedure

All interviews took place in a private room either in the clinical department or on the hospital site that was convenient to the participant. Interviews took between 29 minutes and 1 hour, 18 minutes. Before the interview commenced, any questions were addressed by the researcher before obtaining consent and completion of the demographics questionnaire. All participants were informed in the study invitation letters and study information sheet that the interview would require them to talk about an incident that was challenging and involved diagnostic and case management decisions. Enquiring whether participants had been able to select an incident that they could describe was used as an ice-breaker question. If participants had not been able to select an incident, they were reminded of the criteria and given time to consider and make a choice. Once the participant was happy with the incident they had selected, the interview was audio-taped and the remaining stages of CDM described in Figure 7.1 commenced. Decision point probing was carried out separately for the selected decision points.

On completion of the interview and questionnaires, participants were debriefed and asked whether they wanted to discuss any issues raised through taking part in the study. A list of

possible sources of support was provided to all participants and they were offered the opportunity to be sent a summary of the study findings.

7.3.7 Analysis

Klein *et al*. (1989) suggest that when using CDM the aims of the research should direct the coding strategy used. Therefore, the Framework Approach (Ritchie & Lewis, 2003) informed the stages of analysis of the interview data. This approach was chosen due to its ability to incorporate both inductive and deductive interrogation of the interview data. This allowed for the support of *a priori* theoretical and literature-based assumptions for sources and types of affect, while also providing the flexibility to extend knowledge and move beyond the confines of the theoretical framework that informs this thesis. The 5 stages of the Framework Approach are illustrated in Table 7.1.

Table 7.1 Stages of the Framework Approach to analysis (adapted from Ritchie & Lewis, 2003)

Stage	Procedure
1.	Familiarisation with data
2.	Establishment of key thematic concepts
3.	Labelling of codes
4.	Arrangement of data into thematic charts
5.	Conceptual interpretation

Interviews were transcribed verbatim by the researcher and due to the arrangement and synthesis of data into charts all of the stages of analysis were done by hand. The audio-recordings and typed transcripts were listened to and read several times to allow for familiarisation with the data and the initial identification of key ideas and themes that emerged. Fourteen doctors selected 2 decision points, 1 doctor selected 1 decision point, and 1 doctor selected 3 decision points. During analysis, it was determined that 1 decision point was not

concerned with diagnostic or case management decisions, and was therefore omitted from the analysis. Time restrictions meant that one decision point was not interrogated using all the probes. However, due to relevance this decision point was retained in the analysis. This resulted in 31 decision points.

Interview text was then coded into labels using words and phrases. Not all conversation was coded. To avoid subjective inferences and bias, only segments of conversation that included explicit references to emotions or feelings were coded for sources and types of affect. The codes were then assigned to the key thematic concepts.

While an inductive approach was applied to the analysis, a number of themes were derived from the theoretical framework that informed the research in this thesis. Therefore, for sources of affect; Patient, Team, and Previous clinical experience, and for types of affect; Mood, Anticipatory affect, and Anticipated affect were identified as potential themes. Due to the difference in these concepts, thematic analysis for source of affect took a predominantly inductive approach, while a deductive strategy generally informed type of affect.

The nature of the participant-researcher interaction during qualitative research may mean that it moves from being a professional encounter to a personal dialogue (Murphy *et al*., 1998). The non-clinical background of the researcher may go some way to ensuring that some distance was maintained between the researcher and participant. While reflexivity is one approach to guard against the possibility of bias and subjectivity, transparency in how codes and categories were derived from qualitative data and the level of agreement of interpretation obtained between researchers is another (Murphy *et al*., 1998; Pope & Mays, 2006). However, there is some debate concerning how inter-rater agreement should be determined in qualitative research (Barbour, 2001; Pope and Mays, 2006). While applying techniques such as the Kappa measure of agreement is one such method, it is acknowledged that quantitative approaches used to

address issues concerning inter-rater reliability have limitations. While the Kappa statistic measures researchers' level of concordance, Barbour (2001) argues that, "the degree of concordance between researchers is not really important; what is ultimately of value is the content of disagreements and the insights that discussion can provide for refining coding frames" p. 1116. Furthermore, it is suggested that the Kappa measure of agreement may not be conducive to qualitative data that is or "dependent on detailed interpretation" p. 19 (Thompson, McCaughan, Cullum, Sheldon and Raynor, 2004). It was therefore decided that in order to ensure rigour of the analytical process, and to assist in the refinement of the coding labels and key thematic concepts, multiple coding by 2 further researchers (one researcher with a background in health psychology and another with a background in clinical practice) would be undertaken. This allowed for the data to be interrogated by two appropriate researchers who shared different, yet complementary perspectives and involved the cross-checking of coding labels by each researcher, separately coding the same 2 transcripts (one transcript from a doctor in Accident and Emergency and another from a doctor working in Anaesthetics).

The final themes and sub-themes were decided through a process of all three researchers discussing and describing themes and achieving conceptual clarity through consensus (Barbour, 2001). An example of how codes were transformed into themes and sub-themes is presented in Table 7.2 (see appendix I for tables of transformation of codes into themes and sub-themes). To assist interpretation, frequencies of themes, emotions and answers to particular questions are also illustrated. In an attempt to explain emotional states, it emerged that doctors often used different words to describe an overall feeling state (e.g. anxiety/nervous/uneasy). Therefore, in order to control for any over-representation of emotions, the analysis of discrete emotions has combined different words where appropriate.

Table 7.2 Transformation of codes to themes for Knowing yourself and Professional ethos

Codes	Codes	Sub-themes	Theme
Own likes and dislikes Treatment Preferences Clinical experience Clinical Knowledge Own response Own interests Own personality Training Own busyness Own behaviour Effect on self Appropriate response Previous life experience Belief system Own thought processes Clinical ability	Clinical experience Clinical knowledge Training Own busyness Clinical ability	Professional competence	Knowing yourself
	Own likes and dislikes Treatment Preferences Own response Own interests Own personality Own behaviour Effect on self Appropriate response Previous life experience Belief system Own thought processes	Intrapersonal Self-awareness	
Professional role Sense of ownership Responsibility Sense of control Approach to management Clinical performance Ethics	Professional role Sense of ownership Responsibility Sense of control Approach to management Clinical performance Ethics		Professional ethos

7.4 Results

A total of 8 sources of affect and 5 types of affect emerged using the inductive and deductive approaches described in section 7.3.7. The frequency of themes and concepts, along with illustrative extracts from the interviews, are presented below.

7.4.1 Sources of affect

7.4.1.1 Frequency of themes for source of affect

The frequency of the source of affect that featured in the 31 decisions is shown in Table 7.3. As illustrated the sources, Knowing yourself and Interpersonal factors featured in nearly all of the 31 decisions. The sources, Getting an answer and Organizational or statutory drivers had fewer endorsements, and featured in less than a third of all decisions.

Table 7.3 Frequency of source of affect across all decision points

Source	Total
Knowing yourself	30
Interpersonal factors	29
Professional ethos	25
Clinical environment	18
Risk and uncertainty	18
Narrowing of focus	10
Getting an answer	8
Organizational or statutory drivers	6

7.4.1.2 Themes – Sources of affect

7.4.1.2.1 Theme 1: Knowing yourself: An awareness of one's own abilities, thought patterns and influences

7.4.1.2.1.1 Sub-theme 1: Professional competence: Knowledge of one's own clinical ability and experience

Table 7.4 Interview extracts reflective of the source Professional competence

"…I guess, I guess, what was sort of underlying it was just that I felt out of my… I felt out of my depth in… in erm, being able to advise this, this man appropriately…"
"*Erm, and you're always, you know, "Will I be able to cope with this if it does go wrong?" and hoping that you will be able to. Yeah, I think you're always aware that you may be about to be tested in some way."*
"Contentment in the fact that I'd been in that situation before and I knew what the answer was, where the trainees didn't know the answer, and so I felt in a way, as I said, contentment in the fact that I could offer them the advice that was appropriate."
"…knowing that I'd had lots of experience in transfers and pre-hospital work and actually I was quite comfortable with it…"

In the majority of the decisions described, doctors associated their own awareness of their clinical knowledge and ability with both positive and negative feelings. In general, negative feelings of "nervousness" and "anxiety" were experienced when doctors doubted their level of expertise and skill-base, while positive emotions of feeling, "calm", "comfortable", and "in control" were experienced when doctors were confident that their previous clinical experience, training or a knowledge base enabled them to make clear judgements, perform clinical tasks, or advise junior colleagues.

7.4.1.2.1.2 Sub-theme 2: Intrapersonal self-awareness: Knowledge of one's own thought processes and behavioural tendencies

Table 7.5 Interview extracts reflective of the source Intrapersonal self-awareness

"Erm, you, you hear it in your own voice when you talk to your colleagues."
"I am aware of a, almost a slow time behaviour that I have when things are difficult. When there's a, when there's a complex trauma usually, or something difficult to deal with, I do realise I don't, I don't decide to do it, but I'll catch myself having slowed down my thought processes… become quite pedantic in how I… it's quite hard to describe really."
"…I'm quite a conflict averse kind of person, so I still have that sort of, erm, slight reticence to, to phone people."
"…just from previous discussions, previous, err… just from knowing myself, I know that I can sometimes not be so bothered about, err, taking a risk, and, as some people would be. Err, and so what might…what I might be comfortable accepting, erm, somebody else might not be."
"…because I'm a medical professional, you have to make the right decisions, but then as a human being, I don't like upsetting people, it's just my nature."
"…the anger, just because it's, err, it goes against sort of human, well my human nature to, to, you know, do what you want as long it doesn't adversely affect anybody else, and [patient] clearly, err, didn't live by that rule, so err, that annoyed me somewhat."
"…I was aware that I would…I might slightly err to the side of thinking, 'Oh, well I would not wanna be on the [drug]" and "Oh, well, you know, I'd take my chances if it was me,' whereas, you know, I, I…and so I had to, kind of, keep that in check."

Many diagnostic and treatment decisions involved emotions which stemmed from doctors' own preferences and beliefs, or an awareness of their own trait-based behaviour. In a number of decisions this manifested itself in conscious and familiar vocal or cognitive reactive patterns

that reflected the emotions they felt, while for other decisions, some doctors described how their traits elicited emotions which influenced their behaviour. Most doctors were conscious of how their thought processes and behavioural tendencies influenced their decision making and actions. However, some were comfortable with this notion and felt it assisted their judgement, others spoke about how particular traits and tendencies might result in decisions and behaviour which deviated from a more rational approach.

7.4.1.2.2 Theme 2: Interpersonal factors: How one relates to and responds to others

7.4.1.2.2.1 Sub-theme 1: Reaction *to* others: Decisional or behavioural response *to* others

Table 7.6 Interview extracts reflective of the source Reaction *to* others

"I was obviously fed up with, err, err, you know, the sort of blasé attitude of the surgeon…"
"Erm, I guess I knew because I looked at [patient] and thought, "Huh, I don't really like you very much," yeah"
"…Err, partly I… this is been something that I, erm, have an opinion on and have thought about, is because my [parent]…has a [condition]… and I've looked into the evidence about, erm, how to treat this…"

Affective responses to others featured in nearly every decision. Interactions with other clinical colleagues or team sometimes generated negative emotions such as, "anger", "irritation", and "frustration". This was often due to unhelpful behaviour or a difference in management strategies. Conversely, the support and help of colleagues often led to doctors' feeling more "calm" and "confident" in their judgements and actions. Patients also evoked positive and negative emotions and these tended to be based on the patient as an individual, or the patient's personal circumstances reminding the doctor of a member of their own family or own family situation.

7.4.1.2.2.2 Sub-theme 2: Reaction *of* others: Decisional or behavioural response *of* others

Table 7.7 Interview extracts reflective of the source Reaction *of* others

"…maybe the key feature was who I discussed it with. He said, 'Let's go and get this checked by someone else,' who gave me the confidence to get a second opinion…"
"…and just being able to bounce the ideas and the what ifs and that with the surgical registrar. That was really helpful…"
"…well also you kind of realised as well that no one seemed to be taking this on and you know, potentially he could die, you know, people do die from these symptoms."
"I'm not sure other people really realised that this could kill her in the next, you know, hour you know…"
"*… feedback from the [parent] who also said, 'Thank you for making that decision'"*
"I was like, oh you know the [parent's] not happy with the action, maybe I shouldn't be doing it, and I had to go with what I felt was best for the patient."

The reaction of others also elicited feelings in doctors. Decisions often involved interactions with colleagues concerning the synthesis of diagnostic information. These interactions and the response of other colleagues appeared to evoke two distinct affective responses in doctors. When colleagues engaged in discussions about the case or shared concerns about diagnostic uncertainty, the sense of collaboration encouraged doctors to pursue a chosen course of gathering more information or to action treatment strategies. In contrast, when this did not occur, doctors often felt a sense of isolation in their decision making which was driven by a heightened awareness of the potential serious consequences for the patient. Doctors also spoke of decisions when the response of the patient's family members also caused divergent affective responses. While feedback from family members could be cooperative and served to reaffirm

confidence in the decisions they made, when there was disagreement in proposed management, the sense of conflict resulted in doubt of judgement.

7.4.1.2.3 Theme 3: Professional ethos: Decisions and behaviour which reflect the standards and values associated with being a doctor. This incorporates expectations of self and others.

Table 7.8 Interview extracts reflective of the source Professional ethos

"But I felt like I was in control and doing things right and doing anything that should be done. And I think… I didn't think I was not doing the right thing at any point, I always thought, not to be like big-headed, but I was, I was pleased with how I was going and I thought well, it doesn't matter who else is going to come in because it can't be done any better than what we're doing at the moment."
"…but the rest of the team I think give me their respect. They would look to me to…erm, and I think they would respect my decision as well."
" 'Oh that one's mine.' ((laughs)). Yeah that's mine. Cos that's what I'm trained to do. I'm an emergency medicine doctor."
"…there's a mixture of sort of emotions with these sort of things. I'm always one for taking charge. I like to lead the team and obviously, you know, from the point of view of getting the team, discussing with the team, 'What should we do? Let's… but I think we should…'"
"… I suppose, consciously or subconsciously, I'm not sure but I think I accept that part of the role of being a doctor is, is handling other people's… is kind of shouldering the anxiety for other people to a certain extent."
"*And you think you've got a dying patient in front of you, and you've been doing this for twenty years at least, can you not have a bit of a think?"*
"Erm, so we spoke to the [specialty] unit, and they, erm, unfortunately had no beds, and they didn't seem seem particularly keen to offer much in the way of advice, of they weren't taking the patient, which we found really unhelpful. Erm, and caused a lot of furrowing of brows…"

Table 7.8: Continued

"…as far as actually making the decision goes…it, it, it would, it would in these situations be nice if other specialties didn't wash their hands of the situation." *"Erm, I did feel a bit uneasy about, err, was I copping out by, erm, getting him to see his GP?"*

Decisions and behaviour that reflected or challenged the standards and values that the doctors associated with their profession evoked affective reactions in over two thirds of the decision points. Many doctors described how they felt as being "in control" when making decisions or performing clinical tasks, and a similar feeling was extended to their approach to managing clinical teams. The sense of ownership and responsibility that they saw as integral to their professional role exposed them to harrowing and emotionally burdensome situations. There was also a strong sense that unhelpful attitudes or actions which conveyed a reluctance to share responsibility for patient care made decision making more difficult and elicited negative feelings both at an individual and team level.

7.4.1.2.4 Theme 4: Clinical environment: Physical and sensory components in the clinical setting

Table 7.9 Interview extracts reflective of the source Clinical environment

"I can see the room. I can see the monitors telling me what I didn't know. What I didn't want to know." *"…and quite different to…we went from the stretcher room, when everything was relatively sort of low key, because I was worried, but nobody else was. We went to CT, got the CT and we came back into resus and then it was like the cat was out of the bag…"*

Table 7.9: continued

"But the process I found really frustrating and difficult, err, because I had to make decisions that, erm on a hunch really. And erm, and I felt I was forced into making those decisions because we don't have [type] service here."
"And I remember thinking, 'Is there any reason why we shouldn't do that?' You know, we're not taking him for an operation, that it makes sense, it's, you know, it's ending up at the places of safety, you know, that place where you've got adequate equipment and adequate levels of monitoring and trained staff."

Affective reactions to aspects of the clinical environment featured in many of the decisions. The sight and sounds of monitors and ventilators were prominent in incidents with negative outcomes or when the outcome was uncertain. Specific clinical areas were linked with the feelings experienced during the diagnostic process and treatment decisions. Limitations to services and resources available also produced feelings of frustration.

7.4.1.2.5 Theme 5: Risk and uncertainty: A situation or action with a possible bad or unknown outcome

Table 7.10 Interview extracts reflective of the source Risk and uncertainty

"The worse the situation gets, the calmer and slower I am."
"…when he first came in, he looked grey, he looked sweaty, he looked shocking. What's going on? And there's that kind of stress of that, of that diagnostic conundrum…"
"…I think you always feel a bit nervous, erm, cos I'm sure I was nervous. Erm, I think just knowing that, he could deteriorate at any second, and that naturally produces in you, kind of, a bit of anxiety and a sense that you need to be on your guard…"

Table 7.10: Continued

"It's just because I had the knowledge of what could go wrong, so you know, I wanted to be… not that that in itself is anxiety creating, except to a certain extent, or if it's not, maybe anxiety's not quite the right word, but I felt alert to potential risks."

Over half of the decisions elicited an affective reaction when judgements had to be made about how to manage the patient in the face of diagnostic uncertainty or risky procedures. Doctors either felt "anxiety" or "nervous", or felt "calm".

7.4.1.2.6 Theme 6: Narrowing of focus: A task or feature that causes one to channel attention and effort

Table 7.11 Interview extracts reflective of the source Narrowing of focus

"…just looking at her and thinking, 'Gosh, she's pale,' and then asking somebody, you know, 'What's the matter with the lady in [room]?' I presume I spoke to the nurse and then and then thinking, 'Right, I'd better…' You know, 'I'd better go and see her and just see what's happening.' And then sort of fairly rapidly realising that I was right, that my gut feeling having glanced through the door, was right."
"… and I'm thinking, err, cos of the commotion, moving the bed trolley out to go and pick up the patient. Yeah, and then everybody else rushing in for the other emergencies, yeah. I kind of sat there and I thought, and I looked round and I thought, 'Who's gonna take this guy?' He's just bleeding everywhere. No one's picking up on this information, cos it's being delivered in a different fashion. Yeah, this information is being delivered in a different fashion from the information that's usually being delivered."
"Very focused as well and you're sort or very, erm, focused about what it is that, that we need to do. Err, very, you know, heart rate's going up. I was very conscious at the time, the fact that we need to get this done quickly."

Table 7.11: Continued

"When you've got something to do, or at work then it's, it's pretty. Erm… I don't really feel that much, I don't think, because you've got something to do and you've got a task and you're concentrating on what you wanna do. It's when, when you've stopped…."
"Err, because in the midst of these things on a busy day you don't really have time to sit and think about all these things. You just are going, based on your clinical decision making, err, like what is right? What is the best way to deal with a patient? Patient care, it's like more mechanical, you know…"

Some decisions involved a specific feature which directed the doctor's focus. Here, doctors spoke of a physical aspect of the patient's presentation, an unusual sequence of events in the clinical environment, or an awareness of a time critical situation which elicited an affective reaction, which caused them to channel their attention and effort into a particular case. In contrast, some doctors described how during periods when they were immersed and engaged in clinical tasks, the cognitive and automated state they were in meant that they did not experience feelings.

7.4.1.2.7 Theme 7: Getting an answer : The pursuit of a diagnosis or clear treatment strategy

Table 7.12 Interview extracts reflective of the source Getting an answer

"It's not I'm not someone who can just walk away and think, 'Well I've done this and this, which is what I have to do and it's not sorted, but I've done what I should do. So job done. I can leave that till tomorrow.' I knew that I hadn't got the answer. Erm, so it irked me, for erm, well until I'd got the answer basically."
"… I had a good idea of what was going on, erm, so I think I felt fairly relaxed and, and fairly, err, and you know, I felt, I felt in control of the situation, I guess."

Table 7.12: Continued

"Erm, I think you always feel satisfied and in control if you feel you know what's happened to the patient. So I felt that, erm, the diagnosis that I'd come to was probably the right diagnosis and that I'd considered alternative diagnoses as well. So I didn't feel that I'd be letting him down by just following that route."

For a smaller number of decisions, doctors spoke of the feelings that were evoked during the pursuit of a diagnosis or treatment plan. When the diagnosis or treatment plan was unclear, emotions were aroused and they felt uneasy and restless. In contrast, once the diagnosis or treatment plan was known, emotions seemed less intense and they spoke of feeling, "in control".

7.4.1.2.8 Theme 8: Organizational or statutory drivers: Organizational guidelines and consequences that control clinical decisions and behaviour

Table 7.13 Interview extracts reflective of the source Organizational or statutory drivers

"So there was a degree of frustration there that we were losing a nurse really because of a, of a policy, erm, rather than for a particular clinical reason…"
"…but it's, it's difficult. I mean there's only the staff and there's lots of patients to see and you're looking at your watch and you're thinking, 'I've over ran here,' but then you know, this is not… these are not figures, these are not numbers, these are real people with real issues…."
"Erm, well unfortunately some… err, in every decision that we make, there's always that kind of thought about, erm, could you defend this decision in court, I suppose there's… well in court's a bit, but could you defend it if someone… if he was to go home and erm, unfortunately was to die…"

Table 7.13: Continued

"Erm, I felt like I'd not missed anything out from the normal, erm, procedures that you're meant to follow, so I didn't feel that if anything went wrong… so defensively I felt comfortable if anything went wrong."

Organisational guidelines and policies infringed on decision making and behaviour in some decision points. Those factors that were external to the clinical case resulted in doctors feeling frustrated and contributed to the feeling of being stressed. The threat of litigation also featured in their decisions. Here, the feeling of being "comfortable" was achieved through meticulous consideration of the clinical information and choices that were available to them.

7.4.2 Types of affect

7.4.2.1 Frequency of themes for types of affect

The frequency of the type of affect that featured in the 31 decisions is shown in Table 7.14. As illustrated, Anticipatory affect featured in all 31 decisions and Affective climate and Affective

Table 7.14 Frequency of type of affect across all decision points

Type	Total
Anticipatory affect	31
Affective climate	23
Affective empathy	21
Anticipated affect	16
Reflective mood	13

empathy were endorsed in over two thirds of the decisions. Anticipated affect and Reflective mood had lower frequencies but still featured in more than a third of all decisions.

7.4.2.2 Themes – Types of affect

7.4.2.2.1 Theme 1: Anticipatory affect: Immediate emotional reaction to stimuli

Table 7.15 Interview extracts reflective of Anticipatory affect

"…I felt pretty calm, I felt in control…"
"Erm, quite, erm, well quite, quite comfortable with it really."
"Assertive."
" …but then also a little bit of anger, erm, to the [patient] that was lying in the bed next door to us."
"…but just a sort of a sense of almost anxiety, like butterflies in your tummy, yeah, yeah."
"Err, stressed, and worried. Which is slightly different from stressed in a way. Erm, no I was very worried about him."
"…I think when you first, when this gentleman first came in, he, err, looked, err, he looked like he was about to die. Erm, so that was fairly, it's that's, that's probably one of the most stressful situations…"

All decisions elicited an immediate affective response. In most cases there were affective reactions to an aspect of the patient presentation (e.g. physical appearance or symptoms), and in general this tended to initially arouse negative emotions such as "anxiety" and "stress". However, doctors also described instantaneous feelings towards a number of sources in each decision, and these evoked both positive and negative anticipatory affect.

7.4.2.2.2 Theme 2: Affective climate: An assessment and processing of tone in the social environment

Table 7.16 Interview extracts reflective of Affective climate

"…because it's obviously a shocking experience for anybody to come into, err, A&E resus, isn't it? So suddenly you'll be exposed to so many things which you don't even think of in your normal day, right? So suddenly all these monitorings and ventilators and all this kind of stuff."
"A visual auditory information comes in to say, this is not a situation where it would be, you want to walk away from it, they're, they're struggling here. And you can just tell. There's just an auditory difference to the department when it's…there's too much going on and you're not quite in control to when it's in control. You just know. More of an intuition that I'm not gonna walk away from this…"
"And I suppose we spend a lot of our time as A&E [doctors] with our ears flapping, trying to, cos you can't see every patient, but you're desperately trying to work out ((laughs)) who you should be seeing, what's going on in all these different rooms, and trying to just pick up…"
"...usually if you have a colleague there, you would usually tend to be in agreement, so then it becomes just another pair of hands to help, but it was in some ways harder to have someone else there when their opinion didn't necessarily chime with mine."
"…these kind of decisions are, are collaborative decisions, and, and I think that's a, erm, an important concept in emergency medicine, and it's one of the things that very often bails us out is that, erm, I wasn't the only person in the room. There was, you know, a couple of other nurses, there's other doctors around as well. And, erm, whilst it's another field, it's a, it's a single person job, it's… that's not the atmosphere here "
"So I guess I must have known that things were going the right route because everyone was… well there was no conflict between us so that's probably an important thing. So, all of us there, all the doctors and the nurses were all in agreement, so none of us were disagreeing as to what should happen next, so that makes you relaxed and feel in control."

In over two thirds of the decisions, doctors appeared to assess the affective tone in the social environment in which they carried out their clinical decisions and tasks. The way the patient's family were responding to the clinical situation and setting, noise, movement and interaction within departments, and the interpersonal communication that took place between colleagues, all provided doctors with information relating to whether the climate felt harmonious or discordant, cooperative or antagonistic.

7.4.2.2.3 Theme 3: Affective empathy: The consideration of someone else's feelings

7.4.2.2.3.1 Sub-theme 1: Empathy for others: A concern for and desire to reduce another's distress

Table 7.17 Interview extracts reflective of Empathy for others

"The initial decision was, erm, err, you can't see somebody rocking backwards and forwards, clearly in agony from something that you know is incredibly painful."
"So it's sort of you're, erm, basically, erm, I mean when you stop treatment of something you are actually taking the support of this [child] away, isn't it?"
"…it was the similarities in age with the patient, cos it was only a few years ago I was in that state, and you know things were so different for me."
"I felt so sorry for the family."
"…I hope that I gave my registrar more support than my consultant gave me."
"…but a big part of it was not wishing to expose a a newly qualified doctor to what could be a horrendous, potentially horrendous experience."

In a number of decisions, doctors' concern for how others were feeling or might feel featured in their choices. This prompted action with regard to how they managed patients and interacted

with the patient's family. It also impacted decisions regarding roles and responsibilities of members of the clinical team in treatment plans.

7.4.2.2.3.2 Sub-theme 2: Self-empathy: A consideration of one's own feelings of distress

Table 7.18 Interview extracts reflective of Self-empathy

"Erm, if I if I'd got the call wrong, there was a significant chance she could die in the ambulance and there was no way, I thought, that should be on the conscience of a…of a baby doctor, so in the end I took her myself."
"…I suppose when I'm making these decisions I am thinking, if I don't get this right this person could die, and then there would be, you know the burden of, of guilt and, erm, and the consequences to that person and their loved ones, and my own bereavement, you know, having met them and them, them dying…"

There were examples when decisions which considered someone else's distress also reduced the doctors own negative feelings. This seemed to occur when the doctor felt solely responsible for making a decision in which the outcome could mean that the patient lived or died.

7.4.2.2.4 Theme 4: Anticipated affect: Judgements and behaviours driven by an individual's consideration of how their current decisions or actions may make them feel in the future.

Table 7.19 Interview extracts reflective of Anticipated affect

"…I was apprehensive that the patient would wake up and say, 'It was absolutely dreadful when my hands went numb and I couldn't breathe…"
"…he could have died here, and it would have been delayed. Erm, and I would, because I care about my patients, I would have felt dreadful."

Table 7.19: continued

"Yeah, I mean I keep, I keep thinking of what if, I think a lot of doctors do. I mean I was saying to myself, 'What if I let him go home?'"
"…I think we're, we're always, or at least I'm always, a little bit reticent about making contact because, you know, you want to ask a valid question and you don't want to ask a stupid question. Erm, and so I guess whenever, before I phone… make a phone call like that I'm, I'm always thinking, 'Is this something that's valid, you know? Is this a reasonable thing to, to ask?'"
"No I didn't. No, no, cos there's no point. You don't know what's gonna happen."
"No, I don't think so. There were too many unknowns at that stage, you know. I didn't know what was going to happen to him. I didn't know how the next few hours were going to go, so I wasn't, I wasn't really thinking about how I was gonna feel. I was thinking about what I was going to do, but I didn't think about how I was gonna feel."

In approximately half of the decisions, doctors considered how their choices would make them feel in the future. All anticipated affect was negative and tended to be in relation to how they would feel if their decision led to a negative outcome for the patient. At least two doctors experienced negative anticipated affect when considering speaking to a clinical colleague about a patient. When asked directly about whether they had considered their own future feelings when making the decision, in only 4 decisions did doctors describe anticipated affect. In the majority of the other decisions, doctors stated they had not and in a few cases they explained that this was due to the uncertainty of the outcome.

7.4.2.2.5 Theme 5: Reflective mood : Emotional states that occur when considering decisions that *have* been made

Table 7.20 Interview extracts reflective of Reflective mood

"Err, but, err, when you have some time to yourself, like my time for myself is when I'm driving home… like I have a good half an hour, forty minutes, or maybe an hour, so things you did during the day will be coming back to you. Err, if you did something good, extremely good, you'll be very happy that day. If you're going home full of joy, err, and contentment, err, you'd think that, err, 'Oh you've done all the right things and you've saved lives,' that sort of feeling. But, err, sometimes you could as well, like on a bad day, you could think, 'What else could I have probably done to get a better outcome?'"
"…But I found, I found that very, I found him a very, err, memorable patient, you know and, yes, sort of you do a lot of soul searching afterwards and talk to colleagues…"
"You always reflect upon these situations. Erm, and, erm, you think, what, what might we have done differently? So I think everybody reflects upon them, err, when you are in a critical situation. I mean you know them, so you, err… I think that's why in a way quite often, erm, the emergency cases, you, you, you get more experience because you remember them and you remember how things went and how you were feeling. You think about how you reflect on it and what you might have done differently, and erm, and then you put that into practice, in another, in another event."

A number of doctors described how the decision remained in their thoughts after their role in the patient's care had ceased. This most often involved the use of decisional "what ifs?" which resulted in negative mood and tended to occur when there had been a bad outcome or when there had been some conflict with a colleague or team.

7.4.3 Discrete emotions

7.4.3.1 Frequency of discrete emotions

The frequency of the type of discrete emotions that doctors recalled they had felt in the 31 decision points is shown in Table 7.21. As illustrated, the positive feelings of "calm/relaxed/comfortable" and the negative feelings of "anxiety/nervous/uneasy" had the most endorsements and both featured in 7 of the decisions. The negative feeling of being

"stressed/pressured" featured in 5 decisions. While there were a number of other discrete emotions, these were only endorsed in 1 decision. The list of all discrete emotions is provided in appendix J. In general, doctors tended to experience more negative emotions than positive emotions when making diagnostic and case management decisions in emergency care.

Table 7.21 Frequency of discrete emotions across decisions in response to the question: Can you recall exactly how you were feeling at this point?

Emotion	Total
calm/relaxed/comfortable	7
anxiety/nervous/uneasy	7
stressed/pressured	5
in control	3
satisfied/contentment	3
anger/cross/irritation	3
worried/concern	2
fatigued/exhausted	2
sad	2
letting down	2

7.4.4 Did affect play a role in decision making?

The frequency of response from doctors across 31 decisions when asked the question, "Did these emotions affect the decisions you made?" is displayed in Table 7.22. As illustrated, while affect was not felt to have influenced decisions in 17 of the 31 decisions, in 13 decisions, doctors felt that affect had or may have had an influence on their judgements.

Table 7.22 Response across 31 decisions to the question: Did these emotions affect the decision you made?

Response	Total
Yes	8
May have	5
No	17

Note: Due to time constraints one decision was not interrogated using this question

Table 7.23 Interview extracts where it was considered affect did influence decision making when asked: Did these emotions affect the decision you made?

"Erm, err, yes I expect it did, because I suspect that five years ago I probably wouldn't have felt that calm and I might have run around looking for someone else to do that patient, knowing that they were a critical patient." (calm)
"I think they helped me make a better decision, because when I think of bad decisions I've made, they've usually been when I've been distracted, busy…" (calm and slow)
"Yeah, I mean I think, erm, I think I was able to erm, discharge my duties properly because, erm, I felt in a safe environment with the support of, erm, the nursing colleague who I had with me…" (comfortable)
"Yes, I think, I think I'm not that much assertive and I needed to be assertive at that point…" (assertive)
"…there probably were emotions involved, because if I had done it completely, err, like a machine then I would have just said right, 'Well the policy is this, you should be admitted…' Erm, and, and I think maybe because I had a bit of rapport with him, because I felt empathy for his viewpoint, erm, and because I thought the risks were, were low, erm, I didn't really, kind of, press that. Erm, and I think I certainly felt some part of that decision was to do with, the, the kind of how I was feeling, in terms of how I related to him and how I felt about his decision, rather than just about the cold facts." (rapport with patient)
"I think that only, the only emotion that affected my decision was fear of having, err, a lot of conflict with this person in [dept]" (fear, stressed, and worried)
"It kind of prompted me to do something active, to make sure the patient was getting helped." (upset and letting down patient's family)
"Even the clear cut decision I'm used to making was compromised at every step, taking a lot of time, I was feeling worn out, I wasn't making clean decisions that I would normally make. They were here and there. I was just… I wasn't dedicating myself to the situation or to my decisions. So I think emotions were just kind of infringing on my decision making to be honest." (pressured)

In the 8 decisions where affect was considered to have influenced decision making, positive affect such as feeling "calm", "comfortable" and "assertive" was generally considered to have improved judgement by facilitating a focused approach to the decisions and actions that were required. The only exception to this was that one doctor considered that the empathy they felt for the patient and their wishes, which was elicited because of the rapport they had with the patient, contributed to them deviating from admission policy. In contrast, negative affect such as feeling "stressed" and "pressured" or "fear" was regarded as being a barrier to clear and timely decision making. However, if the doctor felt that they were "letting down" the patient or their family, this often was associated with prompting them to actively seek the information they needed to make a diagnosis or decide on the most appropriate treatment plan.

Table 7.24 Interview extracts where it was considered affect may have influenced decision making when asked: Did these emotions affect the decision you made?

"No, I don't think so. I think it just made me think about things very carefully." (anxious)
"Err, well only in the sense that, you know, I was very anxious about making… well not very anxious, but I didn't, I didn't want to make the…I wanted to make what I thought was the best decision and I was trying to decide what the best decision was." (concern)
"Erm, maybe. It's difficult to answer that. Erm, I try not to get too emotional at work. It can have a positive effect on what you're doing. So erm, yeah, especially if they're strong emotions, they might push you into doing something or speaking to people that you wouldn't normally go and talk to." (irritation and anger)
"You know sometimes, that maybe yes, maybe that held me back, because I was quite calm in my mind that I'd thought of all the options and I knew the proc… and we're gonna do this, this, or if not, we're gonna do that. And maybe if I'd thought there was another thing we could do, I wouldn't have been." (calm)

Where it was considered that affect may have influenced decision making, "anxiety" and "concern" were perceived to have led to more careful judgements. One doctor felt that "anger"

directed and motivated action, while another discussed how experiencing a sense of being "calm" might have prevented them from considering all the possible management options.

Table 7.25 Interview extracts where it was considered affect did not influence decision making when asked: Did these emotions affect the decision you made?

"Err, I don't remember them being involved at all in the decision. Erm, but presumably when you're in control of a situation then you're able to weigh things up and be objective. Whereas, possibly if you're not in control, and feel like you're floundering, or there's other external pressures on you then, you might start making decisions which, erm, become subjective, so they're just how you feel at the time due to the stuff around you." (calm and in control)
"No, no, no. It's a…it's a pretty…it sounds a bit clinical really, but it is a clinical decision. It's just, you know, emotions don't come in. In fact you don't really feel those emotions until after and you start… because generally, and it's probably the right thing really, is you don't really hear the full story about why it happened until after it's all happened…" (anger and sadness)
"No. Not at all, no. Erm, no. You know there is… no. It's kind of decision that I, that I make routinely, routinely every day. Erm, and it's something that I'm not sure we're taught how to do, but it's certainly it's a feature I think of ED doctors to make those kind of decisions fairly rapidly and to sort of try to sort of balance, balance quite a lot of balls and multi-task a bit." (stressed)
"I don't think they were strong enough to make me. They're there and I'm aware that they exist, but they're not overpowering emotions…not to make you cry, make you growl, make you shout, sort of emotions…" (anger, cross, and sadness)
"I don't think so. I mean I wasn't…I mean I don't think I was… I wasn't overly anxious or, you know, sometimes nervousness can cause you to ((inaudible)) it quite a lot, and I kind of, give you a bit of you know, you get a bit paralyzed in decision making, but I don't feel I got to that stage at least at any point." (nervous)

Table 7.25: Continued.

"Err, so I started to say that but then I decided that because I was aware of the emotions and, I therefore decided, actually, no, let's… you know, this isn't such a life and death decision that it has to be made today, it can, it can wait." (uneasy)

In general, the decisions where doctors believed that affect had not influenced decision making usually involved negative emotions. When doctors explained why they felt that affect had not influenced decision making, they tended to assert that clinical decision making was a rational and objective process that involved weighing up clinical facts and choices, or that the emotions that were elicited were not powerful enough to impact judgement. One doctor discussed how an awareness of the potential impact of their feelings on their interaction with a patient actually caused them to reassess and change the advice they gave.

7.5 Discussion

The aim of study 5 was to identify the emotional features of diagnostic and case management decision making in emergency care through doctors' own accounts of decision making strategies used in real-life clinical incidents. It also attempted to identify the discrete emotions which were important in emergency care decision making and assessed to what extent doctors' perceived that emotional factors influenced the decisions they made.

7.5.1 What were the sources of affect that featured in emergency care decision making?

The 8 sources of affect that featured in diagnostic and case management decision making reflected the emotionally-charged nature of emergency care. Sources ranged from physical and circumstantial details of the case presentations to tangible and psycho-social aspects of the clinical setting. The affective values of the sources were generated through the reactions and

interactions of doctors while working with others within their immediate clinical environments and the broader organisation. This demonstrates the influence of social factors in clinical decision making and further supports the need to understand the role of social-based emotion in decision making as well as the role of individual emotion-based responses (Van Kleef *et al.*, 2012).

7.5.2 What types of affect featured in emergency care decision making?

The 5 types of affect that emerged from the analysis suggested that the types of affect in diagnostic and case management decisions were complex and involved the generation and processing of feelings at both an individual and social level. While individual types of affect concerned visceral feedback about one's own affective reactions and states, social types of affect concerned visceral feedback that informed the doctor about the affective tone of the clinical situation or someone else's affective reaction or state.

Affective valence and arousal experienced at an individual level included anticipatory affect, and to a lesser extent, anticipated affect. While incidental mood was not a type of affect that featured when the interview data was analysed, a number of doctors did discuss a reflective mood which took place after the incident. This occurred when doctors were considering the decisions that had been made. They described how this affective state was related to positive or negative feelings that were generally dependent on the patient outcome or an aspect of team work. The use of counterfactuals, in which the doctors imagined how different decisions may have produced different outcomes, was regarded as being a natural part of an experiential process and pivotal to learning for future practice. This supports the view that counterfactual thinking plays an important role in the improvement of performance and behaviour (Baumeister *et al.*, 2007b; Epstude & Roese, 2008).

Affective valence and arousal at a social level included 2 main types of affect. Affective climate reflected doctors' recollection of a processing of affective information from another person, the clinical team, or the environment, that often signified to them whether the clinical situation was calm and controlled or tense and uncontrolled. Doctors used this type of affective processing to gather information to determine what action was required or whether judgements seemed appropriate or needed re-appraising. This supports work which suggests that emotional climate is an affective phenomenon which influences behaviour in clinical settings (Nurok *et al*., 2011).

Affective empathy reflected doctors' consideration of patients' or colleagues' distress when making decisions. However, while most literature on empathy in doctors has tended to focus on its role in doctor-patient relationship interaction and outcomes (Bellini *et al*, 2002; Neumann, *et al*., 2011), this study demonstrated that empathy for colleagues also influenced judgement. Therefore, research should also focus on the role that empathy between members of a clinical team has on decision making and case management. Some accounts of empathy also included decisions where the desire to reduce someone else's distress was linked to the reduction of their own negative feelings with regard to their responsibility for the outcome. This is an interesting finding which may be explained by the empathy-altruism hypothesis (Bateson, 1991, 1994). This suggests that empathy may be motivated by a desire to reduce someone else's distress (e.g. altruism) or the desire to reduce your own distress (e.g. egoism). These social types of affect provide further support for the Emotions as Social Information Model (EASI: Van Kleef, 2009; Van Kleef *et al*, 2010) and provides evidence that others' emotions are taken into consideration when making judgements.

7.5.3 What discrete emotions featured in emergency care decision making?

When doctors were directly asked if they could recall how they were feeling at the decision point, both positive and negative emotions featured. The most frequently reported positive and

negative emotions represented opposite affective states and often reflected the stage of the presentation that the decision was made, the experience and knowledge of the doctor, or their interaction with colleagues. Doctors often discussed feeling "calm", "relaxed" or "comfortable" when they had a diagnosis or clear treatment plan, or conveyed a sense of confidence in their own ability or in the ability and support of other clinical colleagues. In contrast, doctors stated that they felt, "anxiety", "nervous", or "uneasy" when they were unsure of the diagnosis, had not established a clear treatment strategy, were highly aware of the possibility of a bad outcome, or were in conflict with a colleague or another clinical specialty. This corroborates the findings from studies 2-4 which suggest that nervous may be an important emotion in a clinical context.

In general, negative emotions were recalled slightly more often than positive emotions. This may have been due to the nature of the case presentations in emergency care. However, it is arguable that emotions such as anxiety, stressed, anger and worried may produce stronger visceral feelings than the positive emotions, calm, in control and satisfied. Therefore, the negative emotionality experienced during the incident may have been more readily reactivated when recalling the feelings that were experienced during decision making, and may be explained by the "vividness effect" (Nisbett & Ross, 1980).

This suggests that emergency care doctors experience high arousal of negative emotions during diagnostic and case management decisions. As chronic levels of negative emotions such as stress have been related to burnout in doctors (Shirom, Nirel, & Vinikur, 2006), it is important that interventions are developed to lessen the impact of sources of negative affect that are neither purposeful or conducive to optimal diagnostic and case management decision making. Anxiety or a sense of uneasiness may be an appropriate and natural initial response to not knowing the diagnosis, not having a clear treatment plan, or being aware of potential risks and therefore may not be readily amenable to change. However, anxiety and uneasiness that stems from conflict between colleagues and specialties elicit unnecessary negative affect that may be

damaging to doctors and result in hesitant and less assertive decision making. This study provides evidence that conflict between colleagues and specialties features in diagnostic and treatment decisions. This emphasises the importance of devising strategies to help improve relationships by increasing collaboration and the sense of shared responsibility between health professionals when caring for patients.

7.5.4 To what extent were emotional factors perceived to influence decision making in emergency care and what is their role?

Emotional factors were perceived to have influenced, or possibly influenced decision making in 13 of the 31 decisions. In general, positive emotions (e.g. calm, comfortable and relaxed) and in some cases, negative emotions (e.g. nervous, anxiety and uneasy) were believed to have helped the doctor to focus on specific details of the patient presentation or on clinical tasks and led to more considered decision making. These emotions came from a variety of sources and often involved anticipatory affect or the processing of affective climate. This suggests that doctors' feelings played a role in the features and actions that were deemed salient, and indicates that doctors were using affect as an attentional spotlight (Loewenstein *et al*., 2001; Peters *et al*., 2006). Interview data also showed how some doctors considered negative anticipated affect or affective empathy during case management and treatment decisions. They also spoke of how reflective mood was used as learning to guide and improve future decisions. This suggests that doctors use their current feelings, consideration of how they would feel, or the recollection of feelings from incidents that remained vivid in their memory, to guide their choices and supports the role of affect as information (Schwarz & Clore, 1983).

These findings also reflect contrasting research findings where positive affect (Isen *et al*., 1991) and negative affect (Avramova & Stapel, 2008) have both been found to be conducive to optimal decision making. However, these discrepant findings might be explained by the propensity to base findings on valence rather than discrete emotions. It may be that it is specific

emotions rather than valence that produce processes that assist or hinder decision making (Lerner & Keltner, 2000). The importance of disentangling the specific contribution that discrete emotions have on decision making is further supported in this study. While the negative emotions of anger and upset were considered to prompt action in seeking help for the patient, fear resulted in hesitation or avoidance to seek the help and advice from colleagues. This finding supports the idea that affect motivates choice-based behaviour (Lerner & Keltner, 2000, 2001).

In 17 of the 31 decisions, doctors perceived that emotions had not influenced decision making. In a number of cases this seemed to reflect a view that diagnostic and case management decision making were purely rational acts in which emotion did not feature. In others' decisions it seemed to support the notion that the intensity of the affect was not felt to have been sufficiently high to exert an influence on choice and behaviour. Interestingly, in terms of anticipated affect, the response by some doctors that the uncertainty of the outcome meant that they did not consider their future feelings, provides support for the disjunction effect which suggests that uncertainty blunts both the thoughts concerning outcomes and any emotions related to this (Tversky & Shafir, 1992).

The accounts of decisions in which doctors answered that they did not think that emotion influenced their decisions, were mostly in reference to negative emotions. This may indicate an assumption that negative emotions are associated with bad decisions and outcomes and merits further investigation. The fact that the decisions when doctors did not believe affect influenced their judgements when explicitly asked, often did include examples of affect-based judgements in their account, may reflect a reluctance to acknowledge a role for affect in clinical decision making. It may also be due to the fact that the influence of affect is not always a conscious process and therefore doctors were not always able to reflect on the role of affect in the decisions they made.

7.5.5 Limitations

There are a number of limitations to this study. While the decisions that are described in this research are based on real-life incidents, the fact that they rely on memory may mean that the facts recalled may be inaccurate. As CDM incorporates a methodical and meticulous scrutiny of incidents and decision points, this may have assisted in eliciting reliable and comprehensive accounts. Similarly, it may be that accounts that were recalled were incidents that were exceptional because they evoked powerful emotions in the doctors, and therefore their emotionality made these incidents salient (Nisbett & Ross, 1980). This may mean that the incidents did not reflect the typical emotions that are experienced on a day-to-day basis. Furthermore, the memory of powerful emotions may have caused doctors to forget the more subtle feelings they also experienced before, during or after the decision. It is also important to acknowledge that when doctors recalled decision points they spoke about both the specific decision and also sometimes discussed their general feelings and emotional implications for their own overall clinical practice. As more general statements were part of a longer dialogue about specific decision points and were provided when doctors were asked to discuss a particular decision, these statements were included in the extracts if they were considered to be authentic reflections which added clarity and resonance in understanding the role of emotion in diagnostic and case management. Therefore some of the extracts included relate to reflections on their more general decision making strategies than the specific decision points discussed in the interview.

Other biases may have occurred due to the method and analytic strategy. The participants may have felt social desirability pressures which may have been reflected in their responses to questions. Furthermore, the finding that incidental affect did not feature as a type of affect may have been due to the fact that doctors were not directly questioned about how they felt *before* becoming involved in the incident. The aim of this research was to identify sources and types of affect in diagnostic and case management decisions. However, in order to control the

possibility of subjective inferences, the strategy of only coding segments of transcripts that made explicit reference to emotion and feelings will have omitted the cognitive processes involved in the decisions doctors made and may have resulted in a biased representation. It is also important to note that due to the fact that a deductive strategy generally informed the themes for types of affect, the coding of text indicated two further types of affect (affective climate and affective empathy). The analysis is therefore still in the early stages and these two types of affect still need to undergo a process of clustering codes and validation with co-authors before any further dissemination of the findings.

Finally, the REC condition of the inclusion of a disclosure policy may have had implications for the study. Confidentiality and anonymity are important issues for participants in qualitative research (Murphy *et al.*, 1998). It is possible that as the study invitation letters and information sheet alerted doctors to the disclosure policy, this may have dissuaded some doctors from participating. Similarly, due to this, doctors who did participate may have felt unable to openly discuss any errors or negative outcomes that occurred due to the decisions and this may have led to restricted or incomplete accounts.

CHAPTER 8

THESIS SUMMARY

8.1 Introduction

The key objective of this research was to identify some of the affective influences in the diagnostic decision making process and to explore the role that affect played in diagnostic judgement. This chapter presents a summary of the main contributions of the findings to the thesis aims and considers the general limitations of the research. It concludes with a discussion of the implications and recommendations for clinical practice and future research.

8.2 Summary of findings

This section discusses how the key findings from the research inform each of the thesis aims.

8.2.1 Aim 1: To bring together two literatures to explain the potential role of affect in diagnostic decision making

The review of literature from both within and outside healthcare provided an overview of the current understanding of the role of affect in diagnostic decision making and highlighted the gaps in knowledge. In particular it illustrated how knowledge could be derived from research outside healthcare, and that dual process models of decision making would be helpful in understanding the role of affect in diagnostic decision making. It also suggested that the identification of the sources and types of affect in diagnostic decision making would assist in understanding the processing of affective factors and how affect influences outcomes. It also informed the research plan for the thesis. In particular, it suggested that there was a need to: develop and test methods for conducting research to examine the role of emotion in diagnostic decision making; to understand and explain the main sources and types of affect that influence

diagnostic decision making and the interplay between them; to identify the discrete emotions (e.g. anger, happiness etc.) that feature in diagnostic decision making and consider their role; to examine the relationships between affect and perceptions of team factors that are critical for effective clinical decision making; to explore to what extent healthcare professionals are able to reflect on the role of affect in the decisions they make.

8.2.2 Aim 2: To develop and test methods for conducting research to examine the role of affect in diagnostic decision making

This research has highlighted the difficulties of examining diagnostic decision making. Decision making which accomplishes an accurate diagnosis which leads to the most appropriate management has been difficult to assess as this would have required complex studies which examined all stages of diagnostic decision making, from information gathering, to information integration and information implementation. In particular, the methodological issues that emerged during study 2 (see section 5.1) suggested that a focus on accuracy as an outcome (e.g. whether the facts or diagnosis are correct) in the study was problematic. This was due to the static nature of the decision making task which did not enable participants to progress beyond the information gathering stage and therefore did not reflect that real decision making is dependent on feedback from all diagnostic stages.

The design of study 3 was more successful in capturing the dynamic nature of diagnostic decision making by focusing on specific processes involved in the initial stage of information gathering and identifying where deviations in processes occurred. Likewise, study 4 used simulation to examine what type of affect was perceived to be associated with team communication behaviour which is an important skill for the sharing of diagnostic and case management information. These studies demonstrated that in trying to explain how and why affect has played a part in clinical processes, and the possible implications for diagnosis (e.g. delayed/missed diagnosis), a focus on the specific processes that are critical to a particular

diagnostic stage, may be more informative than a more static approach with an emphasis on diagnostic accuracy.

The active involvement in, or recollection of clinical scenarios were useful ways to elicit affect and identify the affective factors involved in diagnostic decision making. However, while clinical scenarios formed the basis of all the research studies, they were either asking doctors or nurses and allied health professions to respond to written or simulated scenarios, or the recollection of incidents from memory. Due to this, it is possible that the emotional responses that were elicited or recalled were not an accurate reflection of those experienced during real-time diagnostic decision making. Incorporating observational or diary methods into diagnostic decision making research may help to overcome this in future research.

Findings across all studies suggested that there may be important specific emotions in clinical practice. While there are reliable and validated measures of emotion (Thompson, 2007; Watson & Clarke, 1994), these may not be sensitive to the particular emotions that are critical in diagnostic decision making. As the importance of understanding the role of discrete emotions in decision making is supported (Lerner & Keltner, 2000; Van Kleef *et al*., 2012), and this research demonstrated the need to use brief measures in research with healthcare professionals, there is now a need to develop shorter and more accurate measures of emotions for future research examining affective factors which are specific to healthcare professionals in a clinical setting. These are discussed further in section 8.2.4.

Finally, this research demonstrated how a mixed methods approach was vital to understanding and explaining the complex affective features involved in diagnostic decision making. Dual process models of decision making (Epstein, 1994; Loewenstein *et al*., 2001) were fundamental to the theoretical framework of this thesis, and have already been applied to diagnostic reasoning to help construct theoretical accounts of the role of affect in the diagnostic process

(Croskerry, 2009a, 2009b; Elstein, 1999, 2009; Elstein & Schwarz, 2002; Norman, 2009). The review presented in chapter 2, and the research presented in chapters 4 to 7, demonstrate that existing dual process models are currently too general and account for the impact of any affective state from a range of sources. Due to this they fail to capture the specific sources and types of affect that play a role in diagnostic decision making and the distinct interplay between them. While it may be tempting to test causal models of decision making, it is important to acknowledge that most of the current decision making knowledge is from studies outside of healthcare. A more worthwhile, relevant and cost-effective approach may be to draw upon and learn from further qualitative studies which have the unique capability of setting and understanding diagnostic decision making within the context in which it takes place. The knowledge obtained can then be used to develop more specific and informed models and hypotheses which can be tested using quantitative methods (Barbour, 2000, Morse, 2007).

8.2.3 Aim 3: What are the main sources and types of affect that influence diagnostic decision making and what is the interplay between them?

The findings across the studies in this thesis revealed that the sources and types of affect involved in diagnostic decision making may be more complex than first thought and involved the generation and processing of feelings at both an individual and social level (Van Kleef, 2009). While anticipatory and anticipated types of affect appear to be supported, the role of incidental mood was not apparent, and may be due to the lack of sensitivity in the measures used. Instead, a role for a more reflective mood that was directly related to decision making emerged, as well as the social types of emotion of affective climate and affective empathy. While affect emanated from many complex physical and psycho-social sources, team factors emerged as an extremely important source of affect and highlighted the need to acknowledge and understand the affective reactions to team factors (Annett *et al*., 2000; Annett and Stanton, 2000). However, team sources appeared to be part of the feelings that were generated from interpersonal factors, which further highlights the multifarious and complicated nature of affect.

To some extent, the findings on the influence of affect on decision making from outside healthcare were replicated in an applied, real-life healthcare setting. Sources of affect elicited affective responses which then appeared to exert their influence on diagnostic and case management decision making. For example, in study 3 when choosing actions to obtain a diagnosis, more doctors in the negative affect conditions than doctors in the positive affect conditions chose to examine the patient first, while more doctors in the positive affect conditions than doctors in the negative affect conditions chose to order tests first. This suggested that doctors in a more negative affective state were basing diagnostic decisions on a more systematic and detailed gathering of clinical information. These findings support the need to distinguish affect and emotion (Baumeister *et al*., 2007a) in diagnostic decision making.

Affect also appeared to facilitate a rational assessment of relevant and non-relevant information (Peters *et al*., 2006; Slovic *et al*., 2005) by acting as a spotlight (Loewenstein *et al*., 2001; Peters *et al*., 2006), as information (Schwarz & Clore, 1983) and as a motivator (Lerner & Keltner, 2000, 2001) for diagnostic and case management decision making and behaviour. For example, in study 5, doctors discussed how feeling "calm" or "anxious" led them to focus on a particular patient feature or to be particularly attentive to an aspect of the task they were carrying out. They described how considering how a clinical situation might make a colleague feel, or how they might feel in the future, informed choices about treatment and management decisions. Doctors also explained how feeling "angry" or "upset" prompted them to seek further advice in order to diagnose or treat the patient. However, affect also evoked less desirable feelings which appeared to be involved in less optimal judgement-based action. This further supports the idea that dependent on other factors such as context, situation, and experience, affect may impact clinical decision making in both positive and negative ways (Croskerry *et al*., 2010; Croskerry & Tait, 2013).

8.2.4 Aim 4: What are the discrete emotions that feature in diagnostic decision making and what is their role?

The importance of gaining knowledge about the role of discrete emotions in decision making (Lerner & Keltner, 2000; Van Kleef, 2009; Van Kleef *et al*., 2010) was evident in this research. Three studies (studies 2 to 4) found that the positive emotions, alert, determined, attentive and the negative emotion of nervous were more highly aroused in comparison to other emotions in response to written or simulated clinical scenarios. While the experimental and correlational approaches suggested that these emotions may play a central role when health professionals are responding to emergency care incidents, they were unable to elucidate what the role of these emotions might be. However, findings from study 5 indicated that feeling nervous was a response to uncertainty, risk and conflict and prompted doctors to be more careful and focused during decision making and clinical tasks. Furthermore, feeling, calm, relaxed or comfortable was associated with certainty, confidence, and feeling supported, Interestingly, alert, determined and attentive were not referred to as feeling states during interviews with doctors, and merits further investigation.

In studies 2 and 3, the relationship between confidence and speed of decision making appeared to be moderated by clinical experience which supports previous research (Croskerry, 2009a; Woolley & Kostopoulou, 2013). Specific emotions were also found to motivate behaviour during the diagnostic process. In study 3, it was found that doctors who chose to examine an angry and abusive patient first when choosing information gathering options, also had higher levels of hostility, and in study 5, anger and upset were perceived to encourage behaviours such as actively seeking help or advice from colleague. This suggests that anger and hostility prompted approach behaviours (Lerner & Keltner, 2000, 2001). Conversely, fear prompted avoidance behaviour (Lerner & Keltner, 2000, 2001) which manifested itself in hesitation to seek help and advice from colleagues. The feeling of fear in medical students appeared to be associated with the notion of interaction with a senior clinical colleague and the feeling of being

afraid was higher for nurses in comparison to doctors during simulated scenarios. This suggests that fear is an emotion that may be experienced by junior health care professionals or nurses or allied health professions during team tasks. As this may impact communication (Kish-Gephart., *et al.*, 2009) it is important that future research examines the causes and effects of fear in clinical teams.

Finally, the intensity of feeling seemed to influence decision making. In study 5, there was evidence that for some doctors anticipated affect did not play a role due to the "disjunction effect" (Tversky & Shafir, 1992), which causes individuals to have a blunted consideration of what might happen and a dulling of any related emotional response, due to the uncertainty of the outcome. In study 4, doctors and nurses or allied health professions were found to experience different levels of intensity for specific emotions during simulated scenarios. As the level of arousal of emotions such as anger has been implicated in risk taking (Pezza Leith & Baumeister, 1996), further studies should examine whether there are consistent differences in the emotional arousal of anger in different health professions during teamwork and establish the causes.

8.2.5 Aim 5: What are the relationships between affect and perceptions of team factors that are critical for effective clinical decision making?

A sense that there was cooperation and low individual negative feeling was related to perceptions of high engagement in communication behaviour and team effectiveness in simulated scenarios. The pivotal role that perceived cooperation played in team communication was corroborated in the accounts of many doctors in study 5. Many doctors placed great importance on working with supportive colleagues and recalled that this was crucial for gaining feedback and reassurance for diagnosis and case management decisions, as well as the building of trust in the undertaking of clinical roles and responsibilities. In contrast, when doctors felt there was conflict between colleagues, this was perceived to be unhelpful to delivering safe and optimal care for the patient and resulted in negative emotions that on some occasions caused

hesitant behaviour. These findings support literature which suggests that cooperation is important for the fostering of effective team communication and behaviour and implies that social, as well as individual affect influences perceptions of team communication and performance (Van Doorn *et al.*, 2012; Van Kleef, 2009).

8.2.6 Aim 6: To what extent are healthcare professionals able to reflect on the role of affect in the decisions they make?

The accounts of reflective mood and the explanations that doctors provided about how affect had influenced decision making in study 5, suggest that some doctors do reflect on the role of affect in diagnostic decision making *after* clinical incidents. However, the level to which they associate clinical decisions with affective responses *during* clinical practice could not be established and was much more difficult to gauge. More decisions were perceived to have not been influenced by affect than those that were, and there was some evidence that this was due to the traditional perception that clinical decision making is a wholly rational process (Croskerry *et al.*, 2008, 2010; Pani & Chariker, 2004; Parker & Lawton, 2003). Doctors also appeared more reluctant to acknowledge that the negative emotions that they felt had an impact on their decisions and may have been due to the belief that negative emotions were related to less optimal clinical outcomes.

8.3 Limitations

The limitations of each study have already been highlighted in the discussion sections of Chapters 5-7. However, there were also general limitations that applied to this research. Recruitment for studies 1 to 3 was lower than anticipated despite utilising a number of recruitment methods. This may have been due to the inconvenience of having to access a laptop or computer to complete the questionnaire, or that the completion of the diagnostic tasks and measures of affect were perceived to be lengthy and burdensome. Alternatively, it may be that

the focus on non-rational aspects of clinical decision making may not have been perceived to be meaningful patient safety research and led to some difficulty in engaging healthcare professionals (Leistikow, 2011). While many parametric techniques are able to tolerate issues such as non-normal distribution, low sample sizes are more likely to produce skewed distribution of scores which should be considered when appraising the results.

The research in this thesis was driven by the belief that in order to explore diagnostic decision making, studies must be conducted with doctors and health care professionals that recreate the real-life clinical scenarios in which they make judgements. However, the applied nature of this research produced several challenges. The time constraints of health professionals meant that measures had to be as brief as possible. While the need for brevity and minimal burden for participants is a pre-requisite in many research studies, this resulted in the use of less extensive and possibly less sensitive measures of emotion, such as the I-PANAS-SF (Thompson, 2007). Research with healthcare professionals often requires participation to take place on their site of work. This meant that a more complex examination of the level of affective arousal using physiological measures of the autonomic nervous system (ANS: e.g. heart rate) or galvanic skin response (GSR) was not practical or feasible in this research. Access to sophisticated research resources such as simulation centres are extremely difficult to negotiate within the financial and time constraints of postgraduate research. The use of simulation in study 4 would not have been possible without the valuable input and support of health professionals and medical education staff. This took over a year to negotiate and plan and was only possible if it could be conducted using pre-developed simulated scenarios and caused minimal disruption to the simulation course and its participants. Therefore, the design and measures in the study were subject to these constraints.

The ethical considerations of research conducted in healthcare are a crucial component of good research practice and ensuring the welfare of participants (Murphy *et al.*, 1998; Pope & Mays,

2006). While Research Ethics Committees and Trust R&D departments recognised the importance of this area of research and were supportive of its undertaking, the time required to obtain research and study amendment approvals was a serious barrier within the time constraints of the research period. This meant that boosting participant recruitment through the inclusion of other Acute NHS Trusts was not a feasible option.

8.4 Implications and recommendations

8.4.1 Clinical practice and patient safety

There are a number of recommendations for clinical practice. System innovations, such as the introduction of decision making tools to improve diagnosis (Ramnarayan *et al*., 2006) suggest that a systems approach to reducing any affect-based factors that may be implicated in diagnostic error may produce effective strategies (Graber *et al*., 2002; Newman-Toker & Pronovost, 2009). However, there is also an acknowledgement that while such approaches may assist and support the diagnostic process, unique patient presentations and evolving clinical contexts mean that health professionals, will to some extent, always have to make decisions using their own reasoning strategies.

If the unconscious, fast and effortless nature of system 1 is implicated in error, then hypothetically, errors can be overcome through educational and de-biasing strategies (Croskerry, 2002, 2003; Graber, 2009). This assumes that in all clinical situations, rapid, affect-based decision making is inferior to slower, cognitive based reasoning and would involve developing strategies which would train system 2 to override system 1. As it is currently not known whether system 2 processing always produces better diagnostic decision making, further testing is required before moving forward with this idea.

As this research suggests that emergency care doctors work in an emotionally-charged environment and that affect can provide information which may both hinder and assist diagnostic judgement, it is suggested that doctors should adopt "mindfulness" strategies during practice (Croskerry, 2013). A diagnostic decision making checklist that includes items which prompt doctors to consider their feelings when making key judgements about a case presentation should be developed. This would facilitate the consideration and management of non-rational information that may be hindering or delaying judgement and action, or may alert doctors to the need to pursue a gut instinct and to gather further diagnostic information.

Similarly, affect-based items should also be added to and trialled in the current checklists used by clinical teams (Haynes *et al*., 2009). The addition of items which foster the open discussion of feelings about clinical cases, treatment strategies, and roles and responsibilities, before, during and after emergency admissions, surgical procedures, or at handover, may prompt individuals to share potentially vital clinical information. It may also encourage members of the team to be more open about how confident they feel in undertaking clinical tasks and responsibilities which may lead to improved support, an increased sense of team cooperation, and safer patient care.

Clinicians could also engage in reflective practice (Bradley, 2005; Epstein, 1999; Mamede *et al*., 2007) in order to learn how affect influences diagnostic decision making at both an individual and team level. One such strategy would be to use counterfactual thinking (Kahneman & Miller, 1986; Kahneman & Tversky, 1982). Reflective practice could incorporate both upwards and downwards counterfactual thinking (Markman, Gavanski, Sherman, & McMullen, 1993). The discussion of upwards counterfactual thinking (e.g. If I/we had made that decision, the outcome would have been better) and downwards counterfactual thinking (e.g. If I/we had made that decision, the outcome would have been worse) could be used to compare instances of negative and positive clinical outcomes and would enable

individuals and teams to identify key decisions and any individual or social affect that was associated with the decision. This may help individuals and teams to develop their own tools of affective indicators, and would also encourage a positive practice approach to diagnosis and case management.

Both of the strategies above should also be utilised in undergraduate and postgraduate medical education programmes that use simulated clinical scenarios. These strategies, combined with affective cues and carefully designed decision points, would enable teams of healthcare students and multi-professional health care teams to participate in, and then review, whether and how affect influenced team communication and discuss the implications for diagnostic and case management decision making. This would encourage inter-professional life-long learning about the role of affect in clinical team performance.

8.4.2 Future research

This research suggests that there is a need for current dual process models of diagnostic decision making to incorporate both individual and social types of affect. These models should be used to further understand the interplay between individual and social affective processes and to determine their role in individual and team-based diagnostic judgements and behaviour. There is also a need to further examine the roles of experience and confidence as moderators of the relationship between affect and diagnostic decision making.

The sources and types of affect that were identified in this research must now be corroborated through further interview studies with doctors who make emergency care decisions in other acute care settings. The use of grounded theory (Glaser & Strauss, 1967) in the analysis of future interviews may facilitate further assessment and refinement of the themes that have emerged from this research. If these findings are transferable, further work should look to

mapping sources onto types of affect and determining which combinations hinder or facilitate diagnostic reasoning.

There is also a need to further assess whether there are specific emotions which are important in diagnostic decision making and to determine their role. This knowledge should be gained about all key health professionals who engage in diagnostic judgement and behaviour in clinical teams and should also be extended to other important clinical care processes (e.g. deteriorating patients, palliative care etc.). This would assist in the development of refined measures of emotion which could then be utilised in further research examining the role of emotion in clinical decision making and performance.

8.5 Conclusion

While many healthcare professionals may intuitively accept the potential for affect to impact their diagnostic performance, Crandall and Wears (2008) suggest, "To be effective, feedback must give physicians information that illuminates contingent relationships and causal consequences" (p. S32). The research presented in this thesis provides empirical evidence that affective factors influence the diagnostic and case management trajectories of individual doctors and healthcare teams. The findings in this research may help to inform health professionals of the complex psychological processes involved in the non-rational influences of diagnostic decision making and may go some way to helping shift the scepticism in the notion that decision making is anything other than a judgement based purely on a rational consideration of the options. This work may contribute to a wider acceptance that affect has direct implications for diagnostic performance and the progress in knowledge may assist in improving the diagnostic decision making of healthcare professionals across a range of clinical contexts.

Recent reports on patient safety (Berwick *et al*., 2013; Francis *et al*., 2013) have emphasised the pivotal role that professionalism, responsibility and a culture of "openness" plays in the provision of optimal care. With this comes a moral obligation to acknowledge and foster discussion about, and incorporate into clinical practice, new evidence of factors that may hinder or facilitate safe patient care. This should include the role of affect in diagnostic decision making.

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Appendix A

Study 1, 2 and 3 - Case Presentations

Instruction for medical students:

When reading the case presentation, please imagine that you are an F1 doctor who will have to make decisions about the diagnosis and management of this patient.

Instructions for doctors:

Please read the following case presentation and answer the questions that follow. When reading the case presentation please imagine that you are the attending doctor.

Positive affect versions

Case 1

At 12.30am a 36 year old woman is brought by taxi to the assessment unit of the emergency department after collapsing earlier while at home. The woman and the two friends who had brought her appear shocked and worried. They all smell of alcohol, and they tell you that they were having a quiet night in, watching a film with a couple of bottles of wine.

Initial observations show that her temperature is 37.2°C, BP is 140/90, pulse is 108bpm, regular. The patient is very cooperative while you take her medical history, and is worried that she might be wasting your time and could just go home. She tells you that she has had some abdominal pain for a few days, but thinks this is because she is having her period. She says that just before collapsing, she felt a really bad pain in her stomach and when she came round she felt dizzy and thinks she was sick, but now feels better and maybe should just go home and sleep it off.

She tells you that she is single, unemployed and lives with her mum and 5 year-old son. She says that she has not had a sexual relationship recently. When you ask her whether she uses

recreational drugs, she says she does not. She allows you to examine her, and is talkative and pleasant, and asks whether there is anything else you need to know.
On checking hospital records you see that she has been in A&E 3 times this year with similar symptoms.

Case 2

On your first day on the surgical ward, you are called to see a 55 year old female inpatient, 2 days following hemicolectomy, as she is complaining of sudden onset moderate tight central chest pain. She says that the pain doesn't go anywhere else. She had some post operative nausea and vomiting, and you notice that urine output has been low. She has not opened her bowels since the operation. Epidural analgesia is in place.

She is a moderate smoker, controlled hypertensive on treatment (which has not been given post op) no history of myocardial infarction nor angina. On examination she is sitting in bed in obvious pain and is pale and sweaty. There is no oxygen in place, no cyanosis and she is apyrexial. Her BP is 200/105, her heart rate is 96 bpm and regular. Chest auscultation is clear and heart sounds are normal.

You are not sure what to do and on the advice of one of the surgical ward nurses, you page the surgeon who had performed the hemicolectomy. She immediately rings the ward and begins by telling you to stay calm and that you have done the right thing to consult a senior doctor. She expresses concern and asks you to present all of the patient's symptoms. She listens carefully, and when you have finished she says that it does not appear to be a surgical matter, but that you have acted in the best interests of your patient, and that she is impressed that you showed initiative and consulted a senior doctor. She advises you that you should page the on-call anaesthetist, and suggests it would be appropriate to do so as a matter of urgency.

Whilst talking to the consultant anaesthetist he tells you that it could be that her pain is not being managed sufficiently, but that until he gets there in about an hour, he cannot be absolutely sure. He instructs you to try and manage her symptoms until he arrives.

Case 3

A 65 year old male, retired plumber, is found semi-conscious by his daughter at home. An ambulance is called and he arrives in A&E. His daughter provides most of the history as he is too breathless to talk. She tells you that he is a life-long heavy smoker, normally quite active and independent. She thinks he has been unwell for a week with fever, aching all over, complaining of a tight chest and occasionally coughing up blood. There is no history of chest pains, heart attacks or diabetes but a long history of high blood pressure. She mentions that he returned from a holiday in Tenerife about 4 weeks ago. There is uncertainty regarding current medications, but they seem to include Salbutamol, Beclomethasone inhalers, Ramipril, Aspirin and a statin. He has no allergies. The man reminds you of a previous patient who had a very similar presentation, and who later had greatly improved and was discharged the following day. The physical examination reveals further similarities.

On brief examination you find no evidence of anaemia, temperature is 37.8C, and he is very thin, approximately 45 kg. His pulse rate appears fast and irregular and his BP is 100/45. You observe that the patient is drowsy, rousable to speech, and speaking in single words. He is peripherally cyanosed and his respiratory rate is 30 shallow with the use of accessory muscles. His chest is barrel shaped.

Negative affect versions

Case 1

At 12.30am a 36 year old woman is brought by taxi to the assessment unit of the emergency department after collapsing earlier while inside a nightclub. The woman and the two friends who had brought her are loud, obnoxious and slurring their words. They all smell heavily of alcohol boasting, 'They've had a right good night'.

Initial observations show that her temperature is 37.2°C, BP is 140/90, pulse is 108bpm, regular. The patient is uncooperative while you try to take her medical history complaining that she is 'sick of waiting around this dump' and wants to go back out. She tells you that she has had some abdominal pain for a few days, but thinks this is because she is having her period. She says that just before collapsing, she felt a really bad pain in her stomach and when she came round she felt dizzy and thinks she was sick, but now feels better and demands to go home to sleep it off.

She tells you that she is single, unemployed and lives with her mum and 5 year-old son. She says that she has not had a sexual relationship recently. When you ask her whether she uses recreational drugs, she laughs raucously and shouts 'No!'. She will not allow you to examine her, and becomes rude and abusive, telling you to leave her alone and to '**** off!'

On checking hospital records you see that she has been in A&E 3 times this year with similar symptoms.

Case 2

On your first day on the surgical ward, you are called to see a 55 year old female inpatient, 2 days following hemicolectomy, as she is complaining of sudden onset moderate tight central

chest pain. She says that the pain doesn't go anywhere else. She had some post operative nausea and vomiting, and you notice that urine output has been low. She has not opened her bowels since the operation. Epidural analgesia is in place.

She is a moderate smoker, controlled hypertensive on treatment (which has not been given post op) no history of myocardial infarction nor angina. On examination she is sitting in bed in obvious pain and is pale and sweaty. There is no oxygen in place, no cyanosis and she is apyrexial. Her BP is 200/105, her heart rate is 96 bpm and regular. Chest auscultation is clear and heart sounds are normal.

You are not sure what to do and on the advice of one of the surgical ward nurses, you page the surgeon who had performed the hemicolectomy. She immediately rings the ward and begins by telling you that this isn't the most convenient time as she is in the middle of very complex surgery. She is impatient and abrupt and asks you to present the patient's symptoms quickly. She interrupts you before you have finished, and insists that it is quite obviously not a surgical matter. She tells you that she is not at all impressed and that instead of wasting everyone's time and putting both her and your patient at risk, you should have had much more sense and paged the on-call anaesthetist, which she suggests you do as a matter of urgency.

Whilst talking to the consultant anaesthetist he tells you that it could be that her pain is not being managed sufficiently, but that until he gets there in about an hour, he cannot be absolutely sure. He instructs you to try and manage her symptoms until he arrives.

Case 3

A 65 year old male, retired plumber, is found semi-conscious by his daughter at home. An ambulance is called and he arrives in A&E. His daughter provides most of the history as he is too breathless to talk. She tells you that he is a life-long heavy smoker, normally quite active

and independent. She thinks he has been unwell for a week with fever, aching all over, complaining of a tight chest and occasionally coughing up blood. There is no history of chest pains, heart attacks or diabetes but a long history of high blood pressure. She mentions that he returned from a holiday in Tenerife about 4 weeks ago. There is uncertainty regarding current medications, but they seem to include Salbutamol, Beclomethasone inhalers, Ramipril, Aspirin and a statin. He has no allergies. The man reminds you of a previous patient who had a very similar presentation, and who later had rapidly deteriorated and died the following day. The physical examination reveals further similarities.

On brief examination you find no evidence of anaemia, temperature is 37.8C, and he is very thin, approximately 45 kg. His pulse rate appears fast and irregular and his BP is 100/45. You observe that the patient is drowsy, rousable to speech, and speaking in single words. He is peripherally cyanosed and his respiratory rate is 30 shallow with the use of accessory muscles. His chest is barrel shaped.

Neutral affect versions

Case 1

At 12.30am a 36 year old woman is brought by taxi to the assessment unit of the emergency department after collapsing earlier. The woman has been brought by two friends. They all smell of alcohol.

Initial observations show that her temperature is 37.2°C, BP is 140/90, pulse is 108bpm, regular. You take the patient's medical history. She tells you that she has had some abdominal pain for a few days, but thinks this is because she is having her period. She says that just before collapsing, she felt a really bad pain in her stomach and when she came round she felt dizzy and thinks she was sick, but now feels better.

She tells you that she is single, unemployed and lives with her mum and 5 year-old son. She says that she has not had a sexual relationship recently and doesn't use recreational drugs. You begin to examine her.

On checking hospital records you see that she has been in A&E 3 times this year with similar symptoms.

Case 2

On your first day on the surgical ward, you are called to see a 55 year old female inpatient, 2 days following hemicolectomy, as she is complaining of sudden onset moderate tight central chest pain. She says that the pain doesn't go anywhere else. She had some post operative nausea and vomiting, and you notice that urine output has been low. She has not opened her bowels since the operation. Epidural analgesia is in place.

She is a moderate smoker, controlled hypertensive on treatment (which has not been given post op) no history of myocardial infarction nor angina. On examination she is sitting in bed in obvious pain and is pale and sweaty. There is no oxygen in place, no cyanosis and she is apyrexial. Her BP is 200/105, her heart rate is 96 bpm and regular. Chest auscultation is clear and heart sounds are normal.

Whilst talking to the consultant anaesthetist he tells you that it could be that her pain is not being managed sufficiently, but that until he gets there in about an hour, he cannot be absolutely sure. He instructs you to try and manage her symptoms until he arrives.

Case 3

A 65 year old male, retired plumber is found semi-conscious by his daughter at home. An ambulance is called and he arrives in A&E. His daughter provides most of the history as he is too breathless to talk. She tells you that he is a life-long heavy smoker, normally quite active and independent. She thinks he has been unwell for a week with fever, aching all over, complaining of a tight chest and occasionally coughing up blood. There is no history of chest pains, heart attacks or diabetes but a long history of high blood pressure. She mentions that he returned from a holiday in Tenerife about 4 weeks ago. There is uncertainty regarding current medications, but they seem to include Salbutamol, Beclomethasone inhalers, Ramipril, Aspirin and a statin. He has no allergies. The man reminds you of a previous patient who had a very similar presentation. The physical examination reveals further similarities.

On brief examination you find no evidence of anaemia, temperature is 37.8C, and he is very thin, approximately 45 kg. His pulse rate appears fast and irregular and his BP is 100/45. You observe that the patient is drowsy, rousable to speech, and speaking in single words. He is peripherally cyanosed and his respiratory rate is 30 shallow with the use of accessory muscles. His chest is barrel shaped.

Appendix B

Study 2 - Expert Panel Important facts

Case presentation 1

Facts	Consultant 1	Consultant 2	Consultant 3	Consultant 3 Additional Information
1	Female	Acute abdominal pain	Abdominal pain for a few days Has been in A&E 3 times this year with similar symptoms.	Likely abdominal pathology. Fact that it has happened several times makes things like appendicitis or ectopic pregnancy unlikely. Ongoing gynae problem like endometriosis or ovarian cysts are possible. As would be intestinal pathology like irritable bowel syndrome
2	Acute abdominal pain (presenting history)	Fast pulse and history of collapse – raises concern of serious pathology	Just before collapsing, she felt a really bad pain in her stomach	This needs to be taken seriously. If she really did 'collapse' and lose consciousness we need to find a definitive diagnosis
3	Chronic problem (been to A&E 3 times)	Age and sex – rules out certain pathologies	Not had a sexual relationship recently	If we believe her then pregnancy related causes can be ruled out. Could still have pelvic infection (ie STD) as has clearly been sexually active in past
4	Age – 36 years old	Previous chronic symptoms Menstruation No sexual relationship - Reduces likelihood of some diagnoses	37.2°C	On high side of normal. Not definite acute infection but worth bearing in mind
5	Pulse rate – 108 tachycardic No sexual relationship Menstruating		BP is 140/90, pulse is 108bpm	Not acutely shocked but has got tachycardia. If it doesn't settle would point to degree of shock which would raise urgency of treatment and investigation

Case presentation 2

Facts	Consultant 1	Consultant 2	Consultant 3	Consultant 3 Additional Information
1	2 days post op	Chest pain	Sudden onset moderate tight central chest pain	Cardiac until proved otherwise
2	Chest pain	Pale & sweaty – raises concern of serious pathology	pale and sweaty	Suggests cardiac or shock (but BP raised, not low)
3	Epidural in place	Post-op – helps likelihood of differentials, but chest pain still most important factor to trigger differentials	urine output has been low	Suggests poor perfusion. Either dehydration, poor cardiac output or renal dysfunction
4	BP raised	Epidural – makes you think of other differentials	moderate smoker, controlled hypertensive	Risk factors for cardiac disease
5	Known hypertensive Age – 55 years	Age High BP (on background of high BP)	Epidural analgesia is in place	May mask abdominal signs and symptoms i.e. may have abdominal pain but can't feel it

Case presentation 3

Facts	Consultant 1	Consultant 2	Consultant 3	Consultant 3 Additional Information
1	smoker	Symptoms & signs (fever, SOB, cough, high resp rate, high pulse) – makes you consider chest infection as top differential but not just chest infection – these are the 'hard facts' whereas others below just help formulate likelihood of differentials	Breathless	This narrows it down to either a respiratory problem or shock. (circulatory failure)
2	Signs of chronic COPD (e.g. use of inhalers)	Recent travel	Fever	This makes it highly likely to be an infective cause
3	Age – 65 years	COPD Age Smoker Weight	Tight chest and occasionally coughing up blood	This points to a respiratory source for the infection
4	Signs of acute chest infection (e.g. coughing up blood, chest tightness, breathlessness, peripherally cyanosed, shallow respiratory rate, chest barrel shaped)		Pulse rate appears fast and irregular and his BP is 100/45	This indicates the degree of severity
5	Weight Recently travelled		Life-long heavy smoker Very thin, approximately 45 kg	Suggests a possible malignancy as an underlying cause

Appendix C

Study 2 – Word unit criteria

1. Words separated by a hyphen or forward slash counted individually

   e.g. post-op = 2 words

2. Numbers = 1 word

3. Abbreviations for medical terms and tests etc. counted as one word

   e.g. CT, IV, FBC, A&E = 1 word

4. Two words that have been added together separated and counted as 2 individual words

Appendix D

Study 3 - Recruitment advert

DOCTORS REQUIRED FOR DECISION MAKING STUDY

COGNITION AND FEELINGS: DO THEY IMPACT DIAGNOSIS IN EMERGENCY CARE?

(Phase 2)

I am a PhD student at the Institute of Psychological Sciences, University of Leeds. I am looking to recruit doctors across all grades and specialties who work in an acute care setting to take part in research examining how doctors' thoughts and feelings influence the clinical decisions they make for diagnosis in emergency care. The study is completed online and requires you to complete a questionnaire in response to **one** clinical scenario. This should take approximately **10** minutes to complete.

If you think that you may be interested in taking part in this research and would like more information, or to access the online questionnaire, please click on the link http://www.psyc.leeds.ac.uk/q/clinicaldecisionmaking2

This research is sponsored by the University of Leeds, and has received ethical approval from **Bradford and University of Leeds Research Ethics Committee (Ref: 10/H1302/65).**

Thank you very much for your interest in this study.

Jane Heyhoe

psc4jeh@leeds.ac.uk

Appendix E

Study 3 - Participant Information Sheet

PARTICIPANT INFORMATION SHEET

RESEARCH TITLE

Cognition and feelings: do they impact diagnosis in emergency care? (Phase 2)

Researcher: Jane Heyhoe

I would like to invite you to take part in a research study. Before you decide, you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Talk to others about the study if you wish.

Part 1 explains the purpose of this study and what will happen to you if you take part. Part 2 provides you with more detailed information about the conduct of the study. This sheet will hopefully provide you with enough information about the study to allow you to make an informed decision about participation. However, if there is anything that is not clear or if you would like more information, please let me know.

PART 1

What is the purpose of the study?

I am a postgraduate research student at the Institute of Psychological Sciences at the University of Leeds conducting research in order to satisfy the requirements of a PhD.

Research suggests that judgement and decision-making in situations involving risk and uncertainty may be influenced by a number of cognitive factors. I am therefore interested in investigating how the way doctors think and feel impacts their clinical decision-making.

Why am I being invited to take part?

You are being invited to take part in this study as I am looking to recruit doctors across all grades and specialties who work in an acute NHS Trust setting. Your colleague may have also discussed this research with you and identified you as someone who may be interested in taking part in this study. All doctors in your hospital will have the opportunity to take part.

Do I have to take part?

Whether or not you take part is entirely your decision. The study will be described to you in this information sheet and in answering any questions that you may have. If you decide to participate, you will be asked to complete an online consent form before you begin the study, to show that you have agreed to take part. You may however, withdraw your consent and participation at any time without giving a reason by contacting Jane Heyhoe using the details below. You will need to provide your anonymous participant code to enable the correct questionnaire responses to be withdrawn from the study.

What will I have to do if I take part?

Participation will involve you reading **one** clinical scenario, and responding to a number of questions before and after the scenario. The questionnaire concerns the clinical decisions that you make in response to clinical scenarios. Participation in the study will take place entirely online. It is estimated that the study will take approximately **10** minutes to complete. This online study can be accessed and completed at a time and place that is convenient to you. However, the study must be completed in one session. It cannot be paused and saved to return to at a later time.

You will be asked to generate your own anonymous participant code. No-one should be able to identify you from this code. You are only being asked to generate this to enable you to withdraw from the study should you wish to at a later date. This code will enable the correct questionnaire responses to be removed from the study should you decide to withdraw. It will not be matched to any data for the purpose of analysis.

Once the study has been completed, an online summary of the study findings will be made available to you. The summary of the study results will include general feedback of the questionnaire responses given by participants and those provided by an expert panel. If you would like to be notified of how to access a summary of the study results, once they are available, you will be asked to provide an email address after you have completed the study. Again, your email address will not be matched to any data for the purpose of analysis. However, it is completely up to you whether or not you choose to provide an email address. If you decide not to provide an email address, this does not prevent you from participating in the study.

Please note that all information collected about you for this research will be kept strictly confidential. If you participate in the study you will be asked to indicate that you have understood what is involved in this study by answering questions on the study consent form. These answers, and your completion of the study questionnaire, will indicate that you are happy to make an informed decision about participation in this research.

What are the possible disadvantages and risks of taking part?

You will have to give up some of your time to take part in this study and you may feel upset or stressed by the nature of the scenario. The scenario has been made as realistic as possible, and as a result, it is possible that you may feel embarrassed or offended by the sensitive nature of some of the language used in the scenario.

What are the possible benefits of taking part?

I cannot promise that this study will help you, but the information from studies such as this may assist in improving diagnostic performance across a range of healthcare professionals and clinical contexts.

The summary of the study results will include general feedback of the questionnaire responses given by other participants as well as those provided by an expert panel. This will incorporate a valuable educative component.

What if there is a problem?

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed. The detailed information on this is given in Part 2.

Will my taking part in the study be kept confidential?

Yes. Strict ethical and legal guidelines will be followed at all times and any information about you will be handled in confidence. The details are included in Part 2.

This completes Part 1.

If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making any decision.

PART 2

What will happen if I do not want to carry on with the study?

If you withdraw from the study any information collected from you will be destroyed and will not be used in any way in the research.

What if there is a problem?

Complaints

If you have a concern about any aspect of this study, you should ask to speak to the researcher who will do their best to answer your questions. The contact telephone number is **0113 3439195**. If you remain unhappy and wish to complain formally, you can do this through the University of Leeds Research Complaints Procedure.

Harm

In the event that something does go wrong and you are harmed during the research and this is due to someone's negligence, then you have grounds for a legal action for compensation against the University of Leeds, but you may have to pay legal costs.

Will my taking part in this study be kept confidential?

This research uses ethical guidelines set out by the British Psychological Society. These guidelines include rules of conduct such as obtaining your informed consent before research starts, notifying you of your right to withdraw at any point during the study, and the protection of your confidentiality and anonymity. The procedures used for handling, processing, storage and destruction of any information you supply conform to the principles of the Data Protection Act 1998.

The information gathered from you will only be used in a report of this research which may include presentations at academic conferences and articles in academic journals. Some of the information collected for the study may be looked at by authorised persons at the University of Leeds in order to check that the study is being carried out correctly. All will have a duty of confidentiality to you as a research participant. However, as your participation is anonymous, no-one should be able to identify you, and at no point will your identity be revealed.

After the study has been completed, all information gathered from this study will be stored

securely at the Institute of Psychological Sciences at the University of Leeds for 5 years. After this time, it will be disposed of securely.

What will happen to the results of the research study?

The results of this research study will appear in a report of this research and in my PhD thesis. The report of the study could be included in presentations at academic conferences and articles in academic journals. It is important for you to note that you will not be identified in any report or publication. Although it will not be possible for me to give you individual feedback, a summary detailing the overall outcome of the study will be made available online.

Who is sponsoring this research?

The University of Leeds is sponsoring this research.

Who has reviewed this study?

All research in the NHS is looked at by an independent group of people called a Research Ethics Committee to protect your safety, rights, wellbeing and dignity. This study has been reviewed and given favourable opinion by Bradford Research Ethics Committee **and University of Leeds Research Ethics Committee (Ref: 10/H1302/65).**

Further information and contact details

For specific information about this research project, please contact Jane Heyhoe:

Telephone: 0113 3439195

Email: psc4jeh@leeds.ac.uk

Advice about whether you should participate in this study:

You could discuss this with your friends or colleagues.

If you feel in distress about any aspect of this study:

You could discuss your concerns with your colleagues. Alternatively, if you feel that you need more support then you could contact the staff counselling service in the Trust.

Thank you very much for taking the time to read this information.

This completes Part 2.

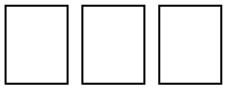
Appendix F

Study 4 - Post simulation questionnaire

Features of Communication and Decision Making in Critical Incidents

POST-SIMULATION QUESTIONNAIRE

Please insert your participant number in the box provided:

UNIQUE PARTICIPANT CODE: 

For each word below, tick the answer which best describes how you felt during the simulation that you have just participated in.

	very slightly or not at all	a little	moderately	quite a bit	extremely
upset	○	○	○	○	○
hostile	○	○	○	○	○
alert	○	○	○	○	○
ashamed	○	○	○	○	○
inspired	○	○	○	○	○
nervous	○	○	○	○	○
determined	○	○	○	○	○
attentive	○	○	○	○	○
afraid	○	○	○	○	○
active	○	○	○	○	○

For each statement please circle the number which best indicates the rating you would give <u>the entire team</u> for their performance during the simulation. If you feel the behaviour or action was not appropriate or necessary, please circle 'NA' (not applicable) where available:

- Did team members seem engaged (e.g. interested, attentive, alert) or disengaged (e.g. bored, inattentive, distracted) throughout the simulation?

  disengaged 1 2 3 4 5 **engaged**

- For what was happening in the case during the simulation, were the team:

  inappropriately tense 1 2 3 4 5 **appropriately tense**

- Was there a tone of collaboration and information sharing in the team which created an atmosphere of safety to speak up?

  not at all 1 2 3 4 5 **very much so** **NA**

- Did the team talk openly about ideas, plans and concerns and discuss important clinical information so that they had a shared understanding of how to manage the case and were clear about what each team member needed to do?

  not at all 1 2 3 4 5 **very much so** **NA**

- Did the team use verbal responses to requests so that team members were confident that requests had been heard correctly and were being acted upon?

  not at all 1 2 3 4 5 **very much so** **NA**

- Did all team members assert their ideas and escalate concerns?

  not at all 1 2 3 4 5 **very much so** **NA**

- Were conflicts within the team appropriately negotiated and resolved?

  not at all 1 2 3 4 5 **very much so** **NA**

For each statement please circle the number which best indicates the rating you would give for <u>your own individual performance</u> during the simulation. If you feel the behaviour or action was not appropriate or necessary, please circle 'NA' (not applicable) where available:

- Were you engaged (e.g. interested, attentive, alert) or disengaged (e.g. bored, inattentive, distracted) throughout the simulation?

  disengaged 1 2 3 4 5 **engaged**

- For what was happening in the case during the simulation, were you:

  inappropriately tense 1 2 3 4 5 **appropriately tense**

- Did you contribute to creating a tone of collaboration and information sharing in the team which created an atmosphere of safety to speak up?

  not at all 1 2 3 4 5 **very much so** **NA**

- Did you talk openly about ideas, plans and concerns and discuss important clinical information so that the team had a shared understanding of how to manage the case and were clear about what each team member needed to do?

  not at all 1 2 3 4 5 **very much so** **NA**

- Did you use verbal responses to requests so that team members were confident that requests had been heard correctly by you and were being acted upon?

  not at all 1 2 3 4 5 **very much so** **NA**

- Did you contribute to all team members being able to assert their ideas and escalate concerns?

  not at all 1 2 3 4 5 **very much so** **NA**

- Did you help to ensure that any conflicts within the team were appropriately negotiated and resolved?

  not at all 1 2 3 4 5 **very much so** **NA**

For each statement please circle the number which best indicates your own thoughts and feelings following your participation in the simulation:

- Did your team's overall performance meet your expectations?

  not at all met 1 2 3 4 5 **completely met**

- Were you satisfied with your experience as a team member?

  not at all satisfied 1 2 3 4 5 **extremely satisfied**

- How do you feel about your experience?

  negative 1 2 3 4 5 **positive**

- Would you be willing to work on a similar team in the future?

  not at all willing 1 2 3 4 5 **extremely willing**

- Was there a co-operative climate in the team during the simulation?

  not at all 1 2 3 4 5 **very much so**

- Was there a competitive climate in the team during the simulation?

  not at all 1 2 3 4 5 **very much so**

- How well do you know any members of the team?

  not at all 1 2 3 4 5 **extremely well**

- How often do you work with any members of the team?

  never 1 2 3 4 5 **all the time**

You have now completed the questionnaire. Please check that you have indicated a response to all questions. Thank you very much for your participation.

Appendix G

Study 5 – Study Invitation letter

Please address correspondence to:

Jane Heyhoe

Institute of Psychological Sciences

University of Leeds

Leeds , LS2 9JT

Telephone: 0113 3439195

Email: psc4jeh@leeds.ac.uk

Dr

Anaesthetics Department

27th May 2011

Dear Dr ,

Re: Invitation to participate in a study: Features of diagnostic decision making in emergency care.

I am a PhD research student at the Institute if Psychological Sciences, University of Leeds. I am writing to invite you to take part in a research study exploring the features of diagnostic decision making in emergency care.

The study aims to explore thought processes and key influences in the diagnostic decisions made by doctors in an emergency care setting through an in-depth interview in which you will be asked to talk about an incident that was challenging and involved diagnostic and case management decisions.

You have been invited to take part in an interview because you are a doctor who has experience of making decisions in emergency care in an acute hospital setting. If you consent to participate in the study, this will involve you being interviewed and completing a questionnaire in order to gain a deeper understanding of the features of diagnostic and case management decision making in emergency care. The interview and completion of the questionnaire will take approximately 1 hour and must be conducted in your free time. If you are a junior doctor you must have completed 3 months in the department before you are eligible to take part in this study.

If you do consent to participation, you are still free to withdraw from the study at any time. Any information you provide in the interview will be kept confidential and the data anonymised.

I enclose a participant information sheet for your information. If you decide that you would like to participate, please contact me using the contact detail above by 18th July, 2011. I will then contact you to arrange a convenient time to conduct the interview. If you have any further questions about this study, please contact me using the contact details above.

Yours sincerely,

Jane Heyhoe

PhD Research Student

Appendix H

Study 5 - Interview Schedule

Features of Diagnostic Decision Making in Emergency Care

INTERVIEW SCHEDULE

Step 1 - Select incident:

Please select an emergency care incident that was challenging and involved diagnostic and case management decisions.

Probe:

If no one case identified, briefly screen a number of possible cases and ask the participant to pick the one deemed most interesting. Those only memorable due to death or an unusual episode will be avoided.

Step 2 - Obtaining unstructured incident account:

Please describe this incident from the time you became aware of the case OR became the attending doctor/anaesthetist to the time when the incident was judged to be under control.

Step 3 - Construct incident timeline:

Using the unstructured account you have provided, I will now repeat the main events which took place so that we can construct an accurate incident timeline of the sequence and duration of the facts of the case.

Step 4 – Decision point identification:

Using the timeline we have constructed, can you now identify specific and key decisions. In particular I would like you to:

a). identify obvious decisions (e.g. verbal cues were used: 'I had to decide whether...')

b). Where there may not be a clear indication that a specific decision was made by you, but:

- you were taking one of a number of possible actions
- you were making a judgement that affected the outcome, but yet there is no clear indication of you actually 'making a decision' at that time point.

and you are able to agree that other reasonable courses of action were possible, or that another doctor (perhaps with less or greater expertise) might have chosen differently.

Step 5 – Decision point probing

For *each* of the decision points identified I would like you to answer the following questions:

1. Cues

What were you seeing at this decision point?

What were you hearing at this decision point?

What were you smelling at this decision point?

2. Knowledge

What information did you use in making this decision, and how was it obtained?

3. Analogues

Did this decision remind you of any previous experience?

4. Goals

What were your specific goals at this decision point?

5. Options

What other courses of action were considered by or available to you at this decision point?

6. Basis

At this decision point, how was this option selected/other options rejected? What rule was being followed?

7. Experience

What specific training, support received (if any), or experience was necessary or helpful in making this decision?

8. Aiding

If the decision at this point was not the best, what training, other support, knowledge, or information could have helped?

9. Time pressure

How much time pressure was involved in making this decision?

10. Situation assessment

Imagine that you were asked to describe the situation to another doctor at handover at this point, how would you summarize the situation?

11. Hypotheticals

If a key feature of the situation had been different, what difference would it have made in your decision?

12. Emotions

a). Can you recall exactly how you were feeling at this point?

b). Were you aware of how you were feeling at the time, and if so, how did you know you were feeling this way?

c). What do you think caused you to have these feelings?

d). Did you think about how you might feel in the future, at this point?

e). Did these emotions affect the decisions you made?

Appendix I

Transformation of codes to themes

Sources of affect

Theme 1 - Knowing yourself

Codes	Codes	Sub-themes	Theme
Own likes and dislikes Treatment Preferences Clinical experience Clinical Knowledge Own response Own interests Own personality Training Own busyness Own behaviour Effect on self Appropriate response Previous life experience Belief system Own thought processes Clinical ability	Clinical experience Clinical knowledge Training Own busyness Clinical ability	Professional competence	Knowing yourself
	Own likes and dislikes Treatment Preferences Own response Own interests Own personality Own behaviour Effect on self Appropriate response Previous life experience Belief system Own thought processes	Intrapersonal Self-awareness	

Theme 2 - Interpersonal factors

Codes	Codes	Sub-themes	Theme
Patient Team Other patients Uncertainty of other's reaction Effect on colleagues Patient's family/friends How regarded by others Effect on patient Isolation Effect on patient's family and friends Circumstance of case Patient's circumstance Effect of treatment	-	Reaction *to* others	Interpersonal factors
		Reaction *of* others	

Theme 3 - Professional ethos

Codes	Codes	Sub-themes	Theme
Professional role Sense of ownership Responsibility Sense of control Approach to management Clinical performance Ethics	-	-	Professional ethos

Theme 4 - Clinical environment

Codes	Codes	Sub-themes	Theme
Noise of monitors Blood Commotion Sound around Movement around Resources Familiarity Availability of equipment Monitor leads Different environment Safety Unusuality Smell	-	-	Clinical environment

Theme 5 - Risk and uncertainty

Codes	Codes	Sub-themes	Theme
Not having an answer Probability of outcome Outcome possibilities Decision to be made Risk of preventable death Uncertainty of outcome Prospect of bad outcome Presentation phase Diagnostic conundrum Complexity	-	-	Risk and uncertainty

Theme 6 - Narrowing of focus

Codes	Codes	Sub-themes	Theme
Time Task Aspect of presentation	-	-	Narrowing of focus

Theme 7 - Getting an answer

Codes	Codes	Sub-themes	Theme
Information Test results Having an answer Decision made Patient records Scans Making diagnosis	-	-	Getting an answer

Theme 8 - Organizational or statutory drivers

Codes	Codes	Sub-themes	Theme
Guidelines Policy Achieving targets Threat of litigation	-	-	Organizational or statutory drivers

Types of affect

Themes 1, 4 and 5 – Anticipatory affect, Anticipated affect and Reflective mood

<table>
<tr><th>Codes</th><th>Codes</th><th>Sub-themes</th><th>Theme</th></tr>
<tr><td rowspan="3">Physical expression of emotion
Visceral response
Discrete emotion
Arousal
Valence
Emotional idiom
Relational emotion</td><td rowspan="2">Physical expression of emotion
Visceral response
Discrete emotion
Arousal
Valence
Emotional idiom
Relational emotion</td><td>Anticipatory affect</td><td>Anticipatory affect</td></tr>
<tr><td>Reflective mood</td><td>Reflective mood</td></tr>
<tr><td>Discrete emotion
Arousal
Relational emotion</td><td>Anticipated affect</td><td>Anticipated affect</td></tr>
</table>

Appendix J

Study 5 - List of discrete emotions

Emotion	Total
calm/relaxed/comfortable	7
anxiety/nervous/uneasy	7
stressed/pressured	5
in control	3
satisfied/contentment	3
anger/cross/irritation	3
worried/concern	2
fatigued/exhausted	2
sad	2
letting down	2
relief	1
assertive	1
confident	1
sorry	1
upset	1
on guard	1
frustration	1