

EVIDENCE IN CLINICAL DECISION-MAKING IN TRAUMA CARE

Thesis submitted for the degree of
Doctor of Philosophy

by

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2016

Abstract

The overall aim of this project is to explore the use of evidence in clinical decision-making in trauma care. The main objectives are to understand attitudes towards evidence among the various clinical participants in the trauma care process, to explore the nature of the evidence they apply in their daily practice, and to clarify the role of the formal research literature in clinical decision making.

Two empirical studies were undertaken: a state-wide survey (n = 574) of clinicians involved in trauma care, and a qualitative investigation involving a series of semi-structured interviews (n = 27) of practitioners in a major urban trauma centre. Together, these studies sought to understand both the sources and the variety of the evidence associated with the actual clinical decision making process.

The findings showed that clinicians in general have a rather narrow conceptual understanding of the concept of evidence. However, in practice they draw on a rich and subtle array of forms of evidence which they deploy with great care and skill. These forms of evidence include—among others—textbook summaries, hospital guidelines, embedded personal knowledge, advice from colleagues, the outcomes of randomised clinical trials and other published information, the results of clinical audits, and other data collected in a formal or semi-formal manner in the course of usual clinical practice. Among these multiple possibilities, the collegiality underlying all forms of clinical practice plays a leading role, sometimes posing challenges when communication across disciplines is not straightforward. Perhaps surprisingly, published research evidence, although regarded with respect, often plays a secondary role in everyday clinical practice.

This thesis challenges the assumption that research evidence is or should be considered to be superior to all other kinds of evidence used in clinical decision making. It proposes that an appreciation of the full richness and complexity of the many modalities of evidence and their use will contribute to a further enhancement of the clinical process.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signed:

A solid black rectangular box used to redact the signature of the author.

Date: 15 May 2017

Acknowledgements

There are many people whom I would like to thank.

First of all, I would like to thank my main supervisor Paul Komesaroff for reviving this project and giving it a second chance. Thank you for inspiring and never giving up on me.

I would like to thank Jenny Advocat for stepping in when time was running out. Thank you for helping me with a lot of cleaning up and sorting out. Thank you for taking the time to understand my work and giving me encouraging feedback.

I would like to thank Viranga Ratnaike for being a patient and tolerant friend from the very beginning of this work. Thank you for putting up with me even at times when I was difficult to bear.

I would like to thank Russell Gruen for enabling the project and giving it a kick start. No one anticipated it was going to be such a long journey. I would like to thank Peter Bragge for sharing his knowledge and for helping in the development of the survey.

I would like to thank Bianca Brijnath for her support and input. We only had a brief time to work together but the experience definitely propelled me forward. I would like to thank Jan Coles for stepping in and sharing knowledge on how to handle the qualitative data. I would like to thank Noriaki Sato for the numerous stimulating discussions during the conceptual development of the project.

I would like to thank Rob Elston.

I am absolutely certain that without these people I would not have been able to complete this gigantic task.

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Abbreviations

EBM	Evidence Based Medicine
ED	Emergency Department
ED+T	Emergency Department and Trauma Centre
GCS	Glasgow Coma Score
CPG	Clinical Practice Guidelines
ICC	Intercostal catheter
ICU	Intensive Care Unit
ISS	Injury Severity Score
MTS	Major Trauma Service
OECD	Organisation for Economic Co-operation and Development
OSS	Operating Suit Services
PI	Performance indicator
RCT	Randomised Controlled Trial
SR	Systematic review
TA	Thematic analysis
VSTORM	Victorian State Trauma Outcome Registry and Monitoring Group
VSTR	Victorian State Trauma Registry
WHO	World Health Organization

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PART I – Background

Chapter One

Introduction

In this chapter I introduce the reader to the main purpose of this thesis and the importance of this research, and I give an overview of the project as a whole.

1.1 Background

The overall aim of this project is to explore the use of evidence in clinical practice in the setting of trauma care.

The project started with the intention of documenting the behaviour of clinicians at the point of care. I conducted a survey in which I asked health professionals to tell us what they did when they were faced with a clinical question to which they did not know the answer. I found that mostly they did not refer to the literature as their first point of call. Indeed, to our surprise, research-derived information, including systematic reviews and randomized controlled trials, were rarely used. Instead, a variety of different strategies were employed in search of evidence, in particular approaching colleagues for help. This behaviour was observed in multiple care settings by many different groups of professionals.

A second study consisted of a qualitative investigation of the attitudes and practices of trauma care clinicians in a large urban hospital setting. This study consisted of in-depth interviews and examined a wide variety of clinical scenarios involving trauma patients. It showed that each clinical case requires the deployment of a unique combination of different forms of evidence. A constant process of gathering and assimilating evidence was seen to be integral to the provision of all aspects of clinical care. Clinicians described how in their decision-making they drew on knowledge that relied on a rich variety of forms of evidence derived from multiple sources.

It is my vision that greater appreciation of the different kinds of evidence that come into play in clinical practice will enhance our understanding of the complexity of clinical decision-making. I believe that it will also enable us to improve both the evidence itself and its use in clinical practice.

1.2 Definitions used in this thesis

For the purpose of this project *information* is understood to comprise any spoken and/or written piece of data that can be used in clinical decision making. It can encompass influences that shape or determine decisions and opinions. It can include anything that (re)shapes the understanding of a situation. In the context of trauma, information is anything that (re)shapes perceptions of the appropriate care for a patient.

The concept of *knowledge* is, of course, a fundamental element of all philosophical systems. For the purposes of this thesis it is usually employed to refer to stored information that can be applied in practical clinical decision making settings.

The concept of *evidence* is one of the oldest concepts of philosophy, albeit a relatively new concept in medicine. In the context of this thesis, the term refers to information that is incorporated into, or rendered usable for, a decision-making process. Evidence is the resource that we apply from the bodies of information, knowledge and experience available to us to assist with practical judgments. It can include formal scientific data, historical records, personal knowledge, advice from skilled colleagues, formal guidelines, or information from multiple, diverse sources. It is the link between our engagement in practical decision making and the world of empirical experience.

Research evidence is evidence that derives specifically from the formal research literature. *Data* refers to a special kind of information that is purposefully produced or gathered during a research project. The outcome of a randomized, controlled clinical trial (RCT) is an example of research evidence which is generated with the purpose of being used in clinical practice.

A colleague's opinion is a quantum of information provided by the colleague in response to a question. This would usually take the form of a verbal comment during a conversation in either a formal

professional or an informal setting. However, occasionally it may constitute a written opinion. *Anecdotal opinion* is a piece of information “floating around” (usually of unknown origin) that may be taken into account in decision making. Anecdotal and colleague opinions are information that can become evidence if used to make decisions. If anecdotal and colleague opinions prove useful they may be retained as an instance of knowledge.

1.3 Use of term “craft group”

Throughout my thesis I use the term *craft group* for the clinicians specialising in a common area of medicine. There are many other ways of referring to these groups of clinicians, such as “disciplines”, “professions”, “specialisations”, “departments”, and other terms.

In order to understand evidence as a concept I undertook a number of discussions with my supervisor and fellow researchers in which their own skills and those of masters of their trades were dissected. I particularly liked an example that was quoted of a carpenter using the wood as his medium. The depth of understanding of the material and the skill of handling the wood, the relationship the carpenter has with a piece of wood—all of these I described as a craft.

Interviewing clinicians and understanding their role in providing care to trauma patients, it made sense to me to use the term *craft group* to describe any group of clinicians that share similar skills and knowledge in providing care to patients. This term represents to me the depth of understanding and the complexity of the skill of the “master”, and the knowing of the “medium” he or she is working with. I feel using the term “craft group” expresses my view of clinicians as masters of their skills. I favour the use of the expression “craft group” over the other terms mentioned above because of the inherent link that it implies between theory and practice. A clinician practising in a specific field is not just in possession of theoretical knowledge (as a “discipline” would suggest), but of a body of experience and know-how that relates to the specific kinds of practical activities in which he or she is involved. This highlights the immanent connection between practice and evidence as enacted within clinical settings rather than as purely abstract constructions or theory.

For the purpose of this thesis a *craft group* is the narrowly specialised medical discipline, a group of clinicians united by the area of medicine in which they work and specialise. There are common features that clinicians from the same craft group have: they may work predominantly within a certain area of anatomy, or a certain area of physiology; or the care they provide may focus on a certain area of expertise. All clinicians are united by the common goal of providing care to trauma patients, but clinicians from a craft group also share the same discourse and the same medium they are working with and within.

1.4 Importance of this research

The process of clinical decision making involves many different kinds of evidence that are brought together for a particular practical purpose. A surgeon makes very different kinds of decisions compared with a physician providing care to the same patient. Different clinicians weigh different facts, gather different evidence, and make different clinical decisions. Every decision made in a clinical setting is conditioned by highly complex arrays of different kinds of evidence. The findings of my study add to the limited literature about the deep nature of evidence used in clinical decision making.

This research shows clinicians in general have a narrow conscious understanding of evidence, and are rarely aware of the complexity of the ways they utilise and share evidence in ordinary, everyday practice. When questioned, they indicate that they consider evidence to be a single thing, while habitually using in their clinical practice species of evidence that they do not even recognise.

The current model of evidence-based medicine (EBM) most widely found in the medical literature imperfectly reflects the reality of clinical practice. Research-derived evidence in fact makes only a small contribution to the decisions made in routine clinical practice. Clinicians are aware of the “importance” of research evidence and they speak *for* it, but they vote with their actions for many other types of evidence, including two in particular: namely patient-derived evidence and clinicians’ expertise. This project shows that the latter two are actually the major players in clinical practice.

My research adds to the literature that speaks against the concept of a “hierarchy of evidence” in clinical practice. It places the kind of evidence privileged in EBM, the factually-based evidence that comes from RCTs and systematic reviews (SRs), on the same level and alongside all other kinds of evidence that clinicians use to make their decisions. More than this, my findings show that the existing concept of a hierarchy of evidence can actually be unhelpful for clinical practice. This is because the hierarchy approach undervalues clinicians’ expertise in comparison with research derived evidence, thereby failing to reflect clinical reality (Ho, Peterson et al. 2008, Hoppe, Schemitsch et al. 2009).

1.5 Thesis overview

This thesis consists of thirteen chapters, including the present one. In Chapter Two ("Literature review") I describe the recent literature about evidence, and the concept of evidence in philosophy and science.

In Chapter Three ("Aims of the research project") I present a brief description of the aims and objectives of the two separate studies that are combined within this project.

In Chapter Four ("Evidence use in trauma care") I describe the methodology employed in the survey.

Chapter Five ("Results") is about the results of the survey. I present the demographic information of the participants and the quantitative results.

In Chapter Six ("Summary and discussion") I review and discuss the outcomes of the survey.

Chapter Seven ("Clinical decision-making") introduces the second, qualitative, inquiry. The aims and objectives and the methods that were used for the qualitative interviews are presented.

In Chapter Eight ("Results") I present the demographic data associated with my study sample population.

In Chapter Nine ("Themes One and Two: Evidence in clinical decision making") I present the results associated with themes 1 and 2.

In Chapter Ten ("Themes Three & Four: The need for evidence and how clinicians source it") I present the results associated with themes 3 and 4.

In Chapter Eleven ("Themes Five and Six. Communication between and within clinical groups") I present the results associated with themes 5 and 6.

In Chapter Twelve ("Summary and discussion") I review and discuss the results of the second study.

In Chapter Thirteen ("Concluding Chapter") I undertake a brief general review of the entire project and draw some broad conclusions.

1.6 Chapter summary

Evidence based medicine (EBM) is an important movement that has exerted a powerful influence over clinical practice. It is my vision to contribute to patient care by improving the use of evidence in clinical practice. I set out to understand clinical practice and the use of evidence at the point of care. This thesis describes the quantitative and the qualitative enquiries that were undertaken. The data is foreshadowed to show that clinicians in trauma care represent numerous craft groups, each with its own unique relationship to knowledge and characteristic ways of acquiring that knowledge. The data is also expected to show how clinicians in trauma care use a rich array of different kinds of evidence.

Chapter Two

Literature review

In this chapter I present a conceptualisation of Evidence Based Medicine and its current role in clinical decision-making. I summarise the literature that aims to resolve the existing “evidence problem” in clinical practice and the literature that promotes Evidence Based Medicine.

2.1 Evidence Based Medicine

During the last thirty years, Evidence Based Medicine (EBM) has been a movement to promote a scientific approach to therapeutic knowledge in medicine (Haynes, Sackett et al. 1996, Sackett, Rosenberg et al. 1996, Ashcroft 2004, Lambert 2006). EBM was developed with the aim to create and apply best evidence in clinical practice (De Vito, Nobile et al. 2009). The literature about EBM contains descriptions of it as a ‘movement’, a ‘philosophy’, a ‘paradigm’ and other technical and qualifying terms (Loughlin 2009, Krishnan, Kapoor et al. 2014).

The concept of “Evidence Based Practice” (EBP) is sometimes used interchangeably with the concept of EBM (Dawes, Summerskill et al. 2005). It is argued that the combined use of research findings, referred to as “evidence”, with clinical expertise, and the values of patients, known all together as EBP (Sackett, Rosenberg et al. 1996), can ensure the best possible care for patients. The assumption is that with the understanding of the principles of EBP clinicians will be able to gain, assess and apply the new knowledge.

The introduction of systematic reviews provided a number of advantages for clinicians. Systematic reviews collate and appraise relevant primary studies in a systematic and transparent way (Higgins 2011). The benefits include a lower likelihood of being misled by research findings, an increased confidence in outcomes (Egger, Smith et al. 2001), and a more efficient use of time due to primary studies being already found and appraised for quality. (Lavis, Davies et al. 2005)

The last two decades have seen a rapid growth of systematic reviews across all medical disciplines (Bastian, Glasziou et al. 2010). As the number of systematic reviews has grown, so has the number of review-derived products, e.g. summaries, policy briefs and overviews. Due to their rigorous methodology and aim for transparency, systematic reviews are often too long to read and have large amounts of information that are not directly relevant to clinical decision-making. Summaries address these issues by presenting information in a concise and structured manner that makes them easy to read, understand and remember (Lavis 2009). A scoping review of knowledge translation resources for policy makers showed that summaries of systematic reviews were the most common resource for policy makers and comprised over half of the review-derived products (Chambers, Wilson et al. 2011). Summaries are increasingly seen as tools to facilitate the use of systematic reviews in clinical practice. It was suggested that clinicians could benefit from research findings presented in a concise and structured form at the point of care (Hartley 2004). There is the potential to improve patients' outcomes when clinicians have access to and use such online evidence (Westbrook, Gosling et al. 2004).

Protocols often incorporate the latest research findings. However, they do not always implement them in detail. Their primary aim is to guide clinical practice and to reduce the variability of the care delivered. Although protocols in this form have become an accepted part of everyday clinical practice, their usefulness is often questioned (Berg 1997). This is, in part, because they see medical action as an isolated rational process, and create the illusion that there is only one possible answer. The complex processes of care that are difficult to explicate are invariably omitted from protocols, and contributes both to the loss of experience and knowledge and to the progressive bureaucratisation of clinical practice (Berg 1997).

The decreasing tolerance of medical errors has led to the scrutiny of professional judgment and an increasing trust in statistical research. EBM is a central tool in the process of increasing accountability of medicine (Saarni 2004).

EBM assumes the authority of scientific evidence and questions the authority of the individual clinician (Goldenberg 2006). Some argue that "evidence based" should not be viewed as synonymous to "best

practice". Evidence based does not mean "increased objectivity" but merely obscures the inevitable subjectivity of human enquiries and the connection between knowledge and power (Goldenberg 2006). EBM is also changing, with a developing literature that refers to EBM in relation to the implementation of research evidence and clinical experience into individual patient care (Swennen, van der Heijden et al. 2013). This is the latest example of how attempts are made to incorporate clinical experience as evidence in clinical decision making under the umbrella of EBM.

2.2 Limits of EBM

There are a number of assumptions that accompany the EBM movement. The movement started with the optimistic hope that epidemiological knowledge would be easy to apply to an individual patient. The principles of EBM, applicable predominantly to propositional knowledge, the knowledge derived from RCTs, have, however, been shown to contain a number of epistemological problems. The 'hierarchy of evidence' is a satellite product of EBM (Ho, Peterson et al. 2008, Hoppe, Schemitsch et al. 2009), which emerged from the focus on effectiveness and efficacy in health care. It downgrades all other evidence and provides no mechanism for integrating other available forms of evidence when assessing the treatment options of an individual patient. (Nutley, Davies et al. 2002).

Randomised clinical trials (RCTs) are said to have a number of major issues, including being too expensive, too broad in their findings, having ethical challenges with randomisation, and being too lengthy, often taking years for the results to reach clinical practice (Angus 2015).

There are a number of methodological and ethical factors that make it impossible in some cases to conduct RCTs; the statistical inference used by RCTs has been continuously disputed by statisticians and clinicians; and RCTs do not provide an explanation or proof of causation, but are merely a "methodological solution to clinical epistemology" (Ashcroft 2004). The last author highlights the need to understand the nature of clinical effectiveness, clinical judgment, and collective knowledge (Ashcroft 2004).

One major critique of RCTs includes the uncertain reliability of their data (Ioannidis 2005) (Ioannidis and Trikalinos 2005). It has been estimated that about 50% of all research will ultimately be shown to be false (Ioannidis 2005).

The EBM approach offers a statistical form of evidence that sometimes is not usable in the complex context embedded clinical practice (Barry 2006, Glasgow 2008); therefore some question the suitability of it in medicine (Barry 2006).

A large volume of clinical research is highlighted as a problem in its own right (Bastian, Glasziou et al. 2010). Authors are calling for the reduction in unnecessary trials and for the improvement of the process of reviewing these trials. Despite this call for the improvement of quantitative research and reviews, Bastian et al. expressed a notion of pessimism for the future if a clinical research literature is dominated by narrative reviews and not systematic reviews of RCTs.

A patient becomes the site for the application of epidemiological knowledge of the population. A patient is the point of the application of evidence in the clinic. EBM, comprising both clinical practice and research, depends on clinical trials. EBM privileges the results from RCTs, and any evidence from other studies are marginalised as less reliable by EBM (Mykhalovskiy and Weir 2004). The debates around EBM are centred on the fate of individual clinical judgement (Mykhalovskiy and Weir 2004).

Guidelines are sometimes viewed by clinicians as posing a threat to their professional autonomy (Timmermans and Kolker 2004). This aspect of the critique of EBM comes mostly from the medical profession (Timmermans and Mauck 2005), with other health professionals being less resistant to the concept.

Some are concerned with research findings not being routinely implemented in clinical practice (Walker, Grimshaw et al. 2003) and there is literature which investigates ways to increase the use of research evidence by clinicians, including the understanding of barriers and facilitators of evidence uptake (Boissel, Haugh et al. 2003, LaPelle, Luckmann et al. 2006, Chambers, Wilson et al. 2011, Curran, Grimshaw et al. 2011).

EBM was designed to be an account of “propositional knowledge” only (Ashcroft 2004). The term propositional knowledge is used to describe the explicit knowledge that can be communicated using spoken and written language. Propositional knowledge is different from implicit knowledge, i.e. tacit knowledge, that cannot be transmitted through the usual ways of communication. EBM and RCTs encounter a number of epidemiological issues. EBM does not encompass the whole comprehensive body of medical knowledge. It is difficult to evaluate the claim that a doctor using his skill, experience, and judgement, knows that a certain treatment is good for his patient in the given circumstances (Ashcroft 2004).

The EBM movement brought a shift in clinical care away from an individual patient and towards the care of populations (Tonelli 1998). This led to the individuality and personal experience of a patient being devalued.

Some prominent critics of RCTs claim that probabilistic evidence cannot give a definitive assurance that the treatment that has been shown by an RCT to work (elsewhere) will work for the particular patient in the particular settings (Cartwright 2011).

2.3 Trauma Care

The large amount of published research in the field of trauma care reflects the great importance and complexity of this area of clinical practice. Neurotrauma in particular has attracted a very large literature, much of it focused around traumatic brain injury (TBI), spinal cord injury (SCI), and the many clinical issues that arise in relation to these conditions. An overview that evaluated the volume of research in the field of neurotrauma found 3,466 research articles, 1,256 articles on TBIs and 2,210 articles on SCs (Bragge, Chau et al. 2012).

It has also been suggested that the gap between knowledge and practice exists in the field of trauma (Shafi, Rayan et al. 2012). The delivery of recommended trauma-specific care to eligible patients across all areas was found to be 58%, ranging from 87% in resuscitation care to 17% in head injury care. (Rayan 2012)

The discussion about the gap between the literature and clinical practice was taken further by the authors of an economic model of health care who estimated that providing patients with traumatic brain injury care based on the latest research findings could save more than \$3.84 billion in societal costs and more than 3,500 lives per year. (Faul, Wald et al. 2007) The authors argued that bridging the gap between research and practice could improve patient outcomes and save lives and resources.

Across Australia almost 7,000 patients with traumatic injuries are treated every year and these remain a significant public health issue (Program 2014). The State Trauma System in Victoria was set up in 2000 with the principle “The right patient to the right hospital in the shortest time” (Atkin, Freedman et al. 2005). Since then, three designated trauma centres have opened in Victoria with a concentration of trauma specialists to ensure optimal care for trauma patients. A collection of the data through Victorian State Trauma Outcome Registry and Monitoring Group (VSTORM) enables the education of all levels of care providers, from clinicians first responding to trauma at the roadside to trauma surgeons in specialised trauma centres. (Atkin, Freedman et al. 2005)

Some researchers express concern about variability in trauma care standards and practices. Investigation into institutional variations in the management of traumatic brain injury highlights differences in the number of trauma specific interventions between institutions. A more aggressive approach to trauma care is linked to better outcomes for trauma patients (Bulger, Nathens et al. 2002).

A study about optimal out-of-hospital treatment for trauma patients in hospitals across the country also found considerable variability. The authors built on the premise that variability is not desirable in clinical practice, which in turn led to the proposition that there was only one right way to provide medical care (Bulger, Nathens et al. 2007). Some argue that the implementation of guidelines will lead to the improvement of care and to the improvement of patient outcomes (Watts, Hanfling et al. 2004, Faul, Wald et al. 2007).

2.4 “Knowledge”

“Epistemology” closely examines what we call knowledge and what information or statements we should believe. This is a very large topic and I will not attempt to summarise the literature about it, but only to highlight a few key points relevant to my thesis.

Historically, there were two prominent schools of thought: “rationalism” and “empiricism”. Rationalism, with the English philosopher John Locke (1632–1704) as its prominent figure, argues that reason is what justifies and tests knowledge. Another English philosopher, David Hume (1711–1776), who represented the empirical school of thought, argued that knowledge comes from our professional and life experiences and is the direct result of our observation or an experiment, or both. He called into question reasoning as a source of knowledge. The German philosopher Immanuel Kant (1724–1804) critically evaluated both rationalism and empiricism and (to state just one conclusion from his complex body of work) argued that reason and experience are both necessary for knowledge.

Knowledge derived from research can only make a difference to patient care if it is delivered to clinical practice and used by clinicians. Health service research claims that a gap exists between “best available scientific evidence” and clinical decision-making (Curran, Grimshaw et al. 2011). Knowledge translation (KT) is a newly proposed set of actions to reduce this alleged gap between research and clinical practice. It is suggested that knowledge generated by research is independent of the knower and the situation where this knowledge can be used (Duguid 2005). Any competent user of the language that codifies the knowledge could access that knowledge, but this does not teach him or her how to use the knowledge.

“Tacit knowledge”, on the other hand, incorporates knowing *how* to use the knowledge. Duguid argues that it is wrong to assume that one kind of knowledge can substantiate the other (Duguid 2005). The author proposes that knowledge acquisition is rooted in the flow of practice within communities. The communities have emergent properties and they amount to more than just a sum of the individual actions of members of a community (Duguid 2005). Tacit knowledge is described as the fact that “we know more than we can tell” (Polanyi 1966). This knowledge is personal because it takes the personal

participation of the knower as key to the act of knowing (Polanyi 1958). The knowledge of “know how” in clinical practice cannot be translated into propositional knowledge.

Organisational knowledge incorporates heuristic knowledge of the members of the organisation doing their job (Tsoukas and Vladimirou 2001). Knowledge exchange occurs in two opposite directions within the organisation. Heuristic knowledge is formalised (bottom up) and the propositional, or explicit knowledge, travels down to the members of the organisation. Tacit knowledge is an important player in the creation of organisational knowledge (Tsoukas 2005).

Foucault (1972) put forward that knowledge is what powerful people define it to be. Certainly, knowledge is closely related to power. This principle can be applied to modern clinical practice where sometimes there are issues in regards to what knowledge counts and what knowledge is valuable. Rhetorical techniques are sometimes used to promote one form of knowledge over another. Evidence is used as an instrument by policy makers in order to achieve certain goals. These goals are often situated in population health and because of it are not always fully aligned with individual patient care (Krishnan, Kapoor et al. 2014).

Knowledge is undoubtedly a complex multi-layered journey (Ward, Smith et al. 2012). It encompasses an exchange of information deeply embedded in the context of clinical practice. The complexity of holistic medicine includes knowledge about the medical condition causing the suffering and knowledge about the sufferer (Gillett 2004). This epitomises how the perception of knowledge has changed: it is no longer viewed as a collection of facts existing independently and waiting to be discovered, but as complex adaptive systems that incorporate context and narrative, and continuously evolve (Sturmberg and Martin 2008).

2.5 “Evidence”

In this section I highlight some aspects of the literature about evidence that is relevant to this thesis. Because the concept is so fundamental to my entire project multiple further references to concepts of evidence and the ways in which it is used in practice are provided throughout the remainder of this chapter.

There is no single definition of evidence. Evidence is thought about as an available body of facts or information indicating whether a belief or proposition is true or valid. However, there is a wide variety of views about the concept. For example, evidence for a forensic expert could refer to the items collected from the crime scene; evidence for an archaeologist could be an artefact discovered in an excavation; evidence for a clinician could be any piece of information that he or she can use in clinical decision-making.

The concept of evidence has been a “table top” discussion topic for philosophers and scientists alike for centuries (Greenhalgh 2002, Worrall 2002, Rycroft-Malone, Seers et al. 2004, Barry 2006, Worrall 2007, Glasgow 2008, Worrall 2010, Kelly 2014). In scientific discourse evidence refers to knowledge acquired through systematic, scientific experiments or observation. In relation to an “assertion” evidence can be weak or strong. Weak evidence does not rule out the validity of an assertion and strong evidence directly supports the assertion.

The production of evidence is a social as well as a scientific process (Barry 2006). Clinical decision making and clinical treatment are deeply embedded in the cultural and social contexts.

Clinical practice cannot be separated from evidence and it is agreed that clinical practice has a particular, albeit variable, relationship with evidence. Evidence is used in clinical practice to diagnose, treat and provide all the necessary care to patients. Each of these activities requires the mobilisation of particular kinds of evidence. The assumption that the knowledge exists independently of a knower (the so-called “objectivist” assumption) needs to be questioned. It suggests a dualism between knowledge and theory and between body and mind. This dualism takes knowledge for granted and ignores the ways in which our minds encounter knowledge through the body. It takes for granted that research knowledge can be used in clinical practice without interpretation or internalization, without this knowledge going through the practical, bodily experiences of each one of the targeted clinicians (Montgomery 2005, Miles 2007).

Green argues that evidence based practice could benefit from “practice based evidence”, where a clinician is a participant in the production of evidence and not just a receiver of the evidence (Green 2008).

Some have argued that the concept of evidence in clinical practice should be expanded to incorporate all available complex data, e.g. cultural, organisational, and qualitative evidence (Lambert 2006). There is clear agreement that the probabilistic evidence from RCTs cannot be used alone at the time of clinical decision making.

2.6 Decision making

Clinical decision making is very complicated topic. There is a vast literature about decision making and opinions about what contributes to decision making are divided.

When a clinician sees a patient he or she follows certain steps in decision-making that are particular to the clinician’s discipline. For example, a surgeon and a physician may make potentially different decisions regarding the same clinical issue. In times of exponential growth of the information available to clinicians, a better understanding of the process of clinical decision-making and a clinician’s evidence needs will contribute to improving patient care.

Berg (1992) described the process of clinical decision making as moulding a patient’s problem into a solvable question, using repeated interactions with a number of participating factors, namely: the patient, medical criteria, historical information, finances, organisation, disposal options, time, examination results, and others. He called these, collectively, the “heterogeneous elements” of a clinician’s environment and it was suggested that they play a paramount role, whereas “biomedical knowledge” plays only a small part in clinical decision-making. Clinical practice was found not to adhere to any universal rules of clinical decision-making. Berg emphasised that it was not “biomedical knowledge” but “locally situated routines” in clinical practice that provided the framework for clinical decisions. (Berg 1992)

Variation in health care is linked to wastage of resources (Bulger, Nathens et al. 2002, Bulger, Nathens et al. 2007) and hope is often expressed that science will come up with optimal solutions that can be standardised, and that this in turn will lead to improvements in care delivery (Clancy and Cronin 2005). Evidence-based decision making is favourably compared to traditional decision making that for centuries was based mostly on clinical experience and judgement. There is a degree of enthusiasm for growth in biomedical science and innovations (Clancy and Cronin 2005).

Bucknall (Bucknall 2003) in her article titled “The clinical landscape of critical care: nurses’ decision-making”, makes an important statement that “decision-making is a manifestation of the landscape” with its “contextual variables”. She concludes that clinical decision-making is embedded in the clinical environment and influenced by the patient’s situation, resource availability, and interpersonal relationships. At the same time, clinical decision-making is guided by time constraints, risk management, and the pressure to standardize clinical decision-making.

A study of the use of RCT - derived evidence amongst clinicians showed direct correlations with the evidence based medicine educational background of the clinicians (De Vito, Nobile et al. 2009). The clinicians who were taught EBM were more likely to use research derived evidence in the form of RCTs and SRs in their clinical decisions. However, there are many other kinds of evidence that are drawn on in clinical practice.

The most frequent source of information for nurses is “nurse colleague” (Doran 2007). In an observational study of triage nurses’ clinical decision-making (Gertz 2001) describes the information nurses collect from a patient in order to allocate the triage priority. It was found that nurses did not use enough objective physiological data in order to decide the priority or urgency of the clinical situation. The study showed that in addition to these objective data the nurse participants used “nursing instinct” to make decisions about triage. “Intuition” is also recognised in the medical literature (Rew and Barrow Jr 2007). Some authors define intuition as a decision-making method that is a highly creative process (Greenhalgh 2002).

Some articles in the literature argue that using intuition is not a good predictor of quality decision making. This was, for example, the conclusion of a study that showed considerable variation in nurses' judgement (Thompson, Bucknall et al. 2007). It has to be noted that the study was investigating nurses' assessment of a patient at risk of a critical event, using a pen and paper simulated scenario, and it can be questioned how accurately intuition can be investigated through such a technique.

The role of intuition in decision making in everyday life has been acknowledged (Pelaccia, Tardif et al. 2011). The latter authors propose a "dual theory" of clinical reasoning that includes a non-analytical model of reasoning with pattern recognition, alongside a hypothetico-deductive approach. The authors suggest that there is an interaction between the analytical reasoning and pattern recognition in the clinical reasoning process. This is what they called dual process theory (Pelaccia, Tardif et al. 2011).

A number of contemporary philosophers have argued that there is no clear line dividing the facts and values (Putnam 2002).

Some literature suggests that doctors do not reason like scientists do and that 'narrative-based medicine' plays a specially important role in medicine (Montgomery 2005, Miles 2007). Furthermore there is a danger in relying too much on science in clinical decision-making (Montgomery 2005). Instead, expert opinion is perhaps a more important source of evidence in clinical practice (Greenhalgh 1999, Montgomery 2005, Hofmeijer 2014, Engebretsen, Vøllestad et al. 2015).

Clinicians' decisions are influenced by environmental and individual variables. Patient based evidence is one of the most important contributors to nurses' clinical decisions (Bucknall 2000, Gertz 2001, Bucknall 2003). An intervention study which tried to increase the use of research evidence in clinical practice found no change in the attitudes or the use of evidence after the educational intervention (Henderson, Winch et al. 2006). The dominance of "oral culture" of nursing and task oriented care they provide might prevent nurses from engaging with the research literature more.

2.7 Discourse

Using the early philosophy of Wittgenstein (Wittgenstein 1951), it can be argued that we have to understand a great deal of the language of clinical practice to understand the decision-making activities in which clinicians are engaged. In his initial work, the *Tractatus Logico-Philosophicus*, Wittgenstein disagreed with the notion that there are ultimately only simple propositions (Wittgenstein 1951, Anscombe 1996, Stern 2004). He insisted that one should consider language in its natural settings to understand the behaviour of people and the circumstances of this setting. By contrast, in his following landmark work *Philosophical investigations* he made the link between the discourses of our physical world and the discourses of our mind (Wittgenstein 1953). Knowledge was now seen as a social practice shared amongst communities and groups (Stern 2004).

The late twentieth century French philosopher Michel Foucault took up some of these ideas to argue that knowledge and power are intimately interrelated. Knowledge can produce power and power can produce knowledge (Foucault 1972). Human relationships constitute the ultimate negotiation of power. “Discourse” is the medium which one can use to establish the truth. Moreover, truth can be produced and restrained through the interplay of discourses.

For the purpose of this thesis I am adopting a special usage of the word “discourse” derived from the work of Foucault:

[the] ways of constituting knowledge, together with the social practices, forms of subjectivity and power relations which inhere in such knowledges and relations between them. Discourses are more than ways of thinking and producing meaning. They constitute the 'nature' of the body, unconscious and conscious mind and emotional life of the subjects they seek to govern (Foucault 1972, Weedon 1989).

2.8 Practice

It is claimed that in clinical practice up to 71% of clinical questions are not being pursued (Green, Ciampi et al. 2000). An investigation of the evidence seeking behaviour of clinicians suggested that there was a potential for change in diagnostic and treatment decision-making in 81% of the cases in which

evidence was sought. (Sackett and Straus 1998) Clinicians are said to contribute to the gap between research and practice by not keeping up to date with the latest research evidence (Hurwitz 2010).

A closer look at clinical practice, however, shows that clinicians face a number of barriers when trying to keep up-to-date with the latest research literature (LaPelle, Luckmann et al. 2006). The main barrier is the lack of time. In their busy professional lives clinicians face clinical questions on a daily basis, but they have very little time to find answers to their questions. There are other barriers, including a lack of awareness of existing research, lack of accessibility, and lack of skill to assess the quality of the research information (LaPelle, Luckmann et al. 2006). Some have concluded that in clinical practice the informational needs of clinicians are unmet.

“Praxis” in Greek means practice guided by, and inseparable from, theory (Rolfe 1993, Pellegrino 1997). For the ancient Greeks “praxis” was always conditioned by knowledge. Praxis was always reflective and made of knowledge and experience. In contemporary views theory is often taken to be completely separate from practice. Theory gives birth to ideas and practice produces physical actions. But the reality is that it is impossible to completely separate practice from theory. All actions are conditioned by knowledge, and prior experience. Any action, any mechanical act, is conditioned by what has happened before.

In an observational study of clinicians’ information needs (Currie 2003), clinicians were shown to exhibit information-seeking behaviour. The most frequent source of information in this study was a colleague. In 76% of cases of a need for information, the “human resource was utilised” instead of the participant turning to a computer interaction. However, a systematic review of this behaviour in clinicians found different results. Here, the most common source used in clinical practice was text books and articles, closely followed by asking colleagues (Dawes and Sampson 2003). The factors positively affecting information-seeking behaviour were found to be convenience of access, reliability, and applicability of information. The obstacles were found to be the large amount of materials to peruse, lack of time, low urgency, forgetfulness, and the belief that there is no published answer to the clinical question.

A review of the literature about information-seeking behaviour (Davies and Harrison 2007) investigated the frequency of doctors' questions and types of information needs, time spent searching, the barriers to searching for information, and types and numbers of information sources used. The latter authors found that "traditional methods [of] face-to-face communication" and the use of printed material prevail in clinical practice. Use of the Cochrane library is found to be low in a number of studies included in the review (studies conducted in 2000, 2002, 2005).

In their work investigating how primary care physicians seek answers to clinical questions, another study found that clinicians first consult their colleagues and paper sources (Coumou and Meijman 2006). Information-seeking behaviour was studied using published peer reviewed reports about the behaviour of clinicians. The role of a clinical librarian was investigated too. It was noted that over a number of years the ways clinicians looked for information did not change significantly, even with better access to electronic resources and the Internet. It was found that clinicians had difficulties formulating their research questions for the search process. Some of the barriers to searching for answers were identified and it was suggested that primary care physicians prefer the support from clinical librarians to doing a search by themselves.

Some authors have adopted the view that information derived from research is "high quality evidence", and failing to employ it in clinical practice generates the alleged gap between research and practice, as well as variations in care and lapses in patient safety (Davis 2005). One author links this gap to morbidity, mortality, and detrimental costs in health care. The Knowledge Translation (KT) movement is said to be an important effort to bridge this gap. The Cambridge Conference in 2003 defined KT as "the iterative, timely and effective process of integrating best evidence into routine practices... in order to effect optimal health care outcomes". Knowledge Translation is equated with education and professional development. It has been relied on for promoting evidence based knowledge, a term often used for research derived knowledge (Davis, Evans et al. 2003).

Within organisations of health care there are concerns about the supposed gap between research knowledge and clinical practice (Boissel, Haugh et al. 2003, Papaioannou, Giangregorio et al. 2004, Rowe, Diner et al. 2007); in other words, between what "we know works" and what we choose to do

(Grol and Grimshaw 2003). This “gap” is said to lead to wasted resources and patients being denied today’s best medical treatment (McGlynn, Asch et al. 2003, Young, Leong et al. 2007, Runciman, Hunt et al. 2012). Within the research community a study evaluating the quality of health care suggested that patients across a broad range of medical disciplines received only 54.9% of recommended care (McGlynn, Asch et al. 2003).

As previously discussed, this so called gap between research and clinical practice is a product of the EBM movement (Boissel, Haugh et al. 2003). Here there is an assumption that the exponential growth of biomedical literature is a representation of the growth of knowledge in clinical practice. It is claimed that doctors cannot deal with the complexity and volume of information and that knowledge is essential to the clinical decision-making. One proposed solution is to break up the knowledge into “pieces” of “core knowledge” that are relevant to different groups of clinicians and deliver this distilled knowledge to its users via messaging services (Boissel, Haugh et al. 2003). Delivering the knowledge to the point of care is an important objective of the EBM paradigm, even if it means reducing it to decision making needs (Boissel, Haugh et al. 2003).

Globally, the World Health Organization has expressed concerns about the situation in developing countries and has claimed that bridging the gap between research and practice is “one of the most important challenges for public health in this century” (WHO 2005).

Improvements in patients’ outcomes have also been examined in relation to specific clinical decisions. For example, the introduction of a checklist for an intercostal catheter (ICC) insertion (Anderson, Fitzgerald et al. 2015) has been claimed to enhance outcomes. The latter authors suggest that increased training alone may not be enough to reduce complication rates following insertion of an ICC. Rather, they suggest that it might be useful to follow the methods of the airline industry and military service where checklists are employed to “standardise performance and decrease human errors” (Anderson, Fitzgerald et al. 2015). After the introduction of a checklist for the insertion of an ICC, authors were able to report a decrease in empyema rates, one of the known complications. They argue that the introduction of checklists will help to standardise the practice and decrease procedural errors.

As mentioned above, nurses appear to prefer knowledge gained from their personal experience, and interaction with their patients and colleagues. Knowledge gained from textbooks and published research was found to be less preferable (Estabrooks, Chong et al. 2005). A clinical nurse educator is a good resource and source of evidence for the nursing practice (Milner, Estabrooks et al. 2005).

The information-seeking behaviour of clinicians in critical care was found to be exploratory, cumulative, and iterative (Kannampallil, Franklin et al. 2013). Information-seeking is driven by local practices and the local organisation of knowledge. Clinicians do have informational needs at the point of care and these have to be addressed to support clinical decision making.

In clinical practice, there is not one, but a number of competing kinds of evidence (Barry 2006). The RCT evidence is only one of many kinds of evidence that exist in clinical practice and contribute to clinical decision making. Evidence and complex knowledge exist simultaneously, and are thought to be transmitted through social interaction and situated learning within communities where the members share the same practice (Lave and Wenger 1991).

The concept of *mindlines* has been developed in an attempt to explain the use of knowledge and knowledge exchange in clinical practice. It has been found that clinicians collectively construct and re-construct knowledge (Gabbay and le May 2004). This knowledge is collectively reinforced and individually embodied by each clinician within the same practice.

A study of the information needs of physicians in clinical practice found that during patient visits only 30% of needs were met (Covell, Uman et al. 1985). It is said that timely information from the biomedical literature should be a part of clinical decision-making (Crowther and Cook 2007).

2.9 Chapter summary

This chapter has summarised some key features of the literature concerning evidence in medical care. Starting with a presentation of some of the main ideas underlying the concept of “evidence based medicine”, I have examined some of the strengths and weakness of this approach. I drew attention to the special importance of trauma in modern clinical practice. I then summarised some of the

philosophical dimensions of certain key concepts for this study, including “evidence”, “knowledge”, and “discourse”. In the light of these concepts I then reviewed key features of the literature about decision making and practice.

This chapter has highlighted the need for further study of the ways in which clinicians understand the concept of evidence, what kinds of decisions arising in trauma care practice require further evidence, and whether there are differences between the ways in which different craft groups understand and seek to apply evidence in their clinical practice. It has also suggested the need for more detailed study of the kinds of evidence that clinicians draw from and how such evidence is used in actual clinical settings, with particular reference to the role and status of the evidence from clinical research contained within the formal journal literature.

Chapter Three

Aims of the research project

The overall aim of this project is to enhance the use of evidence in clinical practice in the setting of trauma care. It is my vision that greater appreciation of the different kinds of evidence that come into play in clinical practice will enhance our understanding of the complexity of clinical decision-making. I believe that it will also enable us to improve both the evidence itself and its use in clinical practice.

This research project aims to address the following research questions:

1. How do clinicians in trauma care currently address their informational needs?
2. What evidence is used in clinical decision-making in trauma care?

To address these questions I have undertaken two studies, referred to as “Study 1” and “Study 2”.

3.1 Aims of Study 1

Study 1 aimed to explore the ways clinicians, practising in the field of trauma, address their informational needs, specifically:

1. To find out what proportions of clinical questions remain unanswered
2. To describe what sources of information are used at the point of care
3. To describe views on the ideal process of finding answers to clinical questions
4. To describe the use of published research in relation to patient encounters

3.2 Aims of Study 2

Study 2 aimed to explore different kinds of evidence that are drawn on in clinical decision-making in trauma care, specifically:

1. To explore the variations between different clinical groups in regards of information used
2. To describe the information-seeking behaviour of clinicians
3. To describe the perception and understanding of evidence from clinicians' points of view

PART II – Study 1

Chapter Four

Evidence use in trauma care

In this chapter I present the methods of the first of the two empirical studies of this project, the survey of clinicians. Finding out from clinicians where and how they access information for their clinical decision-making provided an interesting picture of information-seeking behaviour at the point of care.

4.1 Aims

The aim of Study 1 was to explore the ways clinicians, practising in the field of trauma, address their informational needs.

Specifically, I set out:

1. To find out what proportion of clinical questions remains unanswered
2. To describe what sources of information are used at the point of care
3. To describe views on the ideal process of finding answers to clinical question
4. To describe the use of published research in relation to patient encounters

4.2 Methods

4.2.1 Study design

This took the form of a quantitative study using a paper-and-pen self-administered survey containing multiple-choice questions.

4.2.2 Survey instrument

The development of the survey instrument was informed by a review of relevant surveys in the field (Guindon, Lavis et al. 2010), a previous survey of the Directors of 24-hour Emergency Departments across Australia conducted by the National Trauma Research Institute and a direct observation of clinical practice.

There were three parts to the survey (see Appendix A):

- Part one consisted of five questions and explores what clinicians do when faced with a clinical question they do not know the answer to. These questions addressed objectives 1 and 2.
- Part two had five questions about the time when a journal article is accessed and means of access available to clinicians at the point of care. In addition, this part contained questions on preferences for when access to journal articles would be most helpful in relation to a patient encounter and asks clinicians to rate the importance of different parts of an article. These questions addressed objectives 3 and 4.
- Part three contained questions on demographic information about clinicians including profession, gender, age, research degree, principal work place, distribution of workload between clinical versus academic versus administrative, years of providing trauma care, percentage of trauma patients and of patients with head injury (TBI).

The survey instrument was pilot tested on a small group of trauma practitioners. Face validity of the survey instrument was established by analysing responses from the pilot test and establishing whether or not the questions were clear enough to understand and easy enough to answer and whether the responses address the main research question of the survey.

4.2.3 Inclusion criteria

Eligible clinicians for the survey were defined as those working in Victoria and providing direct patient care to people with traumatic brain and/or spinal cord injuries, working in one of the following capacities: Intensivist, Emergency Department Physician, Nurse, Anaesthesiologist, Surgeon, Neurosurgeon, Radiologist, Haematologist, Dietician, Occupational Therapist, Neuropsychologist, Physiotherapist, Speech Therapist, Rehabilitation Physician, or Social worker.

This list of eligible disciplines was created by mapping the pathway of a patient's journey through all phases of care, from the moment of injury to full recovery or community rehabilitation. The clinicians on the pathway of the patient's journey were consulted to determine the core disciplines involved that play

a significant role in direct patient care. We observed clinical practice in the trauma and ICU departments including hand-over meetings and trauma audit meetings.

4.2.4 Recruitment

I negotiated with the Transport Accident Commission (TAC) to obtain the use of their provider database to administer the survey. I also sampled directly through the healthcare facility the Level I *Major Trauma Service* (MTS) in Victoria.

Ethics approval was obtained from the Alfred Hospital Ethics Committee and the Monash University Human Research Ethics Committee.

4.2.5 Survey administration

The survey pack included a cover letter, the survey instrument, explanatory statement and a stamped self-addressed envelope.

In *Phase I* (duration: 4.5 months) the questionnaires were distributed at the place of clinical duties to clinicians working in the Level 1 Trauma Centre, a major teaching hospital (approx. 640 beds) in Melbourne, Victoria.

In *Phase II* (duration: 3 months) the questionnaires were mailed out using the mailing list of care providers obtained from the TAC.

In addition to quantitative data, the survey contained a brief qualitative component in the form of one open-ended question.

4.2.6 Analysis

I report the actual response rate, which includes respondents who provided partially or fully completed questionnaires and opt-out responses (Burns 2008).

One of my research objectives was to look for the differences between three groups of clinicians: medical, nursing, and allied health. This was exploratory research and I did not set out to test specific pre-existing hypothesis.

SPSS software and Microsoft Excel was used in order to manage and analyse my data. Chi-square tests of independence were used to identify significant response rates between professions for each response variable. Post-hoc tests were applied to find the point of difference. Chi-square values, degrees of freedom, p values, and adjusted standardised residuals were collected and reported.

Adjusted standardised residual is the ratio difference between observed and expected values and the standard deviation of the expected value, i.e.:

$$\text{Standardized residual} = (\text{observed count} - \text{expected count}) / \text{SD}(\text{expected count})$$

The expected values are based on the population mean. Using standardised residual makes it easy to identify which cells are contributing the most and which cells are contributing the least. To interpret, if the standardized residual is <-2 , it is significant and the observed value is less than the expected value. If the adjusted standardized residual is >2 , it is significant and the observed value is greater than the expected value.

Textual analysis was used to identify key themes for the open-ended survey item (i.e.. Question 1.5: What would be your ideal process of finding answers to clinical questions?).

4.3 Chapter summary

The quantitative enquiry aimed to inquire how clinicians in trauma care currently address their informational needs. The study was designed to find out the sources of information used at the point of care, the access to Internet sources available to clinicians, and how often clinicians look at journal articles. A self-administered pen and paper questionnaire was used. Clinicians were recruited through a Level 1 trauma centre and a mailing list of trauma care providers obtained from the large local insurer

company. The survey was distributed at the place of clinical duties in the trauma centre and mailed out using the mailing list of providers.

The data were managed using Microsoft Excel and SPSS software and analysed using descriptive statistics. Significance testing of comparisons was undertaken using the Standardised Residual method.

Chapter Five

Study 1. Results

Four hundred and forty-seven surveys were distributed and 321 were collected at the place of clinical duty at the Trauma Centre, giving a response rate of 72% in the first phase of the survey. One thousand eight hundred and fifty-six surveys were mailed out and 253 were returned by post, giving a response rate of 18% in the second phase. The total of 574 responses were from doctors and surgeons (183), nurses (202), allied health (188) and unidentified (1).

5.1 Demographic information

Demographic information about the participants is presented in Tables 5.1 - 5.3

Distribution of responses between professional groups

Table 5.1 shows the distribution of responses from the three professional groups. The medical group included physicians, surgeons, intensivists, and radiologists. The nursing group included Trauma Ward nurses, Intensive Care Unit nurses, Emergency Department and Trauma Centre nurses, and Perioperative Suite Service nurses. The allied health group included physiotherapists, speech therapists, occupational therapists, and social workers.

Table 5.1

Distribution of responses between professional groups

Professional Group	Number of participants
Medical	183
Nurses	202
Allied Health	188
Not identified	1

Sex distribution

Table 5.2 shows the sex distribution. There were approximately 50% more female participants. The females were mainly represented by the nursing and allied health participants whereas males were predominantly medical staff.

Table 5.2

Participants' sex distribution

Gender	Number of participants
Female	349
Male	221
Missed answer	4
Total	574

Age and years of experience

Table 5.3 shows the age and the years of experience of the clinicians participating in the survey.

Table 5.3

Mean and standard deviation of age and years of experience in the three groups

Group	Age		Years of Experience	
	Mean	SD	Mean	SD
Medical	45.13	11.218	15.207	10.6461
Nursing	33.19	8.769	6.604	6.0425
Allied health	38.14	11.199	11.934	10.5395
Total	38.63	11.494	11.042	9.8729

Approximately one third of participants (36%) had a research based degree, while 64% of participants did not.

Work location

Many participants were working in more than one health care institution. A large proportion of participants (84%) reported the primary place of work as being in the metropolitan area, with only 16% of participants reporting working primarily outside Melbourne. This can be explained by the fact that trauma care is a highly specialised form of critical care and is provided by three major metropolitan hospitals in Melbourne.

Phases of care

Table 5.4 shows the phases of care participants engaged in their work. Again, the participants were largely from the Melbourne metropolitan area and from large teaching hospitals; therefore, the table shows that 70% of participants were working in the acute phase of care. The small proportion comprised by the pre-hospital phase of care was a surprise. The survey had originally been designed to include ambulance workers and paramedics and therefore the option of pre-hospital phase of care was included. Although the ambulance services declined to participate in the survey, the questionnaire was left unchanged.

The high response rate achieved by the survey in the first phase gives a good representation of clinicians providing trauma care in the metropolitan hospital.

Table 5.4

Phases of care reported by participants

Phases of care	Percentage (%)
Pre-hospital	1
Acute	70
Rehab	12
Community	16

5.2 Information-seeking behaviour

Sources of information

Overall, participants reported using sources of information at the point of care as follows: colleagues (85%), Internet search engine (46%), local intranet (32%), text book (21%), medical literature database (e.g. PubMed) and a protocol (17% each), CPG and Up-to-date (10% each), Cochrane (6%).

Table 5.5 (see below) shows the proportion of sources of information used by each clinical group. There is a clear variation between clinical groups with regard to the sources used. It became apparent that there were problems associated with distinguishing these sources of information. For example, a clinician faced with a clinical question could have started an enquiry looking in the protocol, moving on to the intranet, followed up by Internet, general search engine and Clinical Practice Guidelines (CPGs), that would have led to the Medical Literature Database, and so on.

For some clinical settings protocol and intranet could be two separate sources. It is, however, becoming common to have protocols and CPGs made available on the intranet. Similarly, medical literature databases (e.g. Pubmed) and medical websites (e.g. Up-to-date) are available through the use of the Internet and general search engines.

Tables 5.5 and 5.6 present the results regarding sources of information used at the point of care.

Table 5.5

Proportion of various sources used by the three clinical groups

Source of information	Proportion of various sources used by clinical group*		
	Medical group	Nursing group	Allied Health group
Colleague	0.76	0.91	0.83
Textbook	0.25	0.07	0.32
Local Intranet	0.15	0.62	0.15
General search engine (e.g. Google)	0.35	0.43	0.58
Med lit database (e.g. PubMed)	0.27	0.04	0.21
CPG (e.g. Brain trauma Foundation)	0.11	0.08	0.10
Protocol	0.10	0.28	0.12
Cochrane	0.03	0.01	0.13
Med website (e.g. Up-to-date)	0.15	0.08	0.06
Other	0.06	0.04	0.10

**Note: The participants were asked to choose all the options that apply and in many cases they chose more than one option.*

Table 5.6*Adjusted Standardised Residuals for the sources used*

Sources of information	Chi-square test			Adjusted Standardised Residuals		
	χ^2	df	p	Medical group	Nursing Group	Allied Health group
Colleague	14.853	2	.001	-3.3	3.3	-.1
Textbook	40.552	2	.000	1.7	-6.1	4.6
Intranet	131.305	2	.000	-5.8	11.5	-6.0
Internet search	20.845	2	.000	-3.3	-1.0	4.3
Medical lit database	39.081	2	.000	4.4	-6.1	1.8
CPG	1.373	2	.503	.7	-1.2	.5
Protocol	26.646	2	.000	-3.2	5.1	-2.1
Cochrane	31.971	2	.000	-2.0	-3.6	5.6
Med website	10.514	2	.005	3.2	-1.2	-2.0

Note 1: CPG=Clinical Practice Guidelines

Note 2: Significant difference between expected responses (i.e. no difference) and observed responses is shown in bold

These Tables show that there are significant differences between clinical groups in the sources of information used while providing care to trauma patients:

Medical staff are less likely to ask colleagues while nurses are less likely not to ask their colleagues for the help with the clinical questions.

Nurses are less likely to use a textbook while allied health practitioners are more likely to use the textbook to help them with a clinical question.

In relation to the local intranet, nurses are more likely to use it at the point of care while medical staff and allied health are more likely not to use the local intranet.

General search engines are more likely to be used by allied health while it is less likely that medical staff will use them at the point of care.

Medical staff are more likely to use a medical database while nurses are less likely to use it.

There is no significant difference between clinical groups in the use of Clinical Practice Guidelines.

Medical staff are less likely to use protocols in their clinical decision-making and nurses are more likely to use it.

The Cochrane site as a source of information is less likely to be used by nurses and more likely to be used by allied health.

The medical websites are more likely to be used by medical staff.

Ease of answering clinical question

The Adjusted Standardised Residual for how easy or difficult the process was of answering the clinical question are presented in Table 5.7.

Table 5.7

Ease of answering the clinical question

Easy or difficult	Chi-square test			Adjusted Standardised Residuals		
	χ^2	df	p	Medical group	Nursing group	Allied Health group
Very easy	22.702	8	.004	2.4	-.3	-2.1
Easy				.2	1.5	-1.7
Difficult				-2.8	-.9	3.6
Very difficult				1.4	-1.7	.3

The allied health clinicians reported that they considered the process of finding the answer to a clinical question more likely to be difficult when compared to medical and nursing groups. By comparison, the medical group considered answering clinical questions to be easier than the other two groups.

Use of journal articles

The adjusted Standardised Residuals for when clinicians last looked at a journal article are presented in Table 5.8.

Table 5.8

Adjusted Standardised Residual for when clinicians last time looked at the journal article

An article was consulted	Chi-square test			Adjusted Standardised Residuals		
	χ^2	df	p	Medical group	Nursing group	Allied Health group
<1 week ago	111.339	6	.000	8.5	-5.8	-2.4
2-4 weeks ago				-.8	-2.3	3.1
2-6 months ago				-3.8	2.8	1.0
> 6 months ago				-4.8	6.6	-2.0

When all clinical groups were asked how recently they had looked at a journal article they reported that medical staff are more likely to have done so less than one week ago. Nurses on the other hand were more likely to have looked at a journal article more than six months ago.

In relation to seeking research information, nurses were more likely to have looked at a journal article unrelated to a patient encounter and medical staff were more likely to look at a journal article relating to a patient encounter. The allied health workers were less likely to look at a journal article during the patient encounter (see Table 5.9).

Table 5.9

Research article sought in relation to patient encounter

In relation to patient encounter	Chi-square test			Adjusted Standardised Residuals		
	χ^2	df	p	Medical group	Nursing group	Allied Health group
Before patient encounter	34.798	8	.000	3.1	-3.5	.5
During patient encounter				1.5	1.5	-3.1
Immediately after patient encounter				.1	.6	-.7
Sometime after patient encounter				-.2	-1.9	2.1
Unrelated to patient encounter				-3.0	3.3	-.4

In terms of preferences, nurses were more likely to find the access to a journal article useful during a patient encounter in relation to allied health professionals. The latter prefer to have access sometime after a patient encounter (see Table 5.10).

Table 5.10

Research article clinicians would like to have in relation to patient encounter

In relation to patient encounter	Chi-square test			Adjusted Standardised Residuals		
	χ^2	df	p	Medical group	Nursing group	Allied Health group
Before patient encounter	21.101	8	.007	-1.1	.0	1.1
During patient encounter				1.3	2.6	-3.9
Immediately after patient encounter				.5	-1.2	.7
Sometime after patient encounter				-.3	-1.9	2.2
Unrelated to patient encounter				.0	1.1	-1.1

Sources of information

Medical staff are more likely to turn to medical databases and websites and less likely to ask colleagues, use the local intranet, use a general search engine and follow a protocol. Medical staff are more likely to have looked at a journal article less than one week previously.

Nurses are more likely to use local intranet and protocols, and less likely to use textbooks, medical databases and the Cochrane website. Nurses are more likely to have looked at a journal article more than six months ago and are less likely to look at an article before the patient encounter. Nurses are more likely to find access to a journal article useful during patient encounter.

Allied health practitioners are more likely to use textbook, general search engines, and the Cochrane website and less likely to use local intranet. This group of practitioners reported the process of finding the answer to a clinical question to be more likely to be difficult. Clinicians are less likely to look at a

journal article during the patient encounter and less likely to find the access to the journal article useful during a patient encounter.

Table 5.11

Sources of information used (overview)

Medical staff	Nursing staff	Allied health staff
<p>More likely:</p> <ul style="list-style-type: none"> • Medical database • Medical website 	<p>More likely:</p> <ul style="list-style-type: none"> • Local intranet • Protocol 	<p>More likely:</p> <ul style="list-style-type: none"> • Textbook • Search engine • Cochrane
<p>Less likely:</p> <ul style="list-style-type: none"> • Ask colleague • Local intranet • Search engine • Protocol 	<p>Less likely:</p> <ul style="list-style-type: none"> • Textbook • Medical database • Cochrane 	<p>Less likely:</p> <ul style="list-style-type: none"> • Local intranet

Ideal process of answering clinical questions

The survey, while largely designed to collect quantitative data, had one open-ended question inviting the participants to offer their opinion about the ideal process of finding an answer to a clinical question.

From 574 completed and returned surveys, 488 participants responded to the open-ended question “What would be your ‘IDEAL PROCESS’ for finding answers to clinical questions?”.

Below are examples of some answers clinicians gave:

“telephone direct access to professionals or emergency department advice” (Id: 338)

“rapidly accessible, point form, summary of appropriate research” (Id: 339)

“ask colleagues as part of a team structure looking after the patient” (Id: 340)

“reliable single-point of access website” (Id: 341)

“discuss with experienced colleague; Google search + pub med” (Id: 342)

“availability of colleagues. A medical database set out in a text book format” (Id: 343)

“above (text book); or smart phone” (Id: 344)

“believable reliable internet search results (Google)” (Id: 345)

“EB [evidence-based] clinical guidelines” (Id: 346)

The text analysis revealed that the most mentioned source of information at the point of care was a colleague’s opinion. The responses included indications from 22% of medical staff, 21% of nursing staff and 18% of allied health staff that their preferred source of information is a colleague’s opinion when they have a clinical question that they do not know the answer to.

5.3 Chapter summary

Clinicians participating in the survey represented three main professional groups, including medical, nursing, and allied health. While looking for an answer to a clinical question, clinicians would often use more than one source of information. ‘Asking a colleague’s opinion’ was the single most used source of information across all clinical groups (76% of medical staff, 91% of nurses, and 83% of allied health practitioners used colleagues’ opinions). When clinicians were asked about their preferred way of finding an answer, the breakdown of responses was: 22% of medical staff, 21% of nurses, and 18% of allied health staff preferred “asking a colleague”.

Chapter Six

Summary and discussion

6.1 Overview of results

I started my survey with the premise that clinicians in the field of trauma care do not routinely use research-derived evidence in clinical practice. I hypothesised that if the use of research-derived evidence at the point of care could be increased then the patients will get better medical care and therefore achieve better clinical outcomes. So, from the assumption that clinicians, including doctors, nurses, and allied health staff, do not make maximum use of research at the time of clinical decision-making, I set out to understand how to increase the use of research-derived evidence at the point of care.

The survey was designed with the aim of exploring all sources of information used at the time of decision making. I set out to understand the information-seeking behaviour of clinicians at the point of care. I asked them to think back to a situation when they were providing care to a trauma patient and had a clinical question they did not know the answer to. I wanted to know:

1. how many clinicians attempted to answer a clinical question;
2. what sources of information clinicians used to find out the answer;
3. what were clinicians' "ideal process" for finding an answer; and
4. what access to information clinicians actually have at the point of care.

Clinicians undoubtedly need to keep up with the current findings of clinical research. I wanted to know when was the last time individual clinicians had looked at a journal article and whether it was related to a patient encounter. When I used the word "looked" I assumed "read", even if not fully read, but at least skimmed over. Therefore, the survey was anonymous and self-administered, in order to promote honesty in answering the questions.

The majority of the participants, 96% of total responses, had made efforts to find out answers to questions that arose in their clinical practices.

Clinicians used a number of different sources to answer a clinical question. The most used source of information across three clinical groups was a colleague's opinion. 76% of doctors, 91% of nurses, and 83% of allied health practitioners seek information from their colleagues.

There were differences between clinical groups on other sources of information used. The clinicians from the medical group were more likely to consult the medical databases and the medical websites, whereas the clinicians from the nursing groups were more likely to go to the local intranet and the protocol, and the clinicians from the allied health group were more likely to refer to a textbook and the Internet.

6.2 Overlaps with literature

The survey showed that colleagues' opinions played an important role in clinical decision making for the trauma clinicians participating in the survey. This was the most used source of information across all clinical groups alike. The survey did not differentiate between a "colleague's opinion" and an "expert opinion" and the results were interpreted as a combination of both. The knowledgeable "colleague's opinion" in the literature is recognised as playing an important role in clinical decision making (Hofmeijer 2014). Some literature describes it as "face-to-face communication of evidence", and our survey results agree that this is the preferred way of information-seeking behaviour in clinical practice (Dawes and Sampson 2003, Davies and Harrison 2007).

The survey found that clinicians occasionally use the Internet to search for information at the time of clinical decision making. The role of the Internet in the search for information has been highlighted in the literature (Cullen 2002).

The survey showed that clinicians rarely consult research derived information based on randomised controlled trials (RCTs) and systematic reviews (SRs) of RCTs. One of the leading databases of SRs, the Cochrane Collaboration Database, was very rarely used by the participants of the survey. Only 3%

of doctors, 1% of nurses, and 6% of allied health reported having used this database. The lack of the use of research data in clinical practice, the so-called “gap”, is widely described in the literature (Kerse, Arroll et al. 2001, Glasziou and Haynes 2005, Glasziou and Heneghan 2008).

Doctors are often connected to the Internet at the point of care and may use it to assist with their decision making. This finding of the survey agrees with the existing literature (Masters 2008). The survey showed that nurses do not use systematic reviews, a fact that has also been described by Oermann (2006).

The use of online evidence was confirmed by the survey and there is literature that suggests that online evidence used by clinicians is linked to direct patients care (Westbrook, Gosling et al. 2004).

6.3 Differences from literature

This survey has compared the uses of evidence sources across clinical groups. Whereas there is a literature about the use of information at the point of clinical decision making, this survey identifies the differences amongst the sources that are used by different clinical groups.

Participants reported looking for answers in the majority of cases of clinical decision making. This finding differs from most of the literature, which emphasizes clinicians' failure to pursue clinical questions (Green, Ciampi et al. 2000, Ely, Osheroff et al. 2005, Green and Ruff 2005). Our findings indicate that even if clinicians do not always go to the sources of research-based evidence, they nonetheless do seek evidence, albeit in a variety of forms.

The survey helps to further our understanding of the information-seeking behaviour of clinicians (Grol and Wensing 2004). There is a large body of literature on the information-seeking behaviour of primary care physicians (Smith 1996, Currie 2003, Swinglehurst 2005, Ulvenes, Aasland et al. 2009, Shuval, Linn et al. 2010, Younger 2010). However, the survey for the first time displays sharp differences in information-seeking behaviour in trauma care among the different practitioners.

6.4 Questions raised

I had started the survey with the aim of improving trauma care through the provision of the “package and delivery” of research information to the point of clinical decision making. At the time of starting the survey I had several assumptions.

According to the literature, clinicians face barriers to using research data in clinical practice. The barriers discussed are generally related only to the data themselves (Boissel, Haugh et al. 2003, Chambers, Wilson et al. 2011, Curran, Grimshaw et al. 2011) leading to the presumption that clinicians have no problems accessing other information obtainable from patients and from their clinical experience. I planned my project to address some of the barriers. I assumed clinicians need research evidence at the point of clinical decision making. I hypothesised that this decision making could be improved through optimal access to the research resources at the point of care. I aimed to package and deliver research evidence to clinicians at the bedside of an injured patient.

My second assumption was based on my experience of working in the research field and conducting systematic reviews. I learned how research data were scrutinised for robustness and generalisability. I assumed that this research evidence would improve trauma care if clinicians have access to it when they make clinical decisions.

In order to examine the specific information-seeking behaviour of clinicians, the survey was designed to investigate what information clinicians seek when they are looking for an answer to a clinical question. The results showed that only some clinicians accessed the literature at the time of clinical decision making. This highlights the question: *Why do clinicians so infrequently use research evidence at the point of care?*

The survey also indicated that the research literature contributed to some of the clinical decisions. This raises a second question: *What is the role of the research literature in these decisions?*

The results of the survey showed that clinicians often go to their colleagues for information. Clinicians described their ideal way of finding answers as having a knowledgeable colleague whom they can ask. This raises a third question: *What information do clinicians seek when they go to their colleagues?*

This survey is consistent with the view that clinicians are seeking to provide the best care to their patients. The overwhelming majority of clinicians participating in the survey went looking for information when they needed to answer a question. Most of the clinicians used more than one source of information for their decision making. This raised a fourth question: *What is the best approach to evidence for clinicians who wish to practise in the most informed and knowledgeable way?*

These questions in turn demonstrated the need for a deeper, more detailed examination of the ways in which evidence in clinical practice is conceived and deployed. Such an analysis—which would necessarily be qualitative in nature—would allow me to understand the sources of the variable attitudes to EBM among clinicians, and whether these attitudes derive from deep philosophical precepts, from cultural biases or merely as a result of habitual prejudices and assumptions common to different craft groups. The answers would provide resources that could be applied to addressing the concerns and barriers to appropriate use of research data and other forms of evidence, and towards enhancing educational practices.

6.5 Limitations

The study was designed as a self-administered survey with pre-designated answers and therefore made no provision to clarify any uncertainties participants might have had in interpreting the questions. In the survey I had asked participants to reflect on a recent case of caring for a trauma patient, but it is possible that some answered using a collective example from their experience rather than a single case scenario.

The concept of *colleague* was not specified at the beginning of the study and therefore it includes a broad spectrum of possibilities, such as senior colleague, junior colleague, nurse, doctor, allied health professional, visiting consultant, fellow clinician, and any other clinician that might have contributed to the care of trauma patient. Lack of a clear definition of this term may have created some uncertainty.

The surveys were distributed at the place of clinical duties in the Level 1 Trauma Centre and produced a high response rate, accounting for 56% of all responses. It was possible that there might be an institutional bias and that our results do not necessarily reflect the opinions of all clinicians providing trauma care in other parts of the State of Victoria.

6.6 Conclusions

I have found that the information-seeking behaviour of different professional groups of medical staff, nurses and allied health practitioners at the point of care vary widely from one group to the other. The process of clinical decision-making requires the use of many different sources of information, including access to journals, textbooks etc., discussions with colleagues, inspections of written hospital guidelines and protocols etc. Clinicians from different clinical groups appear to draw on different sources of information while answering clinical questions at the point of care. The role of the research literature at the point of care remains unclear, although it appears to be secondary to the other information that is gathered at the time of clinical decision-making.

These findings, and the questions stated above, form the basis for the subsequent qualitative inquiry in the deeper patterns of evidence use and understanding among clinicians of various kinds in the broad setting of trauma care. The results of the survey posed questions about clinical decision making, how clinicians decide what is the right thing to do at the point of care, why clinicians use multiple sources of information, and why many clinicians do not use research evidence. This complex set of questions suggests the need for a more finely grained, qualitative enquiry in which the decision making at the point of care can be explored and discovered through in-depth discussions with clinicians.

PART III – Study 2

Chapter Seven

Clinical decision-making

In this chapter I present the methods I used for Study Two, a qualitative study of the concepts and use of evidence among trauma clinicians. The study involved in-depth discussions with clinicians about various aspects of their clinical decision making. Participants were invited to explore their knowledge, how they know what they know, where this knowledge comes from and how it contributes to clinical decision making.

7.1 Prefatory remark: My personal journey

First, I explain how I came to the topic presented here. To give a good overview of my journey as a researcher, my life could be divided into three stages. Looking back now I can easily connect the dots, but this was not always the case.

Stage One: Medical university

My educational background includes graduating with MB and BS degrees and specialising in internal medicine. I obtained this qualification from a university in the Soviet Union. This education deserves an explanation. It was in many ways a “textbook” based education, with little awareness of the importance of research. We had classroom work, tests, and exams as usual. In addition, from the first semester of medical school, we had many hours of clinical exposure in which, lacking models or mannequins, we interacted directly with patients, for example learning how to do intravenous injections on the patients themselves.

My career path was interrupted almost immediately after graduation by the political changes occurring in the world at that time, which included the break-up of the Soviet Union and my subsequent migration to the West. Once in the UK I diverted all my attention to my family. Medicine remained my passion, although it had become an unfulfilled dream.

Stage Two: Clinical research

As soon as the opportunity arose, I travelled to India where I became involved in clinical research, where I had the opportunity to learn how evidence in medicine is created. I graduated with an MSc in Clinical research. I became involved with the Cochrane Collaboration as an author, undertaking systematic reviews, and shared a passion for Evidence Based Medicine with my colleagues in the Collaboration. This was the time when I learned that evidence is not used enough by clinicians. So I became determined to do something about it in order to enhance the use of evidence in clinical practice.

Stage Three: Clinical decision making

Once again, life treated me favourably and I received an unexpected opportunity to come to Australia to engage in research. The project was designed to increase the use of research evidence at the point of clinical decision-making in trauma care. I thought that was a wonderful idea, on the assumption that if clinicians receive evidence delivered in a timely manner it could improve their patients' outcomes.

It was decided that a survey would be employed to examine where clinicians go for information when they are faced with a clinical question. The survey results, however, revealed that there were complex reflections and interactions occurring at the point of care. They made me question my early assumption that having access to research evidence at the point of care would greatly transform decision making. The qualitative study I subsequently undertook offered the opportunity to gain detailed insight into the complex processes underlying clinical decision making and ways in which evidence was sought and utilised.

7.2 Aims

The aim of Study Two was: to explore different kinds of evidence that are drawn on in clinical decision-making in trauma care, specifically:

1. To explore the variations between different clinical groups in regards to the information used
2. To describe the information-seeking behaviour of clinicians
3. To describe perceptions and understandings of *evidence* from the clinicians' points of view

7.3 Methods

7.3.1 Study design

A qualitative descriptive design (Sandelowski 2000) was used to understand the process of clinical decision-making. This enquiry was conducted in the form of informal semi-structured interviews with clinicians who provided care in one of the major teaching hospitals in Victoria, a Level 1 Trauma Centre with approximately 390 beds. I endeavoured to present the complex findings, multiple perspectives, and factors that influence clinical decision-making.

7.3.2 Recruitment

I used the same sample frame as in the preceding survey, described in Chapter Four.

The participants in this study were similarly divided broadly into three professional groups: medical, nursing, and allied health staff. All three professional groups are represented in the Trauma ward. The medical staff included a trauma physician, intensivist, orthopaedic surgeon, neurosurgeon, plastic surgeon, radiologist, and two interventional radiologists. The nursing staff included nurses who work in ED, ICU, Operating Suits, and trauma wards. The allied health group included physiotherapists, dietitians, occupational therapists, speech therapists, and social workers providing care to trauma patients. The ambulance and paramedic clinicians are not represented as Ambulance Victoria declined to participate in this research.

I used various methods to recruit participants. For medical staff, the Heads of Department of participating departments were approached and the research was introduced via pre-arranged meetings and e-mail. Potential participants were identified by the departmental heads and approached at the daily trauma meetings that took place in the mornings, before or at the end of their work shifts. The times and places for the interviews were agreed with each participant individually around their clinical duties and during working hours.

For nursing staff, the project was presented and discussed with the nurse manager of each department. For the Intensive Care Unit (ICU) the project was presented at the departmental research meeting. The days and times for the interviews were prearranged and potential participants were identified by the nurse-in-charge on duty. In order to avoid disruption to patient care we used double staff periods (two hour overlapping periods when morning shifts finished and evening shifts began) and educational hour periods (two hours specifically allocated once a week for nurses' educational activities) to introduce the study and identify potential participants.

For allied health staff, the clinical team leaders were identified with the help of the Head of the Allied Health Department. The team leaders were approached via meetings and e-mails, to present the upcoming research and to ask for help to identify potential participants. Each participant was then contacted individually via e-mail and a phone call to arrange a suitable time and place for the interview.

7.3.3 Procedure

The interviews were conducted at the place of clinical duties. Those with medical staff were conducted in personal offices.

I recruited from a Level 1 Emergency & Trauma Centre that operates 24 hours a day to provide medical care for people who are acutely ill and injured.

The Emergency & Trauma Centre is a purpose-built modern facility within the metropolitan hospital (approx. 640 beds). The Emergency & Trauma Centre consists of resuscitation and trauma bays, fully monitored general cubicles, rapid assessment cubicles, fast-track cubicles and a co-located emergency short-stay unit. In addition, there is an Intensive Care Unit (ICU) where patients are transferred once they are resuscitated and stabilized. In the last reporting year 58,000 patients were presented to The Emergency & Trauma Centre, of which 6,568 had experienced major trauma. The high number and unique mix of patients who were treated at the Emergency & Trauma Centre means that the staff are constantly exposed to varied new trauma cases and thus developing their clinical expertise - ensuring patients receive the highest quality, most appropriate treatment.

The Trauma ICU is one of four intensive care "pods" within the ICU. There are thirteen physical bed spaces dedicated to Trauma ICU patients, with additional capacity to manage trauma patients in other pods when needed. The hospital is one of only two Victorian adult trauma hospitals, providing specialist state services for the majority of trauma patients in Victoria, Australia. It is the largest Trauma Centre in Australia receiving around 1100 admissions with major trauma (ISS>15) annually, of which over 600 are admitted to the ICU. Trauma ICU patients stay a mean of 7 days and a median of 4 days.

Nurses and allied health staff were interviewed at the places of their clinical duties. Where it was possible, meeting rooms in the participating departments were utilized. Where there was a choice of a place for the interview, the room closest to the environment of clinical duties was chosen to facilitate a mind-set focused on their clinical experiences and assist with clinical recall. One interview took place by the bedside where a patient was asleep and no intervention was needed but the nurse had to continue supervising the patient. Every care was taken to minimize the disruption to clinical duties and inconvenience to participants.

Interviews were conducted in the form of facilitated discussions rather than question and answer sessions (Charmaz 2004, Creswell 2012). The questions used in the interviews were open-ended (Fontana 1994). The questions allowed participants to elaborate on the topic

offered by the interviewer as much as they wanted. The interview questions were adjusted to a participant's clinical role and job description in order to achieve suitable language and better communication with each participant. I kept brief field notes to capture the impressions and non-verbal communications after each interview.

Participants were asked to describe their experience with clinical decision-making. Using an example of a recent trauma case in their practice, participants were invited to explain what kinds of decisions they had to make and what kinds of evidence they used. Participants were asked to elaborate on all sources of information that they found useful in their clinical decision-making. For the interviews I used the following guiding questions:

- What kinds of decisions do you make on your clinical duties?
- In these decisions, what kinds of information do you find relevant?
- What kinds of factual information do you use?
- When you are uncertain about clinical decision how do you go about making up your mind about what is the right thing to do?
- How did you know?
- Where does this information come from?
- How do you use this information?
- What did you do next?
- What does the word "evidence" mean to you?

I was interested to find out what information they used to help them to make clinical decisions. I asked them where they got that information. The participants were invited to explore together with the researcher how they came to know the information and where this information originated. The participating clinicians were asked to explain what their perception was of the concept of "evidence". To keep the interviews focused, I used questions to guide participants back to the topic of the discussion. The lengths of the interviews varied from 12 minutes (Plastic surgeon, 023) to 45 minutes (Speech pathologist, 022).

I approached the interviews with the knowledge derived from the preceding survey. The survey data showed that there were differences in the way clinicians sourced the information. The differences between the sources used by medical, nursing, and allied health groups at the point of care were statistically significant. I was keen to find out how the process of clinical decision occurs, all the sources of information that are used, and why there are differences between the clinical groups

After the first three interviews it became apparent that the use of the word “evidence” was somewhat constricting. Using the word seemed to put participants in a frame of mind that made them talk predominantly about research articles and protocols. After discussing the issue with my supervisor, the word *evidence* was replaced with the word *information* and in the following interviews participants elaborated freely on the numerous sources of information they used at the time of clinical decision making. At the end of each interview I asked participants to describe what the word evidence meant to them, emphasising that I was not looking for a definition but instead for their own interpretation of the term.

The interviews were recorded using a voice-recording device and transcribed using an external professional transcribing service. All transcripts were checked for transcription accuracy and data quality.

Ethics approval was obtained from the Alfred Hospital Ethics Committee and the Monash University Human Research Ethics Committee (MUHREC). Care was taken to ensure that no transcript contained any information that could identify a participant. Informed consent was obtained by discussion with participants prior to the interviews. In case of any sensitive information arising in the interview participants were assured of anonymity. Because the hospital at which I had conducted the interviews could be potentially identified, it was important for me as a researcher to ensure that the anonymity of my participants was protected. The transcription files were stored and managed electronically using NVivo11 software.

7.3.4 Analysis

Thematic analysis (TA) formed the baseline approach to analysis of the data (Crabtree and Miller 1992, Sandelowski 2000, Braun and Clarke 2006, Creswell 2012, Clarke and Braun 2014). This method has evolved in the last four decades to become one of the leading approaches for analysing qualitative data. I used theoretical TA (Braun and Clarke 2006). Doing theoretical TA means that data were analysed using the deductive method and data collection was initiated with the researcher's theoretical and analytical interests in mind.

Six defined steps of theoretical TA (Clarke and Braun 2014) were used in analysing my data. The *first step* was familiarisation with the data. I listened to the audio recordings, read and re-read the transcripts. This allowed me to check the quality of the transcription and to become familiar with the data. The data from the interviews were discussed at supervisory meetings.

The *second step* involved the generation of initial codes. After screening the data I identified potentially interesting sections that were conveying something about evidence in clinical practice or information that is used at the time of clinical decision-making, and everything related to the main concepts of evidence, sources of information, and clinical decision-making. The initial codes were not a result of free coding. I specifically focused on evidence use in clinical practice and anything to do with the process of clinical decision-making. The data were studied independently by my supervisor and the initial codes were discussed at supervisory meetings.

The following *steps three, four, and five* were concerned with identifying, reviewing, and naming the themes derived from the codes. These were accomplished iteratively in discussions with my supervisor. The final list of themes I present in Chapter Eight: Results. The themes were developed early, after the first few interviews, and I continued the interviewing process with the agreed themes in mind. This helped to keep the interviews in focus (Crabtree and Miller 1992, King 2012). In weekly meetings with my supervisor we reviewed the themes and continued to develop them further. Further defining and naming of the themes took place at later stages of data analysis.

Step six involved reporting the data, covered in Chapters Eight, Nine and Ten. I used the language of my participants and where necessary I used a minimum of interpretation (Creswell 2012). For example, for some of the participants English was their second language and it was not difficult to understand what they meant in the interview, but the subsequent verbatim transcription did not make sense. In these cases I have added my words in square brackets to aid the understanding of what a participant was saying, and included multiple perspectives of the participants (Creswell 2012). I looked for data that offered new information and did not present all quotes with the repetition of the data, even though it was obtained from different participants. Throughout reporting, every attempt was made to accurately convey the findings regarding the experiences clinicians had with evidence at the time of clinical decision-making. Paul Komesaroff and Jenny Advocat both were involved in conducting TA.

For the purposes of the analysis, I adopted a working definition of evidence as follows:

Evidence is a combination of objective clinical information (clinical test results), subjective clinical information (clinicians' opinions), and narrative information (patients' stories) that can be used in clinical decision-making.

I would like to draw attention to the fact that there are three components in this definition: objective, subjective, and narrative.

7.4 Chapter summary

The qualitative enquiry aimed to explore the different kinds of evidence used in clinical decision making at the point of care. Recruitment was undertaken in a Level 1 Trauma Centre. The study was designed to include in-depth interviews with clinicians representing different clinical disciplines. The semi-structured interviews took the form of facilitated discussions with clinicians, as there were only a few questions to guide the discussions. Participants were asked to reflect on recent clinical decisions they had had to make and to discuss why they used one source of information rather than another. They were encouraged to think about where the knowledge needed for their decisions came from. The data were collected using voice recording devices. The audiotapes were transcribed. Transcripts were managed using NVivo software.

Chapter Eight

Results

In the next four chapters (including this one) I will present the results of the twenty-seven interviews with clinicians working in trauma care. The length of the interviews ranged from 12 minutes (Plastic surgeon, 023) to 46 minutes (Speech therapist, 022). The total volume of audio recording is 11 hours and 52 minutes.

8.1 Demographic information

The participating hospital provides service as a Level 1 trauma centre. In the Emergency Department there are four specially equipped trauma bays. These are four designated areas where trauma patients are treated as soon as they arrive at the hospital. The trauma bays are operated by a team of trauma clinicians. These clinicians are representatives of a number of clinical disciplines that become involved in treating trauma patients. Each member of the team, when on duty, receives notification in the form of a text message about the trauma incident and a brief description of the patients involved and the extent of their injuries. When a text message arrives this is called “trauma call out”. Clinicians who are on trauma duty then go down to the Emergency Department and attend or get ready to attend the patient who is on the way to the hospital.

The trauma team is led by a trauma physician. After the trauma patient receives emergency care he or she is moved to the Intensive Care Unit (ICU) where an intensivist takes charge. After the patient has been treated in the ICU, he or she is moved to the trauma ward for further recovery and rehabilitation. This provides a unique set of services specialising in providing care to trauma patients.

The participants’ demographic information is presented in Table 8.1

Table 8.1 Demographic Information

ID	Craft group	Gender	Age	Principal work place (within Alfred Hospital)	Workload (%)			Years providing care
					clinical	academic	admin	
001	Neurosurgery	M	47	Neurosurgery	80	10	10	21 years
008	ED and Trauma Medicine	M	58	Emergency + Trauma Centre	40 h/w	25 h/w	10 h/w	34 years
025	ICU Medicine	M	40	ICU	35	35	35	15 years
023	Plastic surgery	M	60	Plastic Surgery	90	--	10	36 years (27 yrs in plastic surgery)
015	Radiology	M	55	Radiology	70	10	20	20 years
021	Radiology interventional	M	39	Radiology	90	--	10	5 years
020		M	41	Radiology	90	5	5	6 years
004	Ward nursing	F	23	Trauma ward	100	--	--	2 years
003		M	29	Trauma ward	100	--	--	1.5 years
005		M	26	Neurosurgery	100	--	--	3 years
006		F	23	Trauma ward	100	--	--	2 years
018	ED nursing	F	47	Emergency + Trauma Centre	100	--	--	29 years (22 yrs in ED)
017		F	45	Emergency + Trauma Centre	32 hrs/week			15.5 years
002		F	47	Emergency + Trauma Centre	50	--	50	20 years
026	ICU nursing	F	29	ICU	25	50+25	--	8 years
007	Perioperative care nursing	F	38	Operating Theatres	10	10	80	9 years
009	Dietetics	F	35	Trauma	100	--	--	9 years (2 yrs in Trauma care)
011		F	29	ICU	60	--	40	6.5 years
016	Physiotherapy	F	42	Trauma ward	80	20	--	20 years
010		F	28	ICU + Trauma ward	95	--	5	6 years (2.5 yrs in Trauma care)
012		F	35	ICU + Trauma ward	100	--	--	14 years (5 yrs in Trauma care)
013		F	32	Trauma ward	100	--	--	10 years (4 yrs in Trauma care)
019	Social Work	F	40	Trauma Social Work Team	60	--	40	17 years
014		F	43	ICU, Trauma Social Work Team	50	--	50	15 years
022	Speech Therapy	F	29	Trauma, 2 West, ICU	predominantly	--	--	6.5 (17 months in Trauma care)
027	Occupational Therapy	F	24	Inpatient trauma + orthopaedics	90	--	10	1.5 years
024		F	36	Trauma ward	60	--	40	14 years (12 yrs in Trauma care)

A total of 27 professionals participated in the survey from which 7 were doctors (7 males) aged 39 to 60 (*Mean* = 48.57, *SD* = 9), 9 were nurses (2 males and 7 females) aged 23 to 47 (*Mean* = 34.11, *SD* = 10.19), and 11 were allied health workers (11 females) aged 24 to 43 (*Mean* = 33.9, *SD* = 6.14). The years of experience ranged from 5 to 36 (*Mean* = 19.57, *SD* = 12.23) for doctors, 1.5 to 29 (*Mean* = 10, *SD* = 9.65) for nurses, and 1.5 to 20 (*Mean* = 10.86, *SD* = 5.58) for allied health professionals.

I asked participants to recall a recent trauma case they had attended and the decisions they had to make in regards to the care. As clinicians were telling me about the patient and the injuries, I asked them about all the information they needed in order to make their clinical decisions.

8.2 Themes identified

The open coding approach was used initially to analyse the data. A number of codes were identified. These codes include *anecdotal opinion*, *advocacy*, *complexity of decision*, *evidence*, *experience*, *errors of omission*, *decisions in unusual circumstances*, *guidelines and decision-making*, *gut instinct*, *leading the team*, *pattern recognition*, *difference of opinion*, *decisions with no literature back up*, and *decisions to overrule the protocol*.

The six identified themes were:

Theme One. Ways of understanding the concept of evidence

This theme is about the information clinicians use in their clinical decision making whether or not they call it evidence.

Theme Two. Contribution of evidence to clinical decisions

This theme gives a description of the overall contribution of evidence in clinical practice.

Theme Three. Problems encountered that require new evidence

This theme brings together the descriptions of care clinicians have to provide to the patients.

Theme Four. Actions undertaken to find evidence

Under this theme I collected data about the information-seeking behaviour of clinicians in response to the need for new evidence.

Theme Five. Communication of evidence between craft groups

This theme describes how clinicians working in different clinical disciplines communicate information to each other.

Theme Six. Communication of evidence within craft groups

This theme describes how clinicians working within the same clinical discipline communicate information with each other.

8.3 How clinicians define evidence

There are different definitions of evidence. Before starting the interviews, I adopted a definition of evidence. EBM has its own definition of evidence, and participating clinicians had their “definitions” of evidence. The existence of the different definitions implies that there are different ways of thinking about the subject.

At the beginning of the interviews, the participants were asked what sources of evidence they used for their clinical decision making. This question seemed to narrow the discussion almost exclusively to the literature and published research. In order to explore all sources of information used in clinical practice, it was decided not to use the term *evidence* in my questions until the very end of each interview. This made an important difference, and the data obtained in subsequent interviews were rich with many examples of different sources of information used by clinicians. At the end of each interview the participating clinicians were asked what the word *evidence* meant to their clinical practice. The clinicians were encouraged to define *evidence* in their own words.

In large part, the clinicians think of *evidence* as limited to research studies (ideally RCTs), but, according to the radiologist who was interviewed, best practice may not currently rely on only that kind of evidence because it is not always available. For the participants the concept of evidence includes research literature, best practice, objective scientific rationale, and published case presentations.

The intensivist gave an explanation of evidence not limited to the results of RCTs, instead covering the range of knowledge produced from scientific enquiry, from baseline hypotheses to experimental findings:

...I would think of it as an objective, scientific rationale that supports something...might be as simple as the theoretical evidence, you know, the science, sort of underscoring it, right through to high levels of clinical ...patient-related evidence, such as randomised controlled trials... (ICU Intensivist, 025)

The nurse participants also equated evidence with the research literature. As he explained:

...my understanding [of] evidence...[is:] this is the way to do things, because the research has shown that is the way to do it... (Ward Nurse, 005)

Overwhelmingly, the participants referred to evidence as something that is produced from a research project to answer a question and produces transferrable results to inform clinical practice. One physician explained it as:

... reproducible object or component of our practice, it can be transferred between institutions, individuals and patients... (Trauma Physician, 008)

However, one participant was less specific in her understanding of what evidence is. The social worker depicted evidence as a complex, evolving process:

...it is intuitive, oral, so it is varying case by case. It is fluid and ever changing, depending on the situation... (Social Worker, 019)

Despite this exception, most participants understood evidence as research findings and peer reviewed published literature.

8.4 Chapter summary

The twenty-seven interviews with clinicians providing care to trauma patients were conducted at the place of their clinical duties. Rich qualitative data were gathered and six themes were identified. Clinicians think of *evidence* as limited to research studies, ideally RCTs, research literature, best practice, objective scientific rationale, and published case presentations.

Chapter Nine

Themes One and Two: Evidence in clinical decision making

In this chapter I present the Theme One and Theme Two results.

9.1 Theme One. Ways of understanding the concept of evidence

In this section I will describe the sources of information clinicians use in clinical practice. The information could be anything that re(shapes) clinicians' perception of the situation. In the context of trauma, information is anything that re(shapes) the perception of appropriate care. This theme presents some of the sources of information that clinicians mentioned: colleagues' opinions, personal experience, published research, Internet, protocols, intranets, organisational knowledge, "home grown" evidence, patients and their families, and textbooks. This Theme is presented with the examples given by the participants.

A number of factors influence decision making. For example, the availability of hospital beds can influence clinical decisions. We are not used to thinking about that as a form of evidence, but this type of information shapes the clinical decision and this section will expand our current thinking about what constitutes evidence.

We should be thinking of evidence as any kind of information that shapes the clinical decision. This thesis argues that all types of information that are used in clinical decision making should be considered evidence. This is a new way of conceptualising evidence. One implication of calling all types of information evidence could be that we will no longer use a hierarchy of evidence. Every bit of information will be given due attention and it will be shown to have an equal contribution to the clinical decision.

9.1.1 *Colleague's opinion*

"Colleague's opinion" is a source of evidence that the clinicians use frequently. This term covers anecdotal evidence, information from any of the treating team or consultants, and other opinions that clinicians use in their decision making. Clinicians who contribute their opinions could be junior to the

clinician, they could have the same level of experience, or they could be senior colleagues. Clinicians sometimes represent different clinical groups and might have been visiting from different departments, hospitals, cities, or countries. There were formally organised discussions around clinical issues including departmental meetings, supervisory meetings, trauma audits and patient handover meetings. These meetings occurred regularly and discussions sometimes involved many stakeholders, including multidisciplinary team of clinicians. There were also less formal meetings and interactions between clinicians, between clinicians and patients, or a patient's family members, or insurers, communities, or others. There is not a lot of research literature in neurosurgery and clinicians often rely on the opinions of colleagues. If advice is given directly by a colleague in response to a question – it is an opinion. If there is a piece of information “floating around” that may or may not be usable for the decision making at hand – it is an “anecdotal opinion”. The neurosurgeon gave an example of anecdotal opinion that can be viewed as a colleague's opinion in his practice. He said that:

...anecdotal opinions, in surgery, it's actually counts for quite a lot. If a senior surgeon says “oh don't do that, I've had bad experience with that” – it is almost like a warning not to do something. (Neurosurgeon, 001)

The dietitian, in her response to the question about the sources of information used in her clinical practice, clarified her reason for relying on a colleague's opinion. She explained:

...often there isn't black and white evidence to support our practice. We do rely a lot on expert opinion and discussions with colleagues (Dietitian, 009)

The interventional radiologist depicted the exchange of information between clinicians in his department:

... We ask each other all the time. Radiology is really very collegial. There's a lot of people, so it's very easy just to grab someone's opinion. (Interventional Radiologist, 021)

Across clinical groups, the use of evidence in the form of a colleague's opinion is common. Most clinical groups also prioritise professional experience as an important way to gather evidence for clinical decision making.

9.1.2 Personal experience and intuitive knowledge

Clinicians spend many years gathering knowledge through their experience. They sometimes call it “clinical acumen” (*Interventional radiologist, 021*) or “gut instinct” (*Perioperative nurse, 007*). The nurse elucidated about his clinical experience in trauma:

...it feels like I got to the point where so many things are the second nature, and the knowledge that I use to make decisions or to do things I know at some point links back to some sort of evidence-base but I won't necessarily be able to, for instance, give off a reference for a why I'm doing one thing or another. (Nurse, 005)

The physiotherapist explained how she makes clinical decisions:

...sometimes it is a bit of a gut feeling. You just know that things aren't right or maybe you learn to look more at trends... It's just one value that is trickling off and maybe another value is increasing... Bringing all that together... (Physiotherapist, 013)

Another physiotherapist continued the exploration of the topic about the knowledge required for decision making:

...it is not always black and white. I think that is what you have learned ...You draw on your experiences mainly from working ...in the area. And perhaps ... [you have] seen this type of injury before. (Physiotherapist, 012)

There was an agreement between clinicians about the origin of knowledge, as one plastic surgeon explained:

...the basic knowledge ...comes from University, comes from books. The decision-making and whether it helps the patient – that comes from the experience. You can't read that from books. (Plastic surgeon, 023)

There is consensus that one kind of knowledge comes from text books and education but that the ability to conduct clinical decision making comes from experience.

9.1.3 Research literature

In the interviews, clinicians gave examples that show variations in the use of research literature between different craft groups. The ED physician stated that he uses literature regularly. As an experienced trauma physician, leading the trauma team in many difficult cases, this clinician has a good knowledge of the gaps in the literature. He organises research activities in the department that address those gaps in the literature. He said:

...[I use] literature all the time ...I've got a medical student looking at chest X-ray insertion. She just researched the site of insertion because ...there is no guidelines to be clear ...now we're developing ways of clarifying that (ED Physician, 008)

One participant nurse specified steps in the process of looking for the information to assist decision making. She is also interested in examining the literature in areas outside of her clinical duties.

Unlike other participants, this nurse is involved in academic and research activities most of her working time:

...initially it would be looking at our policy and guidelines, looking at UpToDate, and then ...do a proper lit[erature] search. You know, if I go home with questions still in my mind, thinking, "Uh, actually, I'm curious about this treatment," then I'll have a look. (ICU Nurse, 026)

The social worker sometimes goes to the literature to look for information to inform her clinical decisions. She explained that each patient case is unique and often there is no directly applicable answer in the literature. Despite that, the clinician would do general reading that contributes to the skills she uses when dealing with patients and clinicians:

...Occasionally I've gone to literature when I've been really stuck, but nine times out of ten, I think I find it more useful actually doing some of that broader reading around what might be going on ...because people's situations are so very different. (Social Worker, 014)

There are variations between craft groups in terms of how useful they find the literature. Some clinicians check with the literature frequently and other clinicians do 'broader reading' from time to time. In contrast, there were only a few examples of nurses using the literature to inform their clinical work.

9.1.4 The Internet

The study found that clinicians frequently search the Internet, using general search engines, i.e. Google and others. Medical staff were searching to inform their practice and their clinical decision-making. When asked where he gets information from, the Interventional radiologist explained that he uses:

... a few different avenues ...the Internet is one ...Google. I have a few websites that I know that I can relatively trust ...looking for journal articles, is very helpful as well. PubMed is another big one that I use or textbooks... (Interventional Radiologist, 021)

The nurse participant gave an account of her using the Internet to increase her knowledge on the clinical issues she encounters at work:

...I'll do a bit of a search... for my knowledge because I'm trying to learn about stuff I don't know... every few weeks... I hear someone says something ... like there [might] be a transplant patient listed that has got some syndrome... I'll go back and have a look at it and read about it... (Perioperative care nurse, 007)

A majority of nurse participants did not mention the Internet as a source of information for their clinical decisions, while other clinicians do have access to the Internet and use it during their clinical duties.

9.1.5 Protocols and intranet

Protocols can be either formal or informal documents. The formal ones include the Trauma Foundation Guidelines, hospital protocols and departmental protocols. The informal protocols are sometimes a written document describing the agreed steps, procedures, or actions within a department or within a clinical team. These documents are not necessarily referred to as protocols, but can be thought about similarly.

For example, the physiotherapy team has its own “trauma training manual” for physiotherapists new to trauma, as the clinician explained:

We basically run through different types of injuries and how they might impact on physio and how generally they managed. And the implications of that... (Physiotherapist, 012)

In the Intensive Care Unit, where a number of clinicians providing care to a patient might have competing interests, the departmental guidelines serve as an arbitrator, as the intensivist explained:

...we have some guidelines which are agreed upon beforehand, so that we're not arguing over a single patient, but we've actually got an agreed set of principles that guide our decision making. (Intensivist, 025)

The majority of nurse participants referred to the intranet for the information they needed for their clinical decision making. The intranet is a computerised access to either the hospital protocol or guidelines, or both. These electronic documents are sometimes called hospital policies and procedures. This was made clear in the nurse's statement:

...If there is nobody around ...you can go to ...probably like guidelines, we have clinical guidelines for care and treatment, policies and procedures they are on the intranet. (Nurse, 002)

Overall, clinicians from the allied health group and from the medical group did not mention the intranet as a source of information they used at the time of their clinical decisions, while nurses do rely on the intranet for the information for their decision making.

9.1.6 Organisational knowledge

Organisational knowledge could be different for different institutions. Each hospital has its own ways of making decisions or solving problems and participants describe how knowing it forms a part of knowledge, and becomes evidence. From the availability of beds to the decisions at the operating table there are many factors affecting clinicians' decisions. The availability and demands for the trauma beds is one example of how the environment impacts clinical decisions. There are a number of monitored beds in ICU with 24-hour surveillance. When there is a trauma patient on the way to the hospital, the intensivist has to make several clinical decisions in order to make sure that there is a bed available for the new patient. Data from the interviews indicated that clinical decisions were sometimes affected by the patient flow, and workload of the clinicians. The intensivist described it in the example with a trauma patient who had a cardiac contusion. The clinician did not go to the cardiologist to ask for advice on the patient, but he went straight to the literature to check whether there is a benefit for a patient with cardiac contusion to stay in the monitored bed or whether it was ok for the patient to be moved to the trauma

ward. He explained it as a conflict of interests, that the cardiologist would advocate the patient remain in the monitored bed but because of the impending arrival of a new trauma patient the preferred decision was for the patient to vacate the monitored bed.

Organisational knowledge is knowledge that new employees need to learn over time before they become comfortable working in the hospital. One nurse participant explained the different ways things are done in his current job in the hospital where he was interviewed compared to the previous hospital where he used to work. When he posed a question to the nurse in charge he was told that he has to work the way it is done here because it is hospital policy. The occupational therapist described his understanding of organisational knowledge. This knowledge is generated and communicated by the clinicians who have experience working in the department:

*...Just inherent knowledge around how to manage a patient with a brain injury...
...clinicians who stay long enough to know... understand how to manage it ...It's
knowledge that is established from working at the hospital... (Occupation Therapist, 024)*

In the Emergency Department, the senior nurse commented that knowledge is lost when there is a high turnover of the full-time staff. Here we see that the participants believed that each hospital has its own ways of interpreting evidence derived from the clinical practice of local clinicians in this specific setting and with the local patient population.

9.1.7 “Home grown” evidence

When clinicians came up against a gap in their knowledge, after reviewing the research literature they would find the need to conduct their own research. Participants reported research projects that were conducted at the place of clinical duties with a local patient population. These projects were run by clinicians in response to the need for the knowledge in the department to inform their clinical decisions:

... we don't have a policy or guideline ...I wanted to find out more about what is the best practice for treating these [subarachnoid haemorrhage] patients... And the literature, the evidence, is ...unclear ...that's kind of what prompted my clinical question ...are we doing the best practice, or are we not? ...So I did my clinical project in management of subarachnoid haemorrhage. (Nurse ICU, 026)

Other participants, such as the ED physician, also described initiating research projects in their area to fill an evidence gap.

9.1.8 Patients and their families

Families of patients contributed information for clinical decision-making that was seen as important to clinicians. They spoke about the importance of communication with the family of a patient. According to the neurosurgeon, a really well executed operation will not work if only a “biological model” is adopted when treating a patient:

...I think you will be doomed to failure because if you don't take into account [the] patient's social and cultural background, your technical operation might not work despite doing [a] very good technical operation, the goal of getting [the] patient back to work will not succeed. (Neurosurgeon, 001)

The majority of the social worker's decisions are based on information about the patient's family and patient's social background:

...Before I go in, I will find out as much as I can about the family... On the history... Sometimes they've collected some of that in the emergency department already, or look at the ambulance report... It doesn't tell you definitively anything, but it gives you clues... whatever interactions... in the emergency department, if they're between staff and family members or staff and patient... to get a bit of a feel for what's going on, what might be fuelling some of these... (Social worker, 014)

Occupational therapists also gather evidence for decision making from multiple sources such as the patient's family, the attending nurse, the treating physiotherapist, and the treating clinician. This evidence is enriched through the inclusion of insights from other therapists who have attended the patient. Information from patients' family members is an important contributor too, as an occupational therapist put it:

...it is all of value, and you can, as I've said before, you can still do your assessment without that information ...but it won't be as rich, and it won't be as comprehensive ...and you'll spend longer trying to put the puzzle together. But the nurse should be around. The physio should be around, and if not, you can read their notes. If the family isn't there, we call them ...I often say that the families, they are just as much a part of the team as we are. (Occupational Therapist, 024)

Overall, the majority of clinicians mentioned that a patient's background or any information relating to the patient and their family was of use in clinical decision making. Many clinicians emphasised the importance of this kind of information and stated that often it is the patient and family who are the ultimate decision makers. The participating dietitian said that at the end of the day it is a patient or a family that say “yes” or “no” to one or the other treatment.

9.1.9 Textbook and university (formal) education

Participants made reference to knowledge they received at university and knowledge from textbooks. At the time of a difficult clinical decision clinicians would “take a step back to the basics” of anatomy

and physiology to try to solve a clinical problem. Clinicians new to trauma spoke about the usefulness of the textbooks:

I regularly look at my books ...they're really helpful, and in terms of revising that knowledge, especially the specific deficits [that patients have] (Occupation Therapist, 027)

Participants suggested that the reliance on textbook knowledge reduced with years of experience.

...I think as a junior staff member ...you want to follow protocol, and you want to do everything that fits with that protocol, but with experience ...there's a lot more grey, and you can work within that grey much more... (Occupational Therapist, 024)

The participants in highly specialised areas of medicine, such as neurosurgery, rely on text books as baseline information because the research literature does not always provide the answers to their clinical questions:

... I usually buy a couple of textbooks every year to keep up, because this type of things is not really in journals... (Neurosurgeon, 001)

However, some participants in specialised areas pointed out the limitations of the textbook for their clinical decisions:

...the basic knowledge ...comes from University, comes from books. The decision-making and whether it helps the patient – that comes from the experience. You can't read that from books. (Plastic surgeon, 023)

In the physiotherapy craft group clinicians described how they use real patient scenarios as learning and educational tools. The junior physiotherapists are shown that much patient management is not as straightforward as university teachers or textbooks suggest. The experienced clinician will never use a journal article without considering the context for the provision of care. Theoretical evidence does not always match the evidence in clinical practice, as this physiotherapist explained:

...Maybe a little bit sort of sceptical and go: "That's all great in theory but it doesn't actually fit in with what we do here." (Physiotherapist, 013)

Textbooks play a somewhat smaller role in clinical practice—there were a few examples when a textbook was used in clinical decisions (e.g. in neurosurgery); however, the majority did not mention textbooks as a source for their clinical decisions.

9.1.10 Summary

The participants, when asked about evidence, described almost exclusively research derived information. Despite this, when asked about their clinical decision making, they were able to give an exhaustive account of the multiple sources of information they used during this process. According to our definition of evidence, the different kinds of information used for making clinical decisions comprise

different kinds of evidence in clinical practice. Therefore, clinicians knowingly or unknowingly were using a large array of evidence for their clinical decision making.

9.2 Theme Two. Contributions of evidence to clinical decisions

Clinicians have a degree of freedom in making their clinical decisions. Each decision is unique to the specific case at hand. Each trauma case is unique and requires varying numbers of clinicians to make a range of decisions. Trauma care is a distinct field of clinical activity. In trauma care, evidence use varies across three broadly defined clinical groups: medical, nursing, and allied health clinicians. Each clinical group draws from specific kinds of evidence and ways of using them to make clinical decisions. In this section I explore the sources of evidence that contribute to clinical decision making across these different groups.

9.2.1 Medical

Standardisation of the processes of care is seen as a way to reduce variability in care and to improve patient outcomes. The participating trauma physician, who worked for many years in a Trauma Centre, described the process of gathering evidence for the best way to insert a chest tube (intercostal catheter). The evidence in his examples originated exclusively from clinical experience and turned into a conventionally acceptable form of evidence through the collection of data and measuring patients' outcomes. The clinicians were able to publish their results in order to show to the medical communities their improved patients' outcomes. This locally generated evidence can now be used to inform clinical practice:

... we introduced a standardised chest tube insertion procedure in resuscitation, how the area was prep, ... where the tube is inserted, what tube, how to secure, what antibiotics. We measured 1000 patients pre-insertion and 2000 post-insertion the empyema rate went from 1.6% to 0.5% (Trauma physician, 008)

Recovery in trauma care is often a long process with many obstacles. Empyema is a frequent problem for older patients. Below is another example of evidence gathered from many years of experience working in trauma. The clinician had observed patients having this complication:

...our empyema rate with this subgroup of patients ...peaks at day 10 ...[I suggested] 'how about we just keep him for another couple of days, it is day 8 now'. Unbelievable! On the day 10 we repeat the ultrasound [patient had developed empyema] (Trauma physician, 008)

In this example, the clinician had to make clinical decisions about the discharge of a patient. The patient had recovered well and on the eighth day discharge home was considered. The clinician decided to

keep him for two more days because he had seen in his clinical practice that there is a high risk of empyema on the tenth day after trauma.

Evidence derived from RCTs has very little use in neurosurgery. Clinicians from this craft group are concerned “with the logistics of implementation” (Neurosurgeon, 001), rather than the evidence from randomised controlled trials, or SRs. The neurosurgeon described time at the operating table when he made a “mental leap” (Neurosurgeon, 001) because there was no literature to assist him after a certain point in the decision-making process. A colleague’s opinion is highly regarded in neurosurgery and often clinicians in this craft group seek out fellow practitioners with the knowledge they require. It is accepted practice to have a colleague standing at the operating table, scrubbed and assisting in clinical decision making during the operation. This is a highly intuitive field of medicine that has gone beyond the anatomy and physiology textbooks. The participant spoke about the need to have some “insights” that require lateral thinking and “pattern recognition”. Such patient-derived evidence is a major contributor to decision making, as this clinician explained that:

... [If you] adopt just the sort of biological model in your decision-making I think you will be doomed to failure because if you don't take into account a patient's social and cultural background, your technical operation might not work despite doing a very good technical operation, the goal of getting a patient back to work will not succeed. (Neurosurgeon, 001)

“Evidence” from “guidelines” does not address a patient’s cultural background. The clinician explained that the patient’s cultural background is an essential component of the evidence in clinical practice:

...At the end of the day you are dealing with the human being; the guidelines often don't deal with the cultural background that sort of nuances clinical decision-making. (Neurosurgeon, 001)

Family members also contribute to the evidence that is used in clinical decision making. The neurosurgeon indicated that he encounters the family’s contribution often and always includes it in his decisions:

...That is not an evidence-based treatment... [but] I would respect that... a... decision by the people who know the patient the best, his family. (Neurosurgeon, 001)

Many kinds of evidence contribute to discussions between experts and these are assimilated and processed to generate the main points that will support the decision making.

The evidence used in ICU is complex and multi-layered. The intensivist expected to have high levels of skill to assimilate the information. He explains:

...That's what we do for every single one of our patients... we have multiple levels of information run through from, you know, the very detailed, low-level information, from their magnesium level and their phosphate level and their keratin and their urea, sodium, and potassium... right through to, you know, their patterns of injury and their complex family interactions, social circumstances... (Intensivist, 025)

The knowledge that colleagues exchange can have an impact on the clinical management of patients.

The following example is from the ICU department where a clinical decision about the termination of the treatment was changed after additional information was obtained from a colleague:

...So I would go to him and say... "What is the evidence for these patients surviving?" And he would say, "Well, in Australia, 83 % of them die, but 17% of those patients would survive," and I would say, "Oh, that's interesting, because I would have assumed these patients all die." So that might inform my decision-making. So instead of withdrawing on the patient... I might actually say... "I think we... should continue treatment for a little bit if that's what they... have wanted." (Intensivist, 025)

Having evidence from multiple sources enriches clinical decision making. Evidence from textbooks alone is not enough to prepare clinicians for practice. Extensive learning begins when a clinician starts to practise medicine and starts provide care:

... trying to practise clinically. Just trying to explain the situation. There's no textbook answer. I've been trained as a doctor first, and a radiologist second... trying to apply the knowledge that I've developed and the clinical experience and acumen to explain what's happening physiologically with the patient (Interventional radiologist, 020)

Despite beliefs about the importance of experience, clinicians in trauma care also gather evidence by general reading on trauma topics. Although clinicians said that there is not much literature to help them with their clinical decisions, they do read regularly. One explained:

I subscribe to a few journals, and, ...newspaper articles... I personally think a lot of it is based on experience and knowledge. I guess that's where, you know, the art of medicine comes in, rather than the science of medicine (Interventional radiologist, 021)

For clinicians from the medical group evidence contributes to the decision-making process in many different ways. Evidence provides the basis for the standardisation of care processes, so the effectiveness of care can be measured. Evidence about the complications observed in current patients informs decisions about the discharge of future patients. The evidence here shows that even a technically very good operation would not work if a patient's social and cultural background are not taken into consideration. The evidence derived from the research literature and available guidelines could be different for different craft groups even when it addresses the same clinical situation. There

are many gaps in the research evidence and clinicians from this group fill those gaps through talking to each other and exchanging their own specific kinds of evidence.

9.2.2 Nursing

Protocols are the main source of evidence used in nursing care. Nurses often use protocols for their clinical decisions. A nurse who came from a different hospital just over a year ago found that a protocol was different from that in the institution in which he was working before. In the interview the nurse commented on how he checked the hospital protocol against the published literature. Nursing care is commonly regulated by protocols and he was told that he has to follow hospital policy:

... As far as I know there is no evidence increasing the risk of new infection using 'clean' hand and 'dirty' hand [method]. They said: "we know, [but] it's a procedure, it's a policy here, [you have to do it]" (Ward nurse, 003)

The hospital policy, that may or may not be in the protocol, is another type of evidence that guides nursing care. The nurse felt restricted in what he could do when he disagrees with the hospital policy:

... I looked up and I questioned... how they developed [the policy]... It says it's not as good as we think... but... I need to use this GCS as it's hospital policy I cannot go against it (Ward nurse, 003)

Written evidence (e.g. guidelines) often does not meet the information needs of the nurses. At the time when a nurse needs to carry out a procedure that he is not familiar with, he asks a senior to supervise and guide him because:

... in the guidelines or procedures it's only written indicators, it's hard for me to understand if it [written] 'gently pulling out' (Ward nurse, 003)

The evidence from a senior and more knowledgeable colleague provides a degree of confidence. Another nurse participant spoke about the evidence from a colleague that helped her to learn and perform the procedure that she was doing for the first few times:

...I felt I needed to go through it with someone before. I would not feel 100% confident by just reading the text, it might tell you step by step guideline but I do not think I will be 100% confident (Ward nurse, 004)

In this example the colleague provides the professional and personal support that the guidelines or the protocols cannot provide. Written evidence is not descriptive enough for the nurse to know how to do the procedure. This is the case of support versus research evidence. By supporting someone with their tacit knowledge, colleagues are adding to the evidence base. This is not only about the support of a colleague, but is the creation of new knowledge and thus should be taken seriously as another form of evidence. When clinicians help each other in clinical practice there is an exchange of knowledge that

is a form of evidence. The evidence derived from tacit knowledge, although recognised, is often called unreliable and not given as much importance as the evidence derived from RCTs.

The more experienced nurse, with at least three years in trauma, sounded more confident when speaking about care that does not fit into the hospital policy. This nurse was more comfortable with the fact that he will encounter aspects of care that are not in the written protocol and will therefore have to look elsewhere for the solution to his clinical dilemma:

... there is always the chance that something goes wrong or something doesn't fit... squarely into what the policy says and you need to just work around it somehow... (Ward nurse, 005)

This understanding also acknowledges that hospital policy cannot foresee all eventualities of clinical practice. Nurses are trying to adjust to the fact that textbooks sometimes do not match clinical practice either:

... say textbook perfect blood pressure is 120/80 – it's never like that... there is a lot of times where say doctors will be like..."no, that blood pressure is fine"... and they have a blood pressure that's sitting around 100 and they say it's fine, whereas a textbook blood pressure will be classified as hypotensive... (Ward nurse, 006)

Clinical practice is a process of continual learning. The evidence a perioperative care nurse needs in clinical practice was described as follows:

... I call upon my experience of working here for a long time and knowing usually A, B, and C follow each other, and I talk to more senior nurses that are around me, and I talk to medical staff and give the information and what I think might be happening and we have a conversation about it. (Perioperative care nurse, 007)

This nurse spoke about evidence in relation to “nursing instinct” or “gut feeling”. This type of evidence is developed by working in trauma care for many years:

... it's not like in my head a cut off amount for anything... its more about... not based on anything... that feel[ing] that that patient is deteriorating... (Perioperative care nurse, 007)

The importance of learning in the clinical environment cannot be overestimated. Accumulating experience, practice-based evidence, happens while working in the trauma environment. The next quote described this in detail:

... I probably learned the most about that stuff from other senior nurses who would come to me and say: oh, your patient doesn't look so good ...then I talk through the patient ...and they go 'oh... actually it just a little bit off... do you think this might be happening? ...you might want to go [get the clinician]' ...that's how I learned and there are some fantastic nurses that really did that with me... (Perioperative care nurse, 007)

Nurses rely on the evidence that exists within their working environment and passed from one nurse to the other. That is the evidence guiding clinicians how to provide care in certain situations. Although necessary and helpful, the evidence found in protocols does not replace the evidence from colleagues

and personal experience. The evidence found in protocols guides clinicians based on the approximate clinical situation and often clinicians have to find a way around the protocol when a clinical case does not fit in with the one described in the protocol. Tacit knowledge and intuitive evidence are the most helpful and commonly used.

9.2.3 Allied health

There is a certain degree of flexibility in decision making between allied health clinicians from the same clinical group using the same sources of evidence. In fact, evidence is sometimes used differently by individual clinicians. Evidence in the form of guidelines and published research is combined with personal experience. This combination results in variations of care, as explained by a dietitian talking about feeding trauma patients:

... I think their trauma requires 30% more energy but my colleague might think it's 40% or 20%, you know, more or less... that's just experience, it's not clear... (Dietitian, 009)

Research evidence is only one element that is used in the process of clinical reasoning. A clinician explained that the reasoning underlying the decision making is important and will justify differences in care:

... there are lots of areas about decision making that are vague. I don't think that it's black and white, right or wrong ...as long as I can say I considered A, B, and C and this is the energy amount that I came up with even if my colleges would do it differently as long as you can justify what you've done (Dietitian, 011)

Research evidence derived from the environment also contributes to clinical decision making. This clinician explained that she has to be cautious when she sees evidence that comes from outside the clinical environment in which she works. She is more comfortable to use evidence produced using the patient population she is working with:

...you need to see if it applies to your population ...unless it's specifically carried out in your population in your hospital... (Dietitian, 009)

Social workers provide care that can usually only be assessed qualitatively. These clinicians form an important part of the trauma team, however, they expressed feelings that their work was undervalued and questioned because it doesn't conform to the standards of evidence normalised by evidence based practice:

...people will say, "Oh, why do you do what you do?" ... "Well, where's the evidence base for that?" ...one of the comments has been "...show me something quantifiable, and how are you making a difference to patients? How are you making a difference in the hospital?" And that's when I felt perhaps it [evidence] was more of a disparaging or a limiting thing. (Social Worker, 019)

Social workers sometimes find obtaining evidence from patients to be a challenge. These clinicians work closely with the doctors in care provision and serve as a bridge of communication between medical team and the patient. According to one social worker evidence from a patient is sometimes difficult to ascertain:

...try to find out through gaining information from a range of people that know this person [patient]... because everyone thinks their view is the truth, and the truth is very difficult to ascertain in relation to relationships, in relation to anything... (Social worker, 014)

The evidence for this kind of clinical decision making may have to take into account the progress of care and the results of care delivered by other clinicians. It can also include the evolution of the patient's state of health.

9.2.4 Summary

Evidence from personal experience causes the variations in the care that patients receive from different clinicians from allied health groups. In a manner similar to that of clinicians from nursing and medical groups, allied health clinicians are guided by the evidence derived from their patients.

9.3 Chapter summary

Theme One, "Ways of understanding the concept of evidence", and Theme Two, "Contribution of evidence to clinical decision making", highlight the different roles of evidence in clinical practice. Although clinicians have a narrow understanding of the concept itself, they give an account of an extremely rich array of evidence routinely employed in clinical decision making.

Chapter Ten

Themes Three and Four: The need for evidence and how clinicians source it

In this chapter I present Theme Three, “Problems encountered that require new evidence”, and Theme Four, “Actions undertaken to find evidence”.

10.1 Introduction: Themes Three and Four

Participating clinicians represented a number of disciplines that are involved in the care of trauma patients. As previously described, each participant was asked to talk about a recent trauma case in their practice and to reflect on the information used to facilitate his or her decision making. The term *evidence* was deliberately avoided by the interviewer. A broad spectrum of examples across clinical disciplines was gathered. Participants spoke about trauma cases where new information was needed in order to make clinical decisions and to provide the necessary care. They described the ways by which they obtained the new information. In many of these cases, they considered that there was insufficient evidence in the research literature to assist their decision making. Indeed, they often found a need to turn to many different sources of evidence to decide how to handle patient care.

This chapter provides examples of clinical problems that require such new evidence (Theme Three) and the actions clinicians undertake to find needed evidence (Theme Four). Because the data representing these two themes are closely interlinked I decided to present these data together. In this chapter I am examining each craft group in terms of the clinical problems it faces and the approach to the need for new evidence that is adopted. I summarise the findings for each craft group at the end of each section.

10.1.1 Neurosurgery craft group

The majority of the neurosurgery workload in trauma is about normalising the intracranial pressure and stopping intracranial bleeding. The participating neurosurgeon emphasised that in his practice he had to deal with cases that were unique in their complexity and presentations. The given example was not from a trauma but a malignant growth in the brain. The neurosurgeon used this example to illustrate the complexity of neurosurgery care and difficulties in decision-making:

I've got a patient, [who has] what looks like a tumour within a spinal cord very high up, just below the brain stem. That's quite unusual. There I do not have a pattern to rely on because I haven't seen anything like this in a long time. (Neurosurgeon, 001)

While this was an example from a neurosurgeon who works both within trauma care and in other areas of clinical neurosurgery, it is illustrative of the complexity of the cases in neurosurgery and also provides a glimpse of the lack of available research evidence for decision making within this craft group.

Neurosurgery is a very narrow and highly specialised area of medicine. In an example of a clinical case where the neurosurgeon needed new evidence he made use of core medical knowledge and regularly read textbooks because, he explained, certain information can be found only in the textbooks. For example, in his most recent clinical case the neurosurgeon sought information on how to set up a theatre and an operating table, and in what kind of operating position the patient should be placed. The information enabled the neurosurgeon to have better access to the operating field as he explained in the interview:

...[when I] go home I will read about it. I usually buy a couple of textbooks every year to keep up, because this type of things is not really in journals... (Neurosurgeon, 001)

The neurosurgeon explained the common practice of asking an experienced colleague to participate in surgery:

... get a mentor to help you with the operation. The mentor will come and scrub in with you. Even though you might know how to do the operation, part of the decision-making is having someone who's seen more of this. (Neurosurgeon, 001)

In difficult cases, the clinician would re-evaluate known information about the patient and retrace the steps of clinical decision making again “like a medical student” (Neurosurgeon, 001). Collegial consensus seemed to be a final step and an important component of decision making. The neurosurgeon explained how in a situation where he was not sure what to do, he would regularly “...sit down with the other surgeons... (Neurosurgeon, 001)

Neurosurgeons regularly come across clinical decisions for which there is little or no evidence based literature to assist. When this happens, they often meet with colleagues to develop a care plan and at times return to textbooks for the advice on setting up the operating theatre.

10.1.2 ED and Trauma Medicine craft group

When asked to describe a case where more evidence was required than was available in the research literature, the trauma physician described the case of a young man who was riding a motorcycle and crashed at high speed. When the patient arrived at the emergency department he had a number of complex and life threatening injuries. The trauma physician described the questions that were raised during the care for this patient:

He has got severe chest injuries, confounded by the fact that he he's got a coarctation of aorta, pre-existing... so he is being treated in peripheral hospital and transferred here, arrived hypoxic, acute respiratory failure with right upper lobe tear, multiple fractured ribs, bilateral pulmonary contusions... difficulty ventilating... The question is should he go on ECMO for him to be able to be oxygenated ... he is on brink really ... what concession can we make to improve his oxygenation? Can we clear his cervical spine? thoracic spine? and sit him up? He has got chest drains. Are they adequately positioned?... on the evidence available, he is draining more than 100ml out of his right chest drain... which is an indication for thoracotomy... because he is too hypoxic to survive the procedure and we just know from the publications and also from the personal experience you can't survive that So we can do all those things which... you can't read about them ... (Trauma physician, 008)

The trauma physician described many grey areas of clinical care that required him to find new types of evidence that would enable him to assist this patient.

The other case was about a patient who received trauma to his neck and chest. This was an elderly gentleman and the injury to the neck was not clear on CT scan. The diagnostic MRI was not possible to conduct due to the patient having a pacemaker. The patient was assessed for the management of his neck and chest injuries. It was important to check whether the injury would allow the patient to be seated and the neck collar to be removed. These two interventions were important for the improvement of the patient outcomes, and prevention of aspirational pneumonia. In cases like this there is not one specific source of evidence that could give a ready-made answer to the physician. Instead the clinician relied on his experience and discussion with colleagues on the way forward for the care of this patient.

Another example of the need to make decisions without research evidence comes from an accident at a work place where a middle-aged gentleman was severely injured by a posthole digger. The machinery

caused an extensive injury to his abdomen wall and internal organs. The clinician needed more information about the sustained trauma and the severely injured patient had a CT scan before he was taken to a theatre, although in the protocol there was a recommendation against doing a CT scan. The trauma physician sent the patient for a CT scan before going to the operating theatre. This decision about the CT scan was made against the hospital protocol, which would have been to send such patients straight into the theatre:

. ...The question is should he go straight in the operation theatre?...so ...decision with him is ... it would be in advantage to get a CT scan, because if [the digger has] gone retroperitonially we will know wat's going on, if he is got a significant caval [or other] vein injury... he is awake and not intubated and should we intubate him now?, should we put chest train in now? and the decision I made... [was to do the CT scan] even though the evidence is ... not to do CT scan... (Trauma physician, 008)

This happened because the trauma physician was able to collect different kinds of evidence and it led him to a decision that the CT scan would be advantageous and would provide all of the necessary information before the surgery. This example shows that sometimes protocols provide the necessary evidence to make informed decisions but sometimes they are disregarded and further evidence is required before treatment.

When trauma physicians do not have all the evidence they require to solve difficult cases present in the trauma ward, they have a number of ways of generating new evidence. One of these ways is by conducting their own research in the department. They see the benefit of conducting studies in the department as generating context relevant data that will apply directly to their local patient population. The trauma physician clearly valued this knowledge and described the efforts to increase the knowledge as:

... prospective studies we have done in here in trauma reception and resuscitation... how these things [the elements of trauma care] interplay... obviously personal experience... basically helps with decision-making (Trauma physician, 008)

Efforts were directed towards standardising the approach of certain procedures. The standardised approach to the insertion of the intercostal catheter (ICC) was successfully implemented and this led to the improvement in patients' outcomes. The study was done in the department. The physician explained:

... we introduced a standardised 'chest tube insertion' procedure in resuscitation, how the area was prep..., where the tube is inserted, what tube, how to secure, what antibiotics. We measured 1000 patients pre-insertion and 2000 post-insertion. The empyema rate went from 1.6 to 0.5%... (Trauma physician, 008)

The work to generate new knowledge is ongoing, focusing on the insertion area of the ICC. The trauma physician is leading this work with the help of his students:

... I've got [a] biomed science student looking at chest X-ray... She just researched the site of insertion... (Trauma physician, 008)

Conducting studies is not the only way that clinicians can gather evidence that is relevant to their patient population. The trauma physician gave an example of a patient who was severely injured and required a life-saving blood transfusion. But due to her religious belief, belonging to Jehovah's Witness religious group, the patient and her family would not agree to a blood transfusion. In this case there was no simple solution to this problem and the clinician went to the published literature looking for ideas and suggestions. The clinician found information on synthetic haemoglobin and this is what he recounted about this case:

... I went to the literature to see what things we could do to improve oxygen delivery [and] also... [I drew from] my own experience...[and] as a result contacted the office of Naval Research in Baltimore who was studying synthetic haemoglobin... went to the manufacturers, had that product flown out, which we administered to her and then she survived... (Trauma physician, 008)

By linking to the research literature, the clinician was able to source the information that he needed. While some evidence was found, it sparked him to draw from his past experiences to find the clinical solution that was eventually pursued.

In the Emergency Department and Trauma Centre, physicians lead the trauma team that provides care to severely injured patients in the trauma and resuscitation bays. The clinicians often have to make a large number of clinical decisions in a very short period of time. Trauma injuries are often not obvious and clinicians have to rely on their work experience and anticipate the continuously changing clinical symptoms. Frequently, decisions are made based on the likelihood of one or the other symptoms of trauma, this is to say that decisions are made in uncertainty. The evidence that is used at the point of care could be of any nature. In addition to the medical knowledge and clinical experience it can include the mechanism of injury, any witnesses' accounts, the family's concerns and preferences for care, the state of health and injuries of others involved, and many other different kinds of evidence. The more evidence the clinicians have for their decision making the more precise their decisions could be.

10.1.3 ICU Medicine (Intensivist) craft group

The ICU Medicine craft group provides another example in which complex care is needed for patients with severe trauma. The clinical decision making for the intensivist is about evaluating the information that is given to him or her from other attending clinicians and deciding what information will take priority. His role is to coordinate the efforts of attending clinicians representing different clinical craft groups. A clinician from this craft group has to negotiate the competing interests of all other clinicians involved in the management of these cases. These are the different kinds of evidence at play. Sometimes clinicians disagree as they have different priorities, depending on their craft group. This will be further discussed in Chapter 10. Here we are interested in the issues that come up and require the use of new evidence to make a clinical decision. The clinical issue in this example involves two clinicians who disagree about the immobilisation of a patient who has severe head and spine injuries. One clinician is ordering to immobilise the patient due to trauma to the spine and the other clinician argues that the patient should be seated with their head in an elevated position due to the head trauma:

...what happens is, one surgeon comes along and says, "Oh, I want this patient immobilized for their spine"... the next surgeon comes along and says, "No, I don't want this person immobilized, so that their head is up, and so that their head injury is looked after"... (Intensivist, 025)

This work dynamic is not new in the ICU and over the years clinicians have agreed to a protocol where the priorities of the interventions are clearly stated so clinicians do not fight with each other at the bedside of a patient:

So around some of those common areas of contention, we have some guidelines which are agreed upon beforehand, so that we're not arguing over a single patient, but we've actually got an agreed set of principles that guide our decision making. (Intensivist, 025)

When clinical decisions need to be made, intensivists sometimes turn to guidelines, derived from literature reviews, to guide their decision making around negotiating between different priorities from the participating clinicians.

When a severely injured patient is transferred to the ICU a number of clinicians representing different medical disciplines are involved in treating one trauma patient. This team of clinicians is led by an intensivist.

There are other ways that the intensivists might fill evidence gaps in their clinical practice. In the interview the intensivist gave an example of different interests from many different disciplines that were

gathered together with the common goal of providing the best care to the trauma patient. The intensivist had to assimilate this large amount of information coming from different clinical disciplines in order to provide the optimal care to a patient:

... we might then go to the experts, and that might be the vascular surgeons, the neurosurgeons, the radiologists, and we might then discuss that case, taking into account those things... ,to be able to take the patient forward, usually trying to gain agreement, negotiating agreement. (Intensivist, 025)

Clinical decisions are also dictated by departmental issues like a shortage of monitored beds. For one trauma patient, with cardiac contusion, the decision was made to move the patient out of ICU and into the trauma ward. The clinician went to the literature about the benefits of keeping a patient, as above, on the monitored (ICU) bed. The intensivist explained that for this kind of information or for this kind of decision-making he will not consult the attending cardiologist, because the cardiologist will advocate the benefits of the monitored bed and this will not help to solve the bed shortage issue in the ICU. The intensivist went to look at the literature to avoid a clash of interests.

The clinicians in ICUs, intensivists, are looking after patients who are stabilised. All beds in ICUs are monitored beds and that means clinicians are getting a large volume of evidence through the equipment used to monitor the patient. In addition to this there is always a nurse that collects the evidence from the patient and passes it on to the clinician. This evidence sometimes includes the nurse's observation in addition to the documented one. The intensivists deal with the issue of competing evidences and often they have to make a call of professional judgement about which evidence will take the priority.

10.1.4 Plastic Surgery craft group

A clinician from this craft group gave an example of a care scenario with a patient having an infection in his leg after a trauma. This was a case of chronic osteomyelitis and it required numerous clinical decisions from the plastic surgeon. The considerations involved an amputation, a reconstruction, tackling deformity and functionality of the limb after the operation, compensations, and the patient's family circumstances:

...patient with chronic infections on the leg after a fracture, tibia... So you've got to decide whether it's worthwhile to reconstruct the leg, or worthwhile to have an amputation. (Plastic surgeon, 023)

The issue with the evidence this plastic surgeon had in this case was that the patient was asking for an amputation. The patient had already had one leg amputated and he was asking for an amputation of

the remaining leg. In his training, the clinician had learned how to preserve and save limbs in such situations, but in this case he had to put aside his training and consider the patient's request carefully.

The plastic surgeon emphasised the importance of "knowing" the patient and the patient's family. In this example, the clinician spent some time talking to the patient, trying to understand the patient's family dynamics in order to see the reason behind his patient's request to amputate the leg. The clinician explained:

... it's the balance of talking to the patient and the history that the patient gave. And then you look at the leg and you assess whether any further operation would improve it. So it's based on a number of factors rather than on one factor; and how genuine the patient is. You only can judge that by talking to the patient, by knowing that patient... (Plastic surgeon, 023)

In this example the plastic surgeon discussed the case with an orthopaedic surgeon. The discussion was about how this operation would fit the patient's circumstances; it was not about the technical aspects of the operation.

When asked about the use of research information, the plastic surgeon said that he finds it unhelpful to his decision making. He added that there was a limited amount of research available in his field and on occasions he searched for clinical evidence internationally. He explained that other plastic surgeons around the world would have experience with a certain type of plastic surgery that perhaps he did not and they would share information.

The plastic surgeon finds the evidence, besides the textbooks, in his field is limited and is often guided by the evidence derived from his patients and sometimes other plastic surgeons that have a professional experience that can inform his decisions. This will not tell him the answer to the clinical question that he might have, but it will give him a general knowledge of the possibilities of care that he might want to consider for his patients.

10.1.5 Interventional Radiology craft group

This craft group, in addition to having a diagnostic role, also provides a treatment. There were two areas of expertise in the interventional radiology craft group: clinical and radiological. The clinician worked with patients, assessing their symptoms and with images, such as X-rays, CT scans, and others. The radiologist worked with images sometimes for diagnostic purposes and more often for visually guided

interventions. The primary sources of information are the patients themselves. The participating radiologist described his role as a consultant, and as a clinician with special skills in radiology.

In the interventional radiology the care for a trauma patient quite often involves dealing with vascular internal bleeding. The clinician spoke of the importance of considering a clinical picture in addition to any radiological investigations that a patient might have had. These clinicians incorporate radiological expertise and the evidence that comes from an examination of the patient into their care decisions.

The radiologist gave an example of a difficult situation in trauma where the CT scanning did not correlate with the clinical picture and the clinicians knew to keep in mind that a negative result from the CT scan did not necessarily mean there was no trauma. Negative results sometimes mean that the trauma is still developing and the time factor needs to be considered. Following is an example where a patient had an “all clear” CT scan and continued to deteriorate clinically. The patient had a second CT scan, which confirmed the bleeding and the need for the immobilization of the bleeding blood vessel. He explained how the situation:

...wasn't clearly evident on the CT scan at the initial presentation... So, timing is always important... and sometimes with vascular injuries, the injury may not be apparent, or may be very subtle at the time of scanning... (Interventional radiologist, 020)

This was a complex case, as the radiologist explained:

... The clinical picture didn't suit the imaging, so we had to look for another cause as to why the patient was hypertensive. So in that setting, I would take an active role in clinically assessing the patient, not in just looking at the imaging (Interventional radiologist, 020)

When the radiologist said that the clinical picture did not “suit the imaging”, he meant that the symptoms the patient displayed clinically were not matching the images of CT scan that patient had had done.

When a difficult clinical decision presents itself, radiologists are required to search for evidence in a number of ways. For example, the radiologist frequently asked colleagues (fellow radiologists) about unusual clinical cases. Sometimes in the search for evidence the radiologist would go to the Internet, where, here he describes it as:

... a few different avenues. ...the Internet is one. So Google. I have a few websites that I know that I can relatively trust, or at least I think I can trust. Also go to PubMed, looking for journal articles, is very helpful as well. PubMed's another big one that I use. Or textbooks. (Interventional radiologist, 021)

The other sources of evidence the clinician spoke about were the research literature and personal experience:

I subscribe to a few journals, and, ...newspaper articles... I personally think a lot of it is based on experience and knowledge. I guess that's where, you know, the art of medicine comes in, rather than the science of medicine (Interventional radiologist, 021)

The clinician gave examples of gathering evidence that started with the patient's notes, and concluded with the multidisciplinary team discussions where clinicians expressed their opinion in their areas of expertise:

... every time we get a referral, we go through the clinical notes and investigate further, on what the appropriateness of this investigation is... we may feed that back to the requesting unit, but at the same time we also conduct a few multi-disciplinary team meetings, where there's in depth discussion about patient options (Interventional radiologist, 021)

The clinician also spoke about conferences as a source of useful information. When a clinical scenario is recognized as having been spoken about in the conference, then the useful information can be recalled and utilised:

I might hear about a particular talk, then eventually when I experience this myself I go, "Okay, I remember hearing this before." (Interventional radiologist, 021)

The interventional radiologists use their colleagues' opinions often and with a lot of professional respect. Although there is some research information available in this field of medicine the clinicians are using many different avenues in addition to the research evidence. The clinicians appear to be very active in terms of discussing their patients with each other and making decisions using this input.

10.1.6 Radiology craft group

The radiologist in this craft group was not involved in clinical examinations and treating patients to the same extent as an interventional radiologist. This clinician conducted the imaging and interpreted the images. He did not directly participate in the treatment of trauma patients. The clinician carried no direct responsibility for the treatment of patients, but he worked closely with trauma surgeons, intensivists, trauma physicians, and other clinicians. The participating clinician was interested in talking about the evidence saying he largely relies on guidelines.

According to the radiologist the clinicians from other disciplines were very keen to conduct a number of diagnostic radiological investigations, unnecessarily irradiating patients. In cases where new evidence is required, in a difficult diagnostic case, the radiologist discussed the images with colleagues, fellow

radiologists, and with clinicians from other craft groups. The consensus based approach seemed the ultimate arbitrator and the way clinicians arrive at a decision:

... When it gets to a more pointy end then there is lack of evidence there and then it's a matter of arriving at a consensus by decision of the experts. So you had to go to a consensus-based approach (Radiologist, 015)

The participating radiologist is responsible for updating department guidelines. He said that the latest research findings were incorporated into clinical practice regularly and the departmental protocol was updated to include the latest findings from the peer reviewed literature. The radiologist spoke with an enthusiasm about what he regards as robust evidence, such as the latest published results from a large RCT that he was impressed with. The example the radiologist gave was the randomised controlled trial called:

... MR CLEAN, [a] trial from [the] Netherlands that has just come out on looking at the outcome of patients for clot extraction... that's a game-changer in a way and to me when I go in in discussion when I'm formulating a policy in the department about stroke management to help the patients I will incorporate this evidence into the protocol (Radiologist, 015)

The radiologist said that based on the finding from this trial clinicians will have clear guidelines on what do to in the first six hours after a stroke patient had symptoms. The clinician placed a lot of value on the findings of this RCT, and research evidence more broadly.

The radiologist participating in the interviews is a clinician who mostly works with images. His clinical practice involves many hours of desktop work, and he only occasionally consults at the bedside. The radiologist's main source of evidence are the guidelines and research literature.

10.1.7 Ward Nursing craft group

Ward nurses provide day-to-day care to patients who are out of the immediate danger of acute trauma. They are with patients throughout the day and usually they are the first to respond to patients' needs. A nurse will often work at a patient's bedside. These clinicians regularly encounter situations where they need new information in order to make their clinical decisions.

The ward nurse gave an example of a trauma case where a patient had external fixation. This is usually a metal frame that is positioned to hold the broken bones together, so the frame penetrates the patient's skin and is attached directly to the bones. At the same time a part of the frame is outside the patient's body and can be adjusted by the treating surgeon. There is a risk of infection because the protective

barrier of the skin is broken and therefore the patient requires special nursing care to prevent any complications:

I came across patients with external fixations... I 'd never looked after these patients before, so again there was a nurse educator that came around the ward and assisted me (Ward nurse, 004)

In the case above the need for new evidence came from a lack of clinical experience. The nurse did not have the chance to look after these patients before. It might be that she had learned the necessary knowledge from her education, but this does not prepare her for the duties in the trauma ward where she has to provide hands on care to patients with external fixations. The nurse looked up to her colleagues, fellow nurses in the ward. She had 2 years of experience and the evidence for her decision making would come from other nurses who had more experience.

Similarly, nurses know the hospital policies but that does not necessarily mean they can do a procedure. The nurse said that for some information she would look up the protocol, but even after printing the information out and reading it, she would ask the senior nurse to supervise the procedure and guide her through the procedure:

...I feel I need to [go] through with someone before. I would not feel 100% confident by just reading the text, it might tell you step by step guideline but I do not think I will be 100% confident. (Ward nurse, 003)

we all know that policy like of the back of our hand, but it does come down to a technique and the way you do it. (Ward nurse, 004)

This example of knowing the policy yet needing assistance with the technique originates from when the nurse had to remove an intercostal catheter from a patient's chest. The nurse was faced with the need for a skill and knowledge that could not be obtained from a textbook or a protocol. She described how the words in the protocol "gently pull out" did not explain the angle of approach, the force, or the tension with which to pull the catheter out. During the procedure there was a different kind of knowledge exchange between the two clinicians, the nurse who was supervising and the nurse who was doing the procedure for the first time. This was described in the given example:

...The nurse educator was standing next to me, but I did it by myself. She just helped me... like which angle... how to approach the drain tube, [from] which side, which effective way to clean... (Ward nurse, 003)

The ward nurse reflected on the knowledge that is obtained from university versus the knowledge that is utilised and essential in clinical practice:

...going from University to hospital... working and having all your responsibility, it's completely different. You need to be in the environment and have the responsibilities... to learn I suppose... and they are a very different... all the textbook knowledge... and then you actually come to work and responsibility... and you have to make all the decisions... (Ward nurse 006)

For the ward nurses, the new evidence that was required often came in the form of mentoring from more senior nurses who had had experience doing the techniques and could teach them how to do it with all the nuances that come from working alongside someone. This evidence is never available in a textbook, published research or guidelines.

10.1.8 ED Nursing craft group

I spoke to three nurses in the ED Nursing craft group. When a patient arrives, there is a trauma “call out”. This means that a number of clinicians receive notification of the patient’s arrival and they come to the Emergency Department. Nurses here are on the front line alongside a trauma physician who leads the trauma team in ED. Patients are brought by ambulance and usually the clinical picture is unclear and their state of health could deteriorate rapidly. Although the treatment care is usually led by doctors, it relies heavily on the care provided by nurses. Communication with medical staff is an important source of information for nurses’ clinical decision-making in ED. The ED nurse responded to the doctor’s need for information. She collected information from patients, and ordered all the tests that she knew were essential for their diagnosis and care.

Nursing care starts with an assessment and information gathering and involves making clinical decisions along the way. The experienced nurse in this example knew that the treatment priority was pain relief. The pain would not completely go away, but the patient had to be helped to breath using as much lung capacity as possible given the multiple fractures of the ribs. She explained that good pain relief is directly related to a good outcome for the patient. However, the case was complex because the patient had already received some pain relief treatment. The challenge was to avoid drowsiness so he was still able to breath and cough. These are important functions of the lungs that don’t function as well on high doses of pain relief.

The nurse explained:

... So you need to look at different types of medication that are gonna give the pain relief, but not make him so drowsy so he can still have the deep breathing and the coughing. So in the short term, morphine is great, but you need a longer term solution to manage his pain and make sure he's still alert and awake enough to deep breathe and to move around. (ED nurse, 017)

So in this case, the nurse needed more evidence about how to provide pain relief without it being too much and compromising other areas of the patient's recovery. The nurse had to ask the doctor to choose what tests he wanted to be done first and what tests could be done later. Even a nurse with twenty years of experience realised that communicating with the doctors was required for her own clinical decision making:

...being aware of what you've got I think is really important and also being really aware of your limitations and if you do not know something you need to go and find somebody... to help you in clinical decisions. (ED nurse, 002)

Sometimes ED nurses are able to make prioritisation decisions themselves. Experience can also play a role in communicating evidence needs and clinical decisions with the doctors. A junior doctor was fixated on one clinical aspect of patient care and the nurse had to manage the priorities of the care and tell the doctor that whilst his concern was important it could be attended to later because there were other pressing issues that were more urgent. This nurse had over fifteen years of experience in trauma care and she felt confident doing her job and communicating with medical staff. She explained:

...I think, when you've been here long enough... you have a good working relationship with the doctors, that you can discuss the patient's care... (ED nurse, 017)

For ED nurses, to provide competent care to trauma patients requires years of experience. This experience would include knowledge learned from patients, from colleagues, and from clinicians from different craft groups. The ED nurses drew on evidence mainly derived from their personal experience and their discourse with trauma physicians during the trauma call out. The ED nurses draw on evidence that they called a "nursing instinct".

10.1.9 ICU Nursing craft group

The example from the Intensive Care Unit in which nurses required new evidence included trauma patients who sustained brain injuries. The nurse had identified the need for evidence about best practice in treating intracranial bleeding due to stroke versus intracranial bleeding due to trauma in the ICU department. She created a survey for nurses in the ICU with the aim of understanding what level of confidence nurses have in caring for two groups of patients: brain trauma patients and stroke patients.

The aims of the survey were to find out information about the best practices of care for each patient group and to educate the nurses in the ICU about these practices:

...I surveyed nursing staff to see what their current,...what their current knowledge and confidence was in managing patients... the goal is to provide... education to nursing staff (ICU nurse, 026)

In this example, there was a need for new evidence because of a gap in the research literature and the participant was able to fill that gap by conducting research.

The ICU nurse drew on the evidence from the research and from the interaction with the intensivist on duty. She became involved with the research opportunity and investigated clinical practice in order to understand the best practices of nursing care in the ICU department.

10.1.10 Perioperative Care Nursing craft group

There are two different clinical fields in this craft group. One is the operating room and the other is the recovery room. In the operating room nurses work closely with the anaesthetist, taking orders and instructions directly from the anaesthetist; however, in the recovery room nurses manage a patient independently, overseeing the patient's recovery and assisting the patient in coming out of anaesthesia. Perioperative care nurses work in a fast-paced environment and have to make urgent decisions. The clinician spoke about the challenges and complexity that each trauma patient presents. The clinical picture changes throughout the operation and in the postoperative period. Anaesthesiology and perioperative care form a multitasking and multi-decision-making environment:

... a patient will deteriorate quite quickly... and its making sure that you identify that early and you get help to come in... and put things in place to treat the patient or treat what ever is happening with the patient earlier... for me its usually... become hypotensive and I have to go "ok, if patients become hypotensive, why are they becoming hypotensive?... is it because of something they had in anaesthetic or is it because they are bleeding and you need to assess all of their dressing and things like that. Is it because they are under filled? You kind of then have to start problem solving why... because patients are fasting often for 10-12 hours before their operation and they might be on the table for another 5 [hours]... just under filled... and they might need some more volume to catch up. It might be they are bleeding or if they had a spinal epidural... which will drop their blood pressure. (Perioperative care nurse, 007)

Perioperative nurses must think broadly and quickly learn to problem solve in order to cope with the many problems that they come across which require evidence. The participant explains that her job involves:

...problem solving what you think [the issues are] going be, so when you do go to your anaesthetist you can say this is their blood pressure, I think this is what is happening, their drains are at this... this improves it ... this doesn't improve it... and then you can go further for management of the patient (Perioperative care nurse, 007)

The care of a patient in both clinical fields involves close monitoring of the patient's blood pressure, heart rate and other vital organs. The main source of information that is drawn upon is experience:

...I call upon the knowledge and skills that I learned when I did my post graduate studies... I call upon my experience of working here for a long time and knowing usually A,B, and C follow each other... and I talk to more senior nurses that are around me and I talk to medical staff and give the information and what I think might be happening and we have conversation...(Perioperative care nurse, 007)

For a junior anaesthetic nurse, information-seeking behaviour involves gathering knowledge within the context of perioperative care, including knowledge in the operating theatre and knowledge in the recovery room. For the senior anaesthetic nurse, information-seeking behaviour includes discussions with doctors and consultants. In both examples such gathered knowledge is highly contextualised and directly relates to a patient and the care that has been provided:

... when I was a novice or just started in theatre I would go to more senior nurses first as a point of call before anything else... I would ask their opinion and talk it through with them first before I would go to the medical staff... whereas now I am that nurse and I'm able to know all that kind of stuff myself, so the things that I'm probably not sure of or can't gauge I just go straight to the anaesthetist or to the surgeon... (Perioperative care nurse, 007)

The main source of information for this nursing group is asking a colleague, a senior nurse or having a conversation with an anaesthesiologist or surgeon, or any other involved clinician:

...I would say to the anaesthetist I never heard of that, what does it mean, what does it involved and they would give you a brief thing and then as soon as I have my patient stable I would then go or ask someone for more information... (Perioperative care nurse, 007)

The OSS nurse used the literature outside her clinical duties. The evidence gap was filled through reading on the topics that are not necessarily directly linked to the patient care. The OSS nurse explained:

...I'll do a bit of a search... for my knowledge because I'm trying to learn about stuff I don't know... every few weeks... I hear someone says something ... like there [might] be a transplant patient listed that has got some syndrome... I'll go back and have a look at it and read about it... (Perioperative care nurse, 007)

The above example is about filling the gaps in knowledge by consulting the research literature. This reading was not directly linked to the decision making, but it could be utilised as knowledge in the future during the provision of care. The perioperative care nurse was very colloquial about the knowledge she gained from other experienced nurses when she just started her nursing career. This knowledge or evidence continues to grow and it helps her with every day clinical work. The nurse consults literature from time to time, but it is the evidence in clinical practice that stimulates her to enquire and read more about certain clinical cases.

10.1.11 Dietetics craft group

Dietetics is a fascinating craft group, rich with examples of clinical cases and care decisions that are made for trauma patients. Although the dietetics for some people could be simply about a food pyramid, dietetics is a complex and multifaceted medical discipline essential to successful trauma care. While there are guidelines and recommendations for the treatment of trauma patients, a lot of discretion was given to a dietitian's own clinical reasoning in decision-making. Therefore, there were examples of cases where dietitians required evidence that was not available from traditional sources.

One dietitian spoke about a trauma patient who had re-current trips to the theatre and that meant that the patient needed to be fasting for 12 hours every time he was due for an operation. In severe trauma cases, where a patient had been intubated, the task of dietary treatment involves calculating and administering nutrition via intravenous delivery, i.e. the parenteral route. The challenges for the dietitian in the example were in making sure the patient received sufficient nutrients between fasting for 12 hours every couple of days due to the patient having to go to the theatre:

...the trauma patients that have recurrent trips to theatre probably are more challenging...once they've been extubated they may still be in the ICU and they have to fast and go to theatre every 2nd or 3rd day which means they're missing 12 hours of feeding every second day and that's difficult... more difficult because we can't get enough oral or enteral feed in... so it's a little less clear... whether or not you have some sort of permissive fasting, is it okay to fast every 2nd day for a week or is it not, and when do you jump in and start more aggressive nutrition therapy like intravenous feeding... does that make sense? (Dietitian, 011)

In another example a patient had facial fractures. The patient's gastro-intestinal tract was not injured and could digest the food—but there was no access to it. The patient could not intake food through his mouth and a naso-gastric tube insertion was impossible. In this case the dietitian had to plan the intravenous (IV) feeding:

... trauma patients with facial fractures, or nasal fractures, or base of skull fractures... so we can't use naso-gastric tube so that's again it's a little more unclear because their stomach and their intestines are working but we just can't get access... so that's when we'd use intravenous feeding... (Dietitian, 011)

The dietitian would require evidence about the nutrition needs for the patient with the unique combination of injuries. As the patient recovers, the dietitian has to reassess and plan the treatment with progressive changes to the naso-gastric tube, and then to the oral feeding, where each step required a reconsideration of the evidence. The nutrition requirements would have to be calculated and checked on a daily basis.

There were examples of the trauma patients where surgeons were cautious and despite the patient having a working gastro-intestinal tract they prescribe the intravenous feeding:

...sometimes their... gastric intestinal tract is working but the surgeons are being very cautious and so they say you know no enteral for 5 days after the operation and then we'd start intravenous feeding because we can't give it in any other way. (Dietitian, 011)

In the example above, the dietitian required evidence that she did not already have and in the end based her clinical decision on the evidence from the treating surgeon.

When in need of information the clinician from this craft group asked her fellow colleagues. The clinician said that her colleagues' opinion may not be evidence-based, but it was used frequently and it was a necessary source of information at the point of care. The dietitian said:

...I don't know if I would formally call that [colleague's opinion] evidence-based but... it is definitely something that we would use as dietitians, because often there isn't black and white evidence to support our practice. So we do rely a lot on expert opinion and discussions with colleagues... (Dietitian, 009)

The exchange of evidence took place in the care of a patient that was moved from the ICU to the ward. The dietitian who took care of the patient in the ward had to speak with a colleague in the ICU who had looked after the patient before. This evidence is essential to the continuation of care and dietitian's decision making:

...[I would be] talking to the dietitian that was looking after the patient in ICU and seeing what their reasoning was and discuss... (Dietitian, 009)

Although in the interview the dietitian did not speak much about the published research, when asked the clinician confirmed that she would use the literature to inform her practice. She said:

...I would look... at the literature and different articles that have been written... (Dietitian, 009)

The experience that dietitians have acquired in trauma care would be one of the important sources of information for their clinical decision making. In the discussion during the interview the terms "background knowledge" for the academic knowledge and "foreground knowledge" for the working experience were used.

The dietitian confirmed the importance of experience for clinical decisions and said:

...I very rarely probably go a textbook or look things up unless it's something I haven't seen very often and definitely [I am] using that foreground experiential knowledge... (Dietitian, 009)

The following quote was an example of the actions taken to fill the gap in the knowledge within the department. The dietitian described a retrospective study looking at the patient population with head injuries and trying to identify the pattern of symptoms that can be used in the future. The participating dietitian explained:

...we've measured 5 different patients with head injuries in the last month lets look at how those 5 fit together and try and educate our future assessments... (Dietitian, 011)

These observations will form the evidence clinicians in the department will use for their future decision making.

Dietitians recognise that in textbooks there is rarely an answer to their clinical question. The evidence they rely on derived from their experience. Every clinician has a different experience and that means that the care they provide could differ lightly from one clinician to the next. The evidence they seek comes from the literature on dietetics, from patients and patients' families, from treating clinicians, and from all professionals from other clinical disciplines. They used an array of evidence and one single evidence can be enough by itself.

10.1.12 Physiotherapy craft group

Physiotherapists often assimilate all the information from several different clinicians treating the same trauma patient. Sometimes there are three or four surgeons who are treating a patient at the same time. Physiotherapists help patients out of bed and assist them in their first steps towards their recovery. The following example is of a trauma patient who was hit by a train in an attempt to commit suicide. The patient had both legs immobilised in braces due to extensive fractures in both legs. The patient had an injury to her arm and elbow. The physiotherapy task was to start rehabilitation using the meaningful activities enabling the patient to work towards independence and recovery following the trauma:

...she basically got two leg injuries that meant that she is in some knee braces that mean her legs are stuck out straight. Then she also has an injury to her elbow which means it's in the back side like that. She can put some weight on her legs but obviously, when your legs are stuck out straight, it is really hard to stand up and mobilize like we normally would do...we had to try and problem solve around how we were going to get her... [out of bed]...so she could use the toilet and have a shower and do some normal things again. So... I drew upon... patients that are having similar situations... (Physiotherapist, 012)

The clinician faced the clinical problem with no readymade answer telling her how to go about it. The clinician referred to her previous experience of dealing with similar patients in the past.

The next example was about a trauma case where the patient had a spinal cord injury. The physiotherapist was emphasizing the importance of providing physiotherapy at early stages after the trauma. The physiotherapist was aware of this trauma case after working hours but she was thinking, and planning, and was on the case first thing the following morning, as soon as she arrived for work:

... new spinal cord injury... the patient who had been admitted to emergency and then was coming to intensive care. Traditionally, we would have a very important role with the care of these patients, including their respiratory management and preventing any respiratory complications. So we would normally need to try and be proactive and treat these patients as early as possible, but the patient at the time had not yet been to theater and had their spine injury stabilized. So trying to weigh up the risks and the benefits of when it was again appropriate to treat the patient, and whether the physiotherapy would provide a benefit in terms of helping with the care of the chest and preventing respiratory complications, but also knowing that the patient had a potentially unstable spine. (Physiotherapist, 013)

The clinician in the example above is aware of the complexity of spinal cord injury care. She knew that early physiotherapy intervention would give a patient a better outcome, so even before she had a chance to see the patient she was already weighing up the possibilities and asking clinical questions in regards to the care this patient will require. This case illustrates the beginning of the evidence gathering that will continue until the patient is discharged from her care.

For physiotherapists, knowledge collection starts with the physiotherapist reading the patient's notes and summarising their history. Most of the information comes from the clinical examination and assessment of the patient. Physiotherapists gather their own information from the patient in order to provide specialised care. They view themselves as important to the care the patient receives. They say that it is a physiotherapist who helps a patient out of bed and onto the road to recovery:

...[we] would be looking at, is their past medical history their social history ...all the stuff that you gain from the medical history [notes] and also stuff from the patient and then there are certain tools that help to determine whether ...they [patient] would need to go to rehab or home... (Physiotherapist, 010)

The physiotherapist participant spoke about a small clinical trial to generate knowledge in the department to inform the physiotherapy practice. This was a small study to investigate the effect of early physiotherapy interventions on the length of stay in a hospital for trauma patients. This is what the physiotherapist said about the results of that study:

...10 days less time [in hospital] if we did more [physiotherapy] with them early... (Physiotherapist, 012)

The physiotherapists in the department have written a document that contained physiotherapy specific trauma-related knowledge to help new graduates with their clinical decisions.

The participant said:

...we generally have written it just as a guideline. It is... up-to-date current information on... well, I am not going to call it a protocol ... it is something just within our physio-trauma team, we have sort of agreed on it... (Physiotherapist, 012)

Complex clinical situations like an injury to a cervical spine were marked in this document with a “red flag” to indicate to a junior clinician to seek supervision from a more experienced physiotherapist. Building up experience involved asking questions as they appear within the context of providing care to a patient. Junior physiotherapists were encouraged to ask questions all the time:

...red flags... there would be things like a cervical spinal cord injury patient. If you haven't seen a patient that has had a cervical spine cord injury before... then you should talk to your seniors... (Physiotherapist, 012)

In the interview the physiotherapist giving the example of a clinical scenario described a treatment process as a “trial and error” journey where the clinician continuously collected the clinical evidence from the patient and that feedback informed the following clinical decisions and steps in treatment. The physiotherapist described how she starts with what worked last time with a similar patient. This decision making process progresses to provide individually tailored care:

...generally, I think I would make a plan based on the injuries. I'd say, "I would like to try and do this." And then I will try that and see if it works... (Physiotherapist, 012)

This physiotherapist also spoke about using a colleague's opinion as a source of evidence in her clinical practice. The clinician spoke using the collective example of the trauma care in her experience, she said:

...you draw on your experiences mainly from working... perhaps, I have seen this type of injury before... like we have fabulous trauma consultants... we can ask all sorts of questions too. That is really great. The next time, I would not need to ask that person that question again because I understand that a little bit more now... (Physiotherapist, 012)

The next participant used evidence from instrumental investigations, such as:

...the X-rays and the op [operation] reports to decide what the weight-bearing status is, and make a decision that actually does make sense based on the fracture... (Physiotherapist, 016)

In addition to the above this physiotherapist also based her decisions on information from the medical staff and from the nursing staff. She aimed to attend trauma patients as soon as they received the initial emergency care. She explained that she needed to put the entire picture of that patient together and

that included the physical and cognitive status of the patient:

... you've got to clarify their cognitive status with the occupational therapist. Then, is this patient cognitively able to understand that they have to non-weight-bear? Or weight-bear, or whatever the orders are. So you need to put all those pictures together, plus you need to have a look at their bloods and that sort of thing... I think from a cardiovascular point of view, you would just, um, you would monitor them and have a basic guideline in your head... then you actually need to use clinical reasoning. You know, so you need to actually use your own brain... (Physiotherapist, 016)

The assessment of cardiovascular status of the patient would give evidence about how the patient is coping with the physiotherapy, so the clinician had to constantly monitor both the patient and the dynamic of the clinical picture. The complexity of the decision-making and the complexity of the evidence used or drawn upon in physiotherapy was described in the following example:

...you put it [information] all together and that's the problem... not just: can the spine "get out of bed"?... but do you know there's a femur fracture too?... and can the spine "hop"? ...that's the sort of questions that you have to be ready to ask... (Physiotherapist, 016)

In the example above all the evidence would come from different clinicians such as the neurosurgeon, orthopaedic surgeon, and sometimes others.

Physiotherapists, in addition to their academic knowledge and experience, are on the lookout for all available evidence relating to their patient. This would be a collage of evidence from different clinicians that are treating the patient, the nurses that are looking after the patient, the other allied health clinicians that have provided care to their patient. It is important for physiotherapists to interact with all clinicians involved in the care of this one patient. The evidence that informs their decisions comes from the experience and knowing what worked last time they had a similar patient. This evidence would provide the starting point from where they will adjust their care as treatment progresses based on their experience.

10.1.13 Social Work craft group

Social workers enable communication that is absolutely necessary and essential to everything that is happening in the hospital. In most cases the social worker conducts the assessment of the patient's needs as well as the assessment of the treating medical team's needs. There are cases when the treating team waits for the outcome of the social worker's assessment in order to initiate or continue the treatment, for example in the cases where informed consent is needed. The social workers explain their role as facilitating smooth treatment provision and good outcomes for the patients and their

families. Social workers play a role in communication between patients, their families and the medical team. They are not called to every trauma case, but their intervention becomes necessary in difficult cases. The social worker participating in the interview was describing the evidence gathering as starting with the notes from an ambulance or an emergency department:

...Before I go in, I will find out as much as I can about the family... On the history... Sometimes they've collected some of that in the emergency department already, or look at the ambulance report... It doesn't tell you definitively anything, but it gives you clues... whatever interactions... in the emergency department, if they're between staff and family members or staff and patient... to get a bit of a feel for what's going on, what might be fuelling some of these... (Social worker, 014)

Talking to the family members is an important source of information. The social worker explained that she always starts by meeting the family and getting an idea about the patient because often the patients are severely injured and may be taken to the operating theatre or are in a coma for a period of time. In this way the social worker can find out the patient's practical needs and can prioritise the care. The clinician explained the need to:

...try to find out through gaining information from a range of people that know this person... What they might be like, who's who... because everyone thinks their view is the truth, and the truth is very difficult to ascertain in relation to relationships, in relation to anything... (Social worker, 014)

The social worker gave an example of a recent trauma case where the patient was particularly vulnerable:

...she, uh, was injured in a motor vehicle accident, and my initial decision making was around meeting with her friend and then briefly talking to her with an interpreter, getting her background information, and working out what the first step was... I suppose in crisis intervention, in working out what her most pressing needs were, and making a decision around what resources she needed, as someone who's quite vulnerable. Not from Australia, not English-speaking, injured in an accident, no family or friends, and then in using the assessment information that I'd gathered, and her current mental state, and her current concerns, to look at, pursuing a compensable claim around the accident, and in working--continuing to work with her on contacting her family. Those are some of the decisions that I've started to make with her (Social worker, 019)

So the social worker explained how she went about filling the gaps in evidence. She said:

...my initial decision making was around meeting with her friend and then briefly talking to her with an interpreter, getting her background information, and working out what the first step was... I suppose in crisis intervention... working out what her most pressing needs were... (Social worker, 019)

The social worker explained her role as a facilitator of communication between a patient and a clinician. In order to do it successfully the social worker assessed the needs of both, the patient and the clinician.

She asked the clinicians what difficulties they were experiencing in treating the patient and she asked the patient and the patient's family what were their needs:

...I think you go about it by doing almost a two-fold assessment. One part of it is an assessment with staff, around what are your concerns? What are the issues as to why you referred the patient? And then talking to the patient, explaining your role, asking about their background prior to the admission, and what their current concerns are... (Social worker, 019)

Another example of the care social workers provide to trauma patients includes the situations where a patient cannot give consent for the treatment and a social worker was called to examine the dynamic in the family and identify the member of the family who would be in a position to give consent. The social worker described the complex dynamic within the family of a trauma patient. The information about who can give consent is set in Law but in real life the relationships are sometimes very difficult to understand. It was a challenging case for a social worker to figure out:

...[patient] that comes in who's got a complex family dynamic and it's not clear from the hospital's perspective about who the... next of kin for consent issues, because if people can't consent for themselves, unless it's an emergency situation... the social workers are often involved with becoming familiar with the full dynamics of this person's family, we can try to navigate who that is... and then often you'll have conflict between different family members, and we're often fully involved in helping to mediate between. Most people are very upset and distressed when they come into a stressful environment. (Social worker, 014)

The role of social workers is essential in some trauma cases. The care sometimes cannot proceed without social worker intervention. The clinician in the example above was dealing with complex relationship dynamics and needed to obtain evidence from the family members. The social worker relies on colleagues in her department for professional and personal support in difficult cases. Colleagues' opinions are frequently sought evidence in social workers' daily practice:

...Whenever I'm stuck, and it's either it's something controversial or ambiguous, something I'm not sure of, my natural response is to come back to the department and talk to a colleague or a senior team member, my supervisor, to say, "What do you think?"... is my first step... (Social worker, 019)

In the example above, the clinician called it "informal supervision" where she would go to a colleague or senior colleague and ask for help with the case. In addition, all clinicians in the Department of Social Work have formal supervision when they have regular meetings with the senior clinician in the department once every few weeks. Both formal and informal supervisions serve as a source of evidence in social workers' clinical practice.

10.1.14 Speech Therapy craft group

Speech therapists are closely involved with the care of trauma patients. Speech therapists assess the cognition, communication, and swallowing ability of patients. Clinical decisions for speech therapists involve establishing meaningful ways of communicating for severely injured patients.

An example of the care a speech therapist provides included a patient with severe traumatic brain injury (TBI). The patient was a young man who had had a car accident. This young man had an injury to his spine in the area of the neck (C-spine) and the upper back (T-spine). Due to severe brain injury and consequent drowsiness the patient had some swallowing difficulties and was only able to consume very limited oral intake of food. The patient had been treated on the ward and the main therapy goal for the speech therapist was to prevent aspirational pneumonia:

...he, I guess when he was initially in the intensive care unit... post-extubation, he was still not safe to commence oral intake. So that would have been a decision by the intensive care unit themselves. So basically his GCS was too low for him to be awake enough to be able to commence oral intake. His brain injury, I guess, was too severe for them to be... there was no need for them to refer to us that early on. So then we received a referral when he got to the ward here. The referral was around whether he was safe to commence oral intake. And that was because his GCS had improved slightly, enough for him to be awake at times throughout the day. (Speech pathologist, 022)

The patient described above presented a number of challenges. Due to the brain trauma, the patient's general behaviour and communication were both affected. The patient displayed a lot of aggression and agitation that are common for that type of injury and it made the treatment more challenging:

...as of today, I guess... he's pulled out his naso-gastric tube again. Which means, obviously, his nutrition levels go down and we're relying on oral intake. So I guess the aim of, I guess, goals for him now are looking at trying to see if he's safe enough to manage large amount of oral intake. (Speech pathologist, 022)

Another example of a trauma patient referred to the speech pathologist for assessment and treatment was a woman with severe brain injury:

...another patient with a severe traumatic brain injury, who has a tracheostomy, and who has ... GCS (Glasgow Coma Score) of eight at the moment and only very occasionally will follow commands. So from reading the notes and reading the nursing notes and allied health notes, I can already gather a clinical picture of what I might be able to do with that patient. So I guess in terms of an assessment. So, I guess from reading the notes, I can already tell that... she's not safe to be eating and drinking. And I can already tell that she's not appropriate for a formalized language screen... So I'm lowering the assessment level to something as, looking at, can she squeeze my hand? Can she open her eyes on command?... Obviously, you know, if I read in the notes that she...is someone who moves her arms around or will try and pull out tubes and things like that, and moves around in the bed quite quickly. Then I need to, before I go and assess her, I need to keep in mind how I present my instructions as well.... So I guess in terms of patients' behaviour as well, we get a lot of that information from the notes and speaking with the nursing staff, and allied health and doctors as well. (Speech pathologist, 022)

In the example given by the speech therapist she received the initial information from her colleagues' notes on the patient. She continued evidence gathering by assessing the patient clinically in terms of coughing and in terms of swallowing. She looked at the patient's neurological state and did a cranial nerve assessment. Then she talked to a nurse who provided care to the patient. She described this process of evidence gathering before making clinical decision as starting:

...from the file... the injuries he's sustained... looking at his alertness, looking at his interactions, and also his ability to maintain alertness throughout the day. Also doing a clinical swallow assessment with oral intake, and looking at how they tolerate that... how they're coughing, do they sound gurgley while they're drinking... We make a decision around looking at the bigger picture... how much oral intake we think he can take safely. . (Speech pathologist, 022)

The evidence this speech therapist gathered was from the nursing and allied health notes. Before seeing the patient, the speech therapist read the notes and was able to build a mental picture of the clinical case and what to expect when she finally saw the patient:

...reading the nursing notes and allied health notes, I can already gather a clinical picture of what I might be able to do with that patient. So I guess in terms of an assessment... I can already tell that... she's not safe to be eating and drinking... I can already tell that she's not appropriate for a formalized language screen... So I'm lowering the assessment level to... looking at, can she squeeze my hand? Can she open her eyes on command? ...looking at receptive language... can she follow my directions? (Speech pathologist, 022)

The clinician clearly valued the collegiality of allied health therapists and the exchange of the evidence regarding the patient's status of health and his or her progress during the stay in hospital:

... particularly, for trauma patients, you know, I think allied health do work very well together on the trauma team as well here. And I think that's very important because, particularly with these patients, with behavioural deficits as well... (Speech pathologist, 022)

The evidence about the treatment and the way forward with this difficult clinical case came from more experienced clinicians, who suggested what else was possible to try with the patient. The speech therapist described this in the quote below:

... asking someone who might have had more clinical experience, just to grab ideas off them, things they've tried before that have worked or haven't worked... Things to try that might be helpful for that patient. Or even just things that they've used before that might be a... "try this first,"... (Speech pathologist, 022)

The collegiality and the evidence held by the experienced clinicians within the department seemed to provide the speech therapist with the necessary professional support for her clinical decision making.

10.1.15 Occupational Therapy craft group

Clinicians in this craft group assess trauma patients' abilities of carrying out everyday activities. Occupational therapists often base their assessments on real life situations meaningful to patients, instead of pen and paper assessments.

The occupational therapist gave an example of a trauma patient. The patient was admitted following a traumatic event, which had occurred because the patient had tried to commit suicide. The patient had tried to hang himself and had lost consciousness due to a lack of oxygen to his brain. Additionally, the patient had pre-existing schizophrenia. The occupational therapist conducted a number of cognitive assessments for this patient because such trauma can have a negative effect on thinking processes and cognition. The clinician described how the symptoms and signs of brain trauma were very subtle and it took an experienced eye to notice subtle symptoms of cognitive deficiencies. There were different tools to conduct the assessment of the patient, and in this example the clinician mentioned an Abbreviated Scale and a Daily Posttraumatic Amnesia Scale (Westmead Scale). The patient had failed the Abbreviated Scale:

...he had a loss of consciousness, and he had lack of oxygen to the brain. So that can have implications and then we found he did have some cognitive deficits, and we were recommending that he goes to in-patient neuro-rehab to address those deficits, and try and get back to his normal baseline function, so he can return to work, and he's quite young, and return to his high-functioning lifestyle, and he was refusing... (Occupational therapist, 024)

The clinical decision about the appropriate assessment to conduct was done after the evidence was provided by the family reporting that the patient was a highly functioning community member prior to the trauma. The clinical issue here was that the patient was recommended that he continue his rehabilitation in rehab facilities, but the patient insisted on going home. This recommendation was given to help the patient recover his cognitive functioning and return to the level of functioning that the patient had had before the trauma. The occupational therapist needed evidence from the neuropsychologist for an assessment of competence to decide whether the patient could go home against the recommendation of the OT. The patient was found able to retain this information and make an informed decision about the risks of going home against the recommendations of the hospital staff, so the patient was discharged without the follow up. In the case above the occupational therapist needed the evidence about the patient's functioning prior to the trauma. She would not have made an accurate assessment of this patient without first obtaining the evidence from the family.

The following example was the trauma patient who had had a mild traumatic brain injury. The patient was in his car travelling at a high speed when he was involved in a car crash, being rear ended by a large truck. The patient hit his head and blacked out. Other injuries included chest injuries with rib fractures and left ankle injuries. The chest injuries were complicated by the fact that the patient was a heavy smoker: he smoked 30 cigarettes a day. The patient was initially admitted to the ICU where he received ketamine and had some hallucinations:

...it was really important that we assess his cognition for multiple reasons... he had a mild traumatic brain injury... he had some what seemed like delirium in ICU... he had some hallucinations and his family were reporting that he was quite confused, and he isn't normally. So, the other assessments that I've done with him are in endurance as well. So I've been assessing him on a daily basis to monitor his cognition, and see how it's improving, because he's now on the ward, and he's getting more used to a different environment, as opposed to ICU...(Occupational therapist, 027)

In the case above the clinician spoke with the family and gathered the information about the patient. This was only one kind of evidence needed in order to provide the appropriate care. The daily assessments that the clinician was conducting were another kind of evidence that continuously tailored the care the patient was receiving.

There was a different example of a trauma case where a patient had fallen down in his own flat and remained on the floor for several days before he was found and brought to the hospital. On examination it was found that patient had stage four metastatic cancer. The patient had neurosurgery and was recovering in the neurosurgical ward. The occupational therapist was assessing the cognitive ability of the patient following the operation on his brain.

So I had a new patient the other day... he is very socially isolated, and he was lying on the floor... for three days....it was found that he's got, metastatic cancer, and he's got cerebral mets [metastases] in his brain, and lung mets [metastases], and it's everywhere, and he had to have... a biopsy ... they took out some tumours in his brain, and he was under neurosurge[on], and I don't cover neurosurge[ry]... So I went to my clinical supervisor, who specializes in neurosurge[ry], and said, "I just wanna talk about this patient, talk about what assessments I should be doing, 'cause you would expect his cognition to be very poor." So... In this case I... I was unfamiliar with this type of diagnosis and this type of expected clinical presentation (Occupational therapist, 027)

This case illustrates the complexity of clinical cases occupational therapists often have to deal with. The needed evidence was obtained from a colleague who had previous experience with patients that had neurosurgery.

Sometimes OT need to make clinical decisions for which they do not have evidence. One solution is to conduct their own research. The clinicians within the Department of Occupational Therapy were

conducting a small trial that was aimed to improve the outcome for a patient with traumatic amnesia.

This was an example of evidence created within the department. The participating clinician describes :

...we're actually doing a trial around that at the moment... sort of standardized approach to re-orientation for these people... limiting visitors, decreasing stimulation, while they improve... until they emerge from posttraumatic amnesia... (Occupational therapist, 024)

The occupational therapist often worked with the patients' families, which are of course important sources of information. In order to perform the assessment of a patient and the extent of their cognitive functioning, it is important for an occupational therapist to know the "normal" level of functioning that a patient had before the accident:

...we heavily rely on families... we ask them about how they manage in their everyday routine (Occupational therapist, 024)

Knowledge about a patient and the patient's environment before the accident is also used to plan meaningful therapy sessions:

...but we use that information heavily to inform what we do with that person on the ward, in terms of engaging them in meaningful occupation, and trying to target their therapy based on things that are meaningful to them, and to create goals for [the stay] within the hospital and for discharge... meaningful goals that will assist that person to transition back into that normal routine as much as possible... (Occupational therapist, 024)

A clinician highlighted the importance of the information:

...we can still make judgements and clinical decision making without family input, but it's... less rich... with information gathered from the family we can be much more clear about how this person has actually functioned in the past. The family will then tell us their reflection of how they feel this person's functioning now, and then we can use that information... (Occupational therapist, 024)

This occupational therapist relied on the evidence gathered from family members while they are spending time in hospital with the patient. In this way the family members are included in the treatment process. The occupational therapist recounted an example where she asked family members to:

...to write... notebooks, for communication... or if they can tell me what they've been seeing, and I look for those things in particular, but I'm very experienced and very objective, and if I don't see it, then it's just about how to communicate that back to the family... (Occupational therapist, 024)

The evidence gathered by family members is valued highly and used frequently by occupational therapists. As a clinician explained that a severely injured patient undergoing rehabilitation would more likely respond to a family member rather than a therapist he doesn't know.

The clinician explained that there were efforts within the department to keep up with the current literature. At the same time the clinician reflected back to the past when the care provided within the department was reviewed through conducting quality improvement projects. These were seen as easy

to organise and conduct, and these projects did not require lengthy ethical reviews. These projects were the means to review current clinical practices and to introduce new knowledge for general practice within the department:

...keep abreast of current evidence, general articles, research... we used to do quality projects. Now... there needs to be an ethics proposal... for every project that's done. (Occupational therapist, 024)

The same occupational therapist spoke about the RCT conducted within the department. This was a small trial and it was done at the place of clinical duties using local settings and the local patient population. The occupational therapist ascertained that there were many questions that needed answering:

...we're doing RCTs. Small RCTs within the department...We need to find lots of answers... (Occupational therapist, 024)

Knowledge is exchanged nationally within the field of occupational therapy. At the institutional level there are efforts to improve quality of care through sharing best practice or what has been found to work in different hospitals:

...we did a lot of work establishing what was the best tool to use for the mild traumatic brain injury group. We liaised with our colleagues from the interstate, so it was a Sydney tool that we're using... that's... now informed much of the practice across the country... (Occupational therapist, 024)

The large volume of trauma cases received and treated in the hospital allowed for an accumulation of experience in the occupational therapy field, thus building up a knowledge bank that is available within the department for the clinicians to use:

...we did huge reviews around mild traumatic brain injury management... we understood what the issues were... we understood what the recommendations were for their assessment and management, and we've implemented them here, over a number of years... (Occupational therapist, 024)

In the quote above the occupational therapist spoke about the processes within the department of keeping up with the literature and educating the staff with the latest research findings.

The occupational therapists primarily based their decision on patient-derived evidence, because this was how they designed their assessments. This evidence about the patient's functioning provides the base line for their assessment. The patients' families are another source of evidence as to provide meaningful tasks for their patients. The nurses looking after the patient and the other clinicians are all contributors to the occupational therapists' decision making.

10.2 Chapter summary

The participants gave accounts of numerous examples of trauma care. The cases they described varied greatly. Clinicians deal with many different issues and have their own specific clinical goals of care, even when providing care to the same patients. Sources of evidence used differ across different craft groups. However, there are some similarities across all the cases the participants described. Examples of these are patient derived evidence and colleagues' opinions, both of which are sources of evidence common to all craft groups.

Chapter Eleven

Themes Five and Six: Communication of evidence in clinical practice

This chapter concerns communication between clinicians from different clinical disciplines. Theme Five, “Communication of evidence between craft groups”, and Theme Six, “Communication of evidence within a craft group”, are both described in this chapter. I organised these themes around three clinical groups of clinicians: medical (section 11.1), nursing (section 11.2), and allied health (section 11.3).

In a very broad and complex area like trauma much relevant evidence is generated from the communication between clinicians representing different disciplines. Clinical decisions in trauma care often involve many clinical specialties. In some specific areas of clinical practice there is a lack of published research, as observed by the radiologist. In these situations, a consensus of experts is seen to be the best available option. Such consensus is an example of complex processes of communication where there are often a number of clinicians present, and representatives of all participating disciplines are able to provide their expert opinions on the treatment of one patient. In this complex decision making process many different kinds of evidence are used and priorities are carefully negotiated. Clinical decision making generally requires agreement between different craft groups, and, as the intensivist explained:

...being able to negotiate with the experts in those fields. So if there's a new type of dissection of a blood vessel related to a trauma, we wouldn't necessarily do a literature review and develop a guideline around that... but we might then go to the experts, and that might be the vascular surgeons, the neurosurgeons, the radiologists, and we might then discuss that case... to be able to take the patient forward, usually trying to gain agreement, negotiating agreement. (Intensivist, 025)

Each clinical group goes about communicating differently amongst themselves and with others. In this chapter I illustrate how medical doctors, nurses and allied health clinicians communicate within their own craft groups and with other craft groups and in doing so generate a form of evidence that is indispensable to clinical trauma care.

11.1 Medical

The medical group comprised a number of different craft groups. First, I will explore the role of communication between craft groups (Theme 5), and then examine the ways in which communication works within a single craft group (Theme 6) across the medical group. Different craft groups may have different opinions regarding the management of a patient. These differences are resolved through continuous communication between different clinical groups.

11.1.1 Theme Five. Communication of evidence between craft groups

Communication between different craft groups is usually initiated by the need to provide care to a patient where different clinical disciplines are involved. For example, in neurosurgery, the theatre set-up for every patient needs to be negotiated and arranged. There is a team of clinicians who work in the operating theatre and assist the neurosurgeon before, during, and immediately after surgery. The neurosurgeon described how the nurse 'running the floor' would want to know how long the surgery is expected to take and the 'scrub staff' would want to know what equipment is going to be used during the surgery. The communication before, during, and after the operation involves different exchanges of information, as the neurosurgeon explained:

...it is different from the general surgery when the patient lays on their back, sometimes you operate when your patient sits up, or lying on their side, what's called park bench position, lying on their tummy, tilted 45 degrees up. No one is actually happy until you come there and tell them this is what we are going to do. (Neurosurgeon, 001)

The trauma physician communicates with the anaesthetist as soon as he completes the additional assessments of a patient with severe trauma so he can tell an anaesthetist that it is okay to start initiating the general anaesthetics for the operation.

Communication between clinicians can be with colleagues who work in the same hospital or between clinicians and researchers across the world. One participant heard of research about synthetic haemoglobin that had been carried out in the US. This clinician contacted the research centre and obtained the product, enabling the trauma physician to successfully treat the trauma patient. The clinician explained how he collaborated with clinician researchers outside Australia. He described how he:

...contacted the office of Naval research in Baltimore who was studying synthetic Hg ...went to the manufactures ...had that product flown out, which we administered to her and then she survived. (Trauma Physician, 008)

Providing care to a trauma patient involves discussion and negotiation between different craft groups. These negotiations are sometimes difficult because clinicians have their own ways of approaching a trauma patient and their own ways of providing care. A radiologist described a difficult communication, when, from his point of view, the radiological investigation for a trauma patient was unnecessary, but a treating clinician insisted on doing it. The clinical picture in trauma sometimes can be obscure and often there is time pressure on clinicians to come up with the right investigation and a treatment plan. The radiologist explained:

...you refer to evidence and sometimes you feel that the test is not indicated because they [patient] don't fulfil the criteria for the imaging... Some of them [doctors] would be happy to listen to you ... and will move with the management. Some will still push their way and that becomes difficult... (Radiologist, 015)

In these cases of disagreement, the radiologist would usually give in and accept the treating clinician's request for the procedure. He would communicate his disagreement to the clinician but he would not insist on his point of view because the treating clinician has responsibility for the patient, as he explained:

...I can't forcibly say that this is not indicated because I haven't examined the patient myself. It is beyond my scope. ...all I can say is try to get them to understand what the rules of the evidence is. What are the criteria for investigation... (Radiologist, 015)

When there is a lack of published research a consensus of experts is thought to be the best available option. This is an example of a complex communication where a number of clinicians are present and all participating disciplines are giving their expert opinion on the treatment of one patient. The radiologist originally spoke about a clinician's opinion as "anecdotal" and therefore not evidence, because the opinion is not based on data from an RCT. On the other hand, the radiologist refers to the consensus of clinicians as the "best available evidence" in the areas of medicine where there is no research being conducted:

...When it gets to a pointy end then there is lack of evidence... then it's a matter of arriving at a consensus by decision of the experts. ...another evidence-based approach... because they may have some more information from their end and then you supplement with what information you've got and then come up with a decision... it's usually based on experience rather than published literature and published evidence. (Radiologist, 015)

An interventional radiologist consults trauma physicians and surgeons regarding the internal bleeding of a trauma patient. The craft of interventional radiology involves a high level of skill in radiology and surgical procedures.

An interventional radiologist relies on communication with referring clinicians to provide evidence for his clinical decision making, as he recounted:

...an elderly gentlemen fell through the roof, was bleeding in his pelvis, his spleen and his chest. The consultant trauma surgeon came, spoke to me ...the patient became a little bit unstable in between, that delayed things slightly, but he came to an angiography and we proceeded to embolise the left internal iliac artery, the splenic artery, and the right intercostal artery. (Interventional Radiologist, 020)

Communication between different craft groups can lead to changes in the treatment plan for a trauma patient. The radiologist, looking at the X-rays and noticing the possible fractured sternum, suggested to the treating clinician that the cardiac contusion could be responsible for the patient's hypotension. From that point onwards the patient's care proceeded differently and the radiologist did not embolise the spleen, the procedure the patient was referred for.

Communication between an interventional radiologist and a trauma surgeon requires discussion involving the expertise of both craft groups that sometimes brings resolution to the clinical question, as the radiologist explained:

...I give my opinion on the imaging. If the clinicians have disagreed with my opinions, they'll often come and ask me. I'll review the imaging with them to see what they saw versus what I saw, and then one of us is often right, in which case we agree that that's the answer and we come to a consensus...(Interventional Radiologist, 020)

However, communication between clinicians involves occasional disagreements. The radiologist pointed out that disagreements do not happen often and are usually about trivial matters not involving patient care. In such cases the clinician who has responsibility for the patient decides on the course of action, as the radiologist explained:

...if they [clinicians] feel that they disagree with my decision, that's for them to act on if they wish to, but I won't change my opinion if I believe... (Interventional Radiologist, 020)

It was interesting to hear an interventional radiologist explaining the difficulty in making a decision not to do a procedure. The clinician introduced a new concept that in some cases not to do a procedure for a patient is sometimes better than to do it. The radiologist described that it is easier to go ahead and do the procedure that one has been trained to do, rather than insist on not undertaking the procedure, because it might not benefit the patient in the way that is anticipated:

...It's much harder to act as the patient advocate and say, "No, I don't think this is appropriate," or "I think this other procedure is appropriate." ...that comes from talking to your colleagues in a collegiate manner... (Interventional Radiologist, 020)

This quote illustrates how the patients' interests and the goals of care almost always take priority, even when clinicians want to carry out the procedure. In this case a clinician initiated communication with the radiologist in the hope of beginning a procedure, which instead led to a decision to not proceed.

Communication in clinical practice serves as a way to gain knowledge. Clinical acumen is developed through interactions between clinicians representing different clinical disciplines:

...talking to people who have worked in the area ...trauma team, the surgeons, the emergency physicians, and learning from them, because they have their knowledge base, and you have your knowledge base. You're working together. You gain knowledge from that, and that's how you develop your clinical acumen. ...you don't just get it from your patient interactions, you also get it from your interactions with your colleagues, and learn from them. (Interventional Radiologist, 020)

The communication that radiologists have with the treating teams takes the form of multi-disciplinary meetings that are conducted regularly. In these meetings, every participating clinician has a chance to contribute to the discussion. They can also learn from the experience of other clinicians discussing their reasoning in their clinical decision making.

The role of the intensivist, the physician in the Intensive Care Unit (UCI), is one of coordinating the communications between involved clinicians and treating the trauma patient. As he explained:

...It's not that we're the specialists in head injuries. It's not that we're the specialists in pelvic fractures. It's not that we're the specialists in spinal cord injuries, or organ injuries, blunt trauma, you know, orthopaedic injuries, but we need to coordinate all those things, and in the critically ill patient, that's all the more important. (Intensivist, 025)

The intensivist gave a number of examples of communication between clinicians treating a trauma patient in ICU. Decision-making in the ICU involves many different craft groups. Although 'patient's benefits are shared interests, the ability to take a patient forward requires negotiating an agreement between clinicians from different craft groups:

...you would establish not only what the teams are interested in ...what interests are ...the patient's benefits are shared interests. What individual interests are competing, and then negotiate through them using some external criteria, and this external criterion might simply be a guideline that you've established ...there might simply be an external body of research, like a ...brain trauma foundation recommendations for managing brain injuries (Intensivist, 025)

I asked a clinician to give a recent example of the care he provided to a trauma patient. In response, the clinician gave me a broad description of the issues he has to deal with when providing care to trauma patients in ICU. He spoke about competing interests stemming from different professional treatment goals held by each clinician.

He gave an example of a patient who had experienced a severe trauma, including a head injury. He explained that the neurosurgeon asserted that only he fully understood of the extent of the injury so he needed full access and timely attention for the head injury.

In this example, several different clinicians also attended the patient, including an orthopaedic surgeon. The neurosurgeon was fully focused on the head injury and was making sure that other attending clinicians understood its extent. The orthopaedic surgeon was very concerned about an injury to the pelvis that needed urgent treatment, on the basis that early initiation of treatment produces better outcomes. These were the competing interests of the clinicians at the bedside. In addition to this complex situation the patient required low molecular weight heparin, a drug that prevents deep vein thrombosis (DVT). However, this medication is contraindicated in patients at risk of cerebral bleeding. In this case a trauma physician had prescribed the blood thinner, but the neurosurgeon asked to cease the medication because of the patient's condition:

...because a surgeon who's looking after the head, quite correctly, says, "I'm the only one who knows how bad that head injury is... how to manage that head injury"... the person [clinician] managing the pelvis says the same of the pelvis, and so then whose priorities win? It's the loudest person... (Intensivist, 025)

In cases in which the negotiation of the interests of all the different craft groups is difficult, clinicians often refer to external criteria such as guidelines or a body of research.

11.1.2 Theme Six. Communication of evidence within a craft group

Clinicians communicate information to their colleagues all the time. Collegiality and anecdotal opinions are frequent and permanent features of clinical practice. It is not uncommon for one of them to ask a senior colleague to 'scrub in' for an operation where it is expected a number of clinical decisions will be made:

...you might get a mentor to help you with the operation. The mentor will come and scrub in with you. Even though you might know how to do the operation, part of the decision-making is having someone who seeing more of this. (Neurosurgeon, 001)

Radiologists participating in our study confirmed that they rely on their colleagues' opinions frequently. There are always conversations going on in the office shared by two radiologists.

Their colleagues' offices are nearby too, so it is easy to ask questions about a patient or a treatment or an unusual clinical case:

...We ask each other all the time, yeah. Radiology's really very collegial. There's a lot of people, so it's very easy just to grab someone's opinion ...for example, Tom is just sitting there. I can ask him... a question about something. He would ask me a question about something. (Radiologist, 021)

The information about a patient that clinicians communicate with each other varies in volume and in the level of expertise:

...That's what we do for every single one of our patients... we have multiple levels of information run through from the very detailed, low-level information, from their magnesium level and their phosphate level and their keratin and their urea, sodium, and potassium... right through to their patterns of injury and their complex family interactions, social circumstances... (Intensivist, 025)

The communication of evidence between colleagues can have an impact on the clinical management of patients. In the ICU department, a clinical decision about the termination of the treatment was changed after additional information was obtained from a colleague:

...So I would go to him and say... "What is the evidence for these patients surviving?" And he would say, "Well, in Australia, 83 % of them die, but 17% of those patients would survive," and I would say, "Oh, that's interesting, because I would have assumed these patients all die." So that might inform my decision-making. So instead of withdrawing on the patient... I might actually say... "I think we... should continue treatment for a little bit..." (Intensivist, 025)

In the quote above the intensivist may consider the withdrawal of a treatment, and in order to make that decision he seeks evidence from a colleague who has access to the survival likelihood figures for this kind of patient in Australia. The evidence obtained is then used immediately in the intensivist's clinical decision making. In this example the communication between colleagues is directly linked to their decision making.

11.1.3 Summary

Trauma care necessarily involves the coming together of numerous craft groups. Communication between these groups is essential. Doctors talk with each other about treatment plans or to gain expertise from another craft group, such as with nurses to communicate the setting up of an operating theatre. Competing interests may make communication difficult and sometimes the lead doctor makes a decision that goes against evidence provided by communications with others. Communication within the medical craft group serves to provide clinicians with advice and support and has a significant effect on clinical decision making.

11.2 Nursing

11.2.1 Theme Five. Communication of evidence between craft groups

Communication between craft groups can fill the information gap found by nurses in protocols or guidelines. Caring for trauma patients requires complex nursing skills. Nurses are encouraged to communicate with both senior nurses and with the treating team of doctors and allied health professionals:

...I guess if there is something you cannot find on the intranet you would probably go to the treating unit or the treating doctor and ask for some guidance... (ED nurse, 002)

While nurses were supported by information found on the intranet, they would often still need to supplement the information found there with discussions with clinicians from other craft groups. Communication with doctors also contributes to nurses' clinical decision making. While there is a lot of communication between nurses, there are also many situations when nurses have to communicate with clinicians from the medical group.

At times these communications between nurses and doctors lead to a different treatment plan. A nurse gave an example of a case where the procedure was postponed at the request of the nurse because according to her assessment the patient was not ready for the procedure. He explained that if he believes the decision that was made was not the best clinical decision, he would:

...usually inform the clinical treating team, saying that 'I have a bit of concern about your order' (Ward nurse, 003)

In another example of discharge planning quoted below, it was the nurse who felt she knew the patient best and she communicated the information to the doctors that affected the discharge plan for the patient. As the nurse recounted:

...we fed that back to the doctors... the doctors try to get him up for a walk and he was unsteady and we were liaising with physio as well... the doctor wanted to send him home and he ended up going to the rehab I believe... (Ward nurse, 006)

While the doctors thought the patient was ready to go home, the nurse's communication with the treating doctors led to a different decision, namely to send the patient to rehab.

In other cases, nurses communicate with junior doctors and doctors new to trauma to pass on their knowledge. The nurse gave another example where he supervised a resident doctor performing a

procedure. This was an example of the communication of knowledge from a nurse to a resident where the nurse showed the resident doctor how to remove the intercostal catheter.

The next example illustrates how an experienced nurse communicated with a doctor who is new to working in trauma. As she explained:

...new doctors to trauma, they tend to fixate on something that's really not that important at that time... needing to say to them I understand you've seen that it's important but at the moment, we're here and we'll come to that... but um not dismissing what they've seen either, accepting it just sort of trying to say that's good but we need to get back here and just being able to zone in on the urgent stuff but not lose the knowledge and information that you've also received from whether that be from the ambulance or relatives (ED Nurse, 018)

This quote provides an example of a nurse communicating with a doctor who is new to trauma and it illustrates the need for trauma clinicians to work differently than they may be used to. All of this must be communicated to doctors new to trauma and often nurses do that communicating. The nature of these relationships is complex and steeped in established roles and traditions. Furthermore, they may be influenced by personalities, by notions of hierarchy and social status, and by a commitment to care. In the example above the nurse showed care for the colleague whose skills and judgement were perhaps incompletely developed.

Interestingly, the nurse spoke about the knowledge that is kept by the people in the department. This knowledge gets lost if people do not stay long enough in the department, long enough for new staff to learn this knowledge:

...we have such a high turnover of staff that a lot of that information is lost. It's not always communicated, and it's not always a priority. (ED Nurse, 017)

While knowledge is seen to be lost with staff turnover, one remedy is the communication that occurs between nurses and junior doctors and doctors new to trauma.

Nurses often provide knowledge and evidence to others through their communication, but sometimes information is provided to nurses from others. An ICU nurse providing care to a trauma patient communicates with a treating doctor regarding the treatment plan and outcomes. The communication of evidence for ICU nurses happens especially at the very start of their shift. At handover the nurse receives information about a patient.

Interestingly, in addition to the vital physiological readings, the nurse wants to know the “opinion” of medical staff on the progress the patient is making:

...I'm happy to ...talk to the ICU doctors if I have any concerns about the patient, and then during the day, I usually ask physicians, the ICU consultant, what their opinion is, and which way they think the patient's going ...just to get an idea... Of what they're thinking, and if what I'm thinking is the same or similar... (ICU Nurse, 026)

The nurse talks to the medical staff about the patient “just to get an idea”. This is a rarely spoken about kind of evidence that will directly or indirectly inform the nurse’s clinical decision making.

Communication is not always one way. Instead, nurses sometimes communicate with other craft groups, including allied health clinicians, in order to facilitate joint decision making. This case illustrates the communication between a nurse and a physiotherapist. In the process of this decision making the nurse and the physiotherapist exchanged with each other the information that was combined and used in their decision:

...we liaise with each other and decided that it would be safe that he [the patient] goes home, like he is living with his wife ...so he doesn't need the rehab. We felt that going home would be a safe option. I felt through my understanding of seeing a patient it was my decision that it would be safe so we agreed and that was the plan... (Nurse, 004)

Shared decision making, and the communication it requires, develops an atmosphere of support on the ward. The atmosphere in the hospital where the interviews were conducted is seen to be one of collaboration and support and this was observed in my own time spent there, and recorded in my field notes. One nurse explained how he feels supported and well connected to other members of staff when he is on duty. He gave an account of collegiality and sharing of decision making. He said:

...there is pretty good collaboration between ourselves and medical staff ...they recognise our experience in the area, and so we are able to... more collaboratively discuss patients and their care and what would be the most beneficial for the patients ...from medication they are receiving ...any sort of treatment they are receiving. ...its good that we have that environment we are able to discuss with them and that gives us pretty good scope in terms of helping, aiding... decision-making process ...overall sort of holistic care of the patient. (Ward nurse, 005)

This collegiality extends to the operating theatre and nurses find it helpful to communicate with doctors around surgery, to get as much information as they can to help their patients. The nurse freely and regularly speaks with the anaesthetist when she comes across a case that is new where she had never heard of a diagnosis or treatment before.

She gave details in the example below:

...I would say to the anaesthetist I never heard of that, what does it mean, what does it involve and they would give you a briefing and then as soon as I have my patient stable I would then go or ask someone for more information ...so I would know exactly what that meant... does it mean it will affect their clotting or...all of that kind of information that I need to look after the patient... so it's usually something about that they've got in their past history or even sometimes if it's an operation I am not familiar with I might need to look at... what that procedure was why it was done... how it's done... for me to be able to make sure that I give appropriate nursing care postoperatively... (Perioperative care nurse, 007)

In the Emergency Department there is also a lot of communication between nurses and doctors where there are good working relationships. An experienced nurse participant explained that:

...there's a lot of communication between the medical and the nursing staff about the patient's care, what's appropriate. ...I think, when you've been here long enough, and when you have a good working relationship with the doctors, that you can discuss the patient's care... (ED Nurse, 017)

The emergency and trauma physicians decide on the priorities of the care interventions. The patient's interests are at the centre of all the decisions. The ED Nurse explains that the trauma physician will:

...say 'I want to have the blood, I want to have a catheter, I want to do this' and I have to say to him 'look, which one will we do first because we have only, we only have a certain number of nurses, what do you want us to prioritise?' though after you know working in trauma - you know what is important (ED Nurse, 018)

Experience can mean that a nurse may not need to communicate with the doctor to receive more information. But sometimes experience may also lead to difficult communication between nurses and doctors. Below is an example of a nurse having knowledge of a procedure but not being qualified to perform the procedure herself. She discussed the care plan with the doctor and suggested to him to implement this procedure for the benefit of the patient. The nurse obtained knowledge of this procedure by attending a specialised clinical course. Although the course did not give her the authority to conduct the procedure, she wanted the knowledge to be able to advocate for her patients. Despite good relationships with clinicians from the medical group the nurse was not able to insist on the procedure that she believed was the right thing to do. She had to wait for the doctor to try all other options before he finally agreed with her and implemented the procedure. This example illustrates what could be a power of knowledge at play. The doctors are expected to know more and to tell nurses what to do and not the other way around:

...so I asked a doctor about a nerve block, and she goes, "Oh, well we need to do this [first]," and I said, "But a nerve block would help." And after 20 minutes, and we couldn't control the pain, she said, "Oh, maybe we should do a nerve block." ... I suppose, a nurse asking a doctor to initiate a procedure... is sometimes confronting... (ED Nurse, 017)

While it was a difficult communication to have, the nurse decided to communicate her thoughts with the clinician. In that case, the communication did not compromise care in any way. However, at times, communication can be an obstacle to clinical judgement. In other words, the observation that is communicated by one craft group may serve clinicians from that craft group well in their clinical decisions and the care they provide, but if clinicians from another craft group adopt this observation for their decision making it might compromise the care they are supposed to provide. The ED nurse explained:

...sometimes I think the streaming nurses listen to the ambulance officers rather than looking at the patients themselves and the ambulance officers you know said to me look she's ... got abdo pain and has taken something and it hasn't helped... and instead of looking at the patient I think they [streaming nurses] just listened to the ambulance officer and may have yeah but it's just if may have maybe the patient has change or maybe the streaming nurse didn't think she looked as unwell as I thought she looked (ED Nurse, 018)

So this is an example of how communication with another craft group may encourage nurses not to conduct their own assessment and then they might miss something they would have otherwise picked up about a patient.

Sometimes, though, communication can be successful but silent. In a complex trauma case, where many clinicians are involved, communication is important. The nurse explains how silent communication in the Emergency Department during an urgent trauma case is a feature of a good trauma team at work:

...if you stand outside and watch a good trauma run, it's very quiet. There's not a lot of talking... The communication is about passing information, usually to the senior nurse, who's doing all the documentation, so, you know, the nurse who is doing the heart rate, the blood pressure, all that, that goes up on the screen. The nurse can see that. (ED Nurse, 017)

The nurse explained that during the initial stages of critical care, when the trauma team works well together, there are no questions asked. The information needed for decision making is gathered progressively through the systematic approach clinicians use. Clinicians with experience of working in trauma know what needs to be done and in what order:

So we'll tell about their pupils [17:52], their limbs' [17:53] strength, their allergies, their medication, but there shouldn't be 'have you done these?', 'could you do that?', 'have we done an ECG yet?', 'have we done a BSL yet?' Because those things just progressively happen through the systematic approach that we use. And when you become familiar with that systematic approach, it runs really smoothly. (ED Nurse, 017)

In order for this silent communication to work well, the emergency department nurse needs to be coordinated with the medical leader. She explains that there are:

...a lot of people who are wanting to make decisions at the same time so I find that my role in that sort of scenario is with the medical leader and together we need, we talk about what needs to be done first (ED Nurse, 018)

The number of clinicians includes at least three medical specialties that coordinate their efforts to provide initial care to the patient:

...in trauma we have an emergency doctor, who runs the trauma... then we have an anaesthetist who comes down to help with the airway and then you have a trauma doctor who's to oversee the injuries so the emergency physician... (ED Nurse, 018)

While there is a certain coordination with the leader, there are a number of examples where competing interests make communication between craft groups difficult for nurses. The following example describes teamwork in trauma care where clinicians have competing interests:

...[The] emergency physician or doctor is the one who makes the decisions of what happens first, he runs the trauma basically. The problem is sometimes you've got a sick patient, you've got the trauma doctor wanting to ... fix up the legs so if you've got a leg that's got no circulation... you've got the anaesthetist saying I'm not happy with his breathing... and you've got someone saying I want to get urgent CT... (ED Nurse, 018)

This notion of competing interests is an important one, as illustrated above in the previous section on the medical group.

Nurses communicate with many different craft groups. Providing care to a trauma patient usually involves a large multidisciplinary team of clinicians working together. Their communication is absolutely essential to achieving patients' care goals.

11.2.2 Theme Six. Communication of evidence within a craft group

Many of the communication strategies found between nurses and other craft groups are also found between nurses themselves. The culture of learning and asking questions is promoted in the nursing clinical practice. The communication between nurses facilitates knowledge exchange. As the Emergency Department (ED) nurse explained:

...you might not know that and I might not know something else. I can help you with something else and you can help me with what I do not know. (ED Nurse, 002)

The nurse, with one and a half years of experience in trauma, explained that he does not yet have confidence to do some of the procedures.

When the patient care requires him to do the procedure he always asks a senior nurse to supervise and guide him:

...whenever I feel unsafe or unconfident I think is best to... ask the senior nurses with more experience... (Ward nurse, 003)

The communication in the example above helps with the transmission of tacit knowledge from the experienced nurse to a junior nurse. In the hospital, on most departments and wards, there is a nurse who is allocated to supervise the nurses who are new to trauma. The allocated nurses are called 'nurse educators'. These nurses provide decision making support and communicate knowledge that is context relevant and directly linked to the nurses' decision making, as the junior nurse described how "*the nurse educator was standing by, next to me*" (Nurse, 003) while the nurse was doing the procedure.

One nurse participant described how knowledge is communicated in two different ways. One way is "by word of mouth" when the nurse hears other nurses explaining how a certain procedure is done. The other is by watching someone doing the procedure. These two ways of communication teach nurses how to provide needed care and are much more efficient and comprehensive compared with the written material in the hospital policy. There are many nuances that hospital policy does not go into, but these small details can be picked up by doing the procedure under the supervision of an experienced nurse.

Team nursing is another concept where the communication and shared clinical decision-making takes place with instant access to the nurse in charge in the ward. In the trauma ward the nurses looked after the patients in teams of two. This arrangement enabled nurses to support each other in decision making. Nurses on the ward look after two or three, or sometimes four patients at the same time. This responsibility is given to the two-nurse team. This structure is in place to assist nurses with their clinical decisions. A two-nurse team shares the responsibility for the patients, so no nurse is on her own and solely responsible for any one patient.

A nurse in the Emergency Department in the role of Critical Care Nurse Leader (CCNL) has to make logistical management decisions. This nurse is expected to have a clinical understanding of a patient's presentations but she relies on primary nurses to provide care to the patient, to make basic clinical decisions, and to communicate information about the patient back to her. Sharing of the decision-

making and clear and structured communication are essential to the smooth working of the trauma team in the emergency care.

At handover the nurse receives information about a patient from the nurse who is finishing her shift. In addition to the vital physiological readings, the nurse wants to know the “opinion” of her colleague on the progress the patient made during the previous nursing shift:

...you're gathering... their opinions on how the patient had progressed in the shift before ...if a patient was deteriorating, I would probably go to one of my colleagues, so another nurse, (ICU Nurse, 026)

Another example of the communication within a craft group was given by the nurse from the ICU. She had conducted a research project within the department in order to assess the quality of care the nurses provide. This project aimed to identify best nursing practice, to understand what is involved, and to educate other nurses in the department about best practice:

...I surveyed nursing staff to see what their current knowledge... and confidence was in managing patients... now the goal is to provide education to nursing staff, and then to eventually do a post-survey. (Nurse ICU, 026)

This type of communication promotes the creation and distribution of knowledge within the department. Nurses communicate with each other regularly and frequently. The communication starts with the handover of a patient at the beginning of the clinical shift and continues through the clinical duties right to the end of the shift when the patient's data is communicated to a nurse taking over the duties.

11.2.3 Summary

There are a number of different ways that evidence is communicated between nurses. This communication plays a role in sharing the experiences of senior nurses in the department and facilitates shared decision making. Sometimes the conversations are more information-rich and allow the nurses to impart their knowledge and evidence to other craft groups, including junior doctors and doctors who are new to trauma, and others. At other times, nurses require information and communicate with clinicians from other craft groups to obtain knowledge. Another important kind of communication occurs when nurses join with other clinicians to achieve shared decision making. Although communication often provides a positive work environment for all the participating clinicians, there can also be difficulties, in part related to competing interests, which is an occasional issue across different craft groups and clinical groups.

11.3 Allied Health

The complexity of a patient's trauma brings together different craft groups in an acute environment where the clinical situation can change at a rapid pace. The allied health clinicians work in close collaboration with each other and with other clinical groups.

11.3.1 Theme Five. Communication of evidence between craft groups

Allied health clinicians have many and varied roles in trauma care. They communicate with a range of clinicians outside of their own specialty to ensure the care of trauma patients goes smoothly and progresses as it should. Specifically, allied health clinicians need to know when and how to intervene in trauma care and other clinicians often hold this information.

One example was a patient who had an existing lack of mental capacity, in addition to a new trauma. The physiotherapist had to liaise closely with the psychiatric nurse who spends many hours with patients, as this communication was essential to enable her to provide appropriate care to this trauma patient:

...So I spoke with a nursing staff, and also, she had a psychiatric nurse that was sitting with her [patient] all the time as well. So we kind of just talk through. 'Well, let us try it like this and then see if that works.'... (Physiotherapist, 012)

The role of the trauma physiotherapist is important in terms of communication between the involved craft groups. The physiotherapist explained that no two trauma patients are the same. With every new patient, the physiotherapists:

...have close discussions with the doctors about what they feel is the appropriate care for the patient at the time, and when they would be happy for physio to intervene. (Physiotherapist, 013)

Physiotherapists also need to be aware of:

...what the rest of the team are doing and how that might impact [on their decision making]... (Physiotherapist, 013)

The physiotherapists' interventions are guided by physicians' and surgeons' treatments, but physiotherapists also feel they have autonomy in working with the patient:

...Sometimes we are limited until the doctors have made their decisions or made their plans whether it be for surgery or not and that sort of thing. I also think we are in quite a unique position where we do have quite a lot of sort of autonomy and usually our decisions... and our input is respected such that we sometimes are almost the first persons to get to the patient and do the most thorough assessment. So yeah, we work closely with the medical team. (Physiotherapist, 013)

Physiotherapists coordinate the trauma team's efforts to get a patient out of bed:

...somebody needs to know the whole patient, and it's often the physio that knows the whole patient, from absolute cognitive, femur fracture, tibia fracture, a pelvis fracture, spine fracture, all managed by four different surgeons ...I mean, there is a trauma team, that hopefully manages the patient, but the whole sort of weight-bearing, and when to actually make that move of getting them up and about, I think is really left up to the physio (Physiotherapist, 016)

The physiotherapist communicates closely with a neurosurgeon in regards to a head injury and whether the patient can get up and get out of bed. At the same time the physiotherapist speaks to the orthopaedic surgeon in regards to the leg injury and possible mobilization. There may be more injuries that the patient has and the physiotherapist has to consider them all and speak to all clinicians involved in treating those injuries. These communications are essential to the clinical decision making that the physiotherapist does when providing care to the trauma patient:

...you ask the neurosurgeon whether the head can mobilize, and you ask the general surgeon whether the spleen can mobilize, and then you ask the orthopaedic surgeon whether the femur can mobilize, and then you put it all together ...not just can the spine get out of bed, but do you know there's a femur fracture too, and can the spine hop? So that's the sort of questions that you have to be ready to ask the surgeons from the beginning. (Physiotherapist, 016)

Social workers have different requirements from communicating with other clinicians. A social worker, as a part of her clinical duties, does some linking in communication between the patient, the patient's family and the treating team of clinicians. Social workers create a conducive environment for the successful negotiation and carrying out of the trauma care that is needed for the patient. The request for the intervention can come from different people. The social worker explains:

...often I'll be consulting other staff to see what they think is needed from me... so the reason why social work might get involved in a patient comes from the patient, can come from the patient's family, but equally it can come from the staff expressing a concern.... So, in doing our work, our intervention can be with the patient, it can be with the family, equally, our intervention can be with the staff. (Social Worker, 019)

Like, physiotherapists, speech therapists need to do their own assessment of a patient. A speech therapist assesses trauma patients' ability to swallow and speak and their cognition. However, when providing care to such patients it becomes important to communicate to the clinicians that spend many hours caring for the patient, like a nurse, trauma physician, surgeon and others. This communication often takes place in the patient's notes, where many craft groups write their observations and their recommendations on the treatment pathways from their respective points of view. In addition to reading the patient's notes it is very important for speech therapists to speak to nurses who provide care to the patient to receive important clinical information.

The speech therapist explains:

...talking to the nurses about what he's [patient] been like with them... he'd been very agitated and impulsive, because of his brain injury... that gives us information about how we might approach him when we go in the room... (Speech Therapist, 022)

Every week there is a board meeting for the allied health clinicians where there is an update on the stage of care of all trauma patients. This meeting coordinates the efforts in providing care to these complex patients. Clinical decisions about discharge are made in collaboration with other allied health staff:

...I guess clinical decisions about whether they are someone who needs to go to rehab... in combination with OT, physio, other allied health staff and the medical team... we... discuss that with other allied health members... from our perspective, whether they would benefit from inpatient rehab versus, where they're safe to go home... (Speech Therapist, 022)

There is an undeniable need for coordinated teamwork:

...I think allied health do work very well together on the trauma team ...and I think that's very important..., particularly with these patients... I'm talking about the patients who require multiple inputs from all allied health. There's a lot of kinds of things to consider... It's important for us to work together... (Speech Therapist, 022)

An occupational therapist discusses a patient with all clinicians who have attended the patient. The opinions of a nurse, an allied health, and a doctor helps to create a better understanding of the patient.

The occupational therapist recounted:

...we speak to the nurse who's looking after the patient. If the doctor's around, we might want to have a word with him as well. If an allied health practitioner has already seen the patient, we'll check in with them too.... (Occupational Therapist, 024)

These discussions help the occupational therapist to position their assessment of the patient in the overall clinical assessment.

All allied health clinicians are required to communicate with other craft groups to communicate evidence they have collected or to receive information that others have obtained. Allied health clinicians speak to other allied health clinicians as well as nurses and doctors to coordinate the care the patients receive. It is equally important for them to communicate with each other.

11.3.2 Theme Six. Communication of evidence within a craft group

Allied health clinicians communicate with each other all the time. Different craft groups gave similar accounts where they sought their colleagues' advice or opinion for their decision-making:

...we do rely a lot on... discussions with colleagues (Dietitian, 009)

Communication within a craft group, as found between others, can be written and spoken communication. In the physiotherapy craft group initiative was taken to prepare a training manual with helpful advice for junior physiotherapists. This tool for the communication of knowledge describes scenarios that might be helpful to avoid common mistakes experienced by new physiotherapists:

...we called it a trauma training manual. We basically run through different types of injuries and how they might impact on physio and how generally they managed... I think it is something that you definitely learn as you go, really, and learn from those around you... The more you see trauma patients, the better you get at seeing them. It is that kind of thing. (Physiotherapist, 012)

Communication amongst physiotherapists is considered a very important tool to support new staff. New physiotherapists are encouraged to speak about any issues with their colleagues and senior physiotherapists. Through communication in the department and the encouragement to ask questions the new physiotherapists are provided with professional support. One explains:

...they're basically never left alone, psychologically, even if they're physically alone with the patient. They know that they can call us. They can leave the room and call us ...whenever they feel that something just doesn't quite look right. They don't have to wait... (Physiotherapist, 016)

Social workers also provide this kind of support to their colleagues, in the form of one-to-one supervision with senior colleagues in the department where any ongoing issues from daily practice are discussed. In addition to these provisions, more informal communication is also an important part of the job. The social worker described how she would return to the department from seeing the patient and discuss the case with her colleagues:

...Whenever I'm stuck, and it's either it's something controversial or ambiguous, something I'm not sure of, my natural response is to come back to the department and talk to a colleague or a senior team member, my supervisor, to say, "What do you think?" So it's more practice-based, I would say, is my first step. (Social worker, 019)

Clinicians receive essential support through established relationships within the department. The clinician receives support and guidance in regards to how to manage patients or difficult situations in the ward by communicating with her colleagues. The colleague advises her on the possible pathways and strategies to provide care to a patient. Occasionally she would be directed to a research evidence.

She explains:

...I get from the discussion with the colleague... It might just be around reassurance that my feeling was correct, or my judgment, my decision, I'm heading on the right path. It might be to articulate, "am I missing something?" Is there something that I'm missing in the services I'm offering or in the assessment that I've done? ...they may refer me, it's not often, but they might say, "Oh, there's an article, there's some research, or there's a theory, that would help". (Social worker, 019)

A speech therapist spoke about how she will always discuss the issue amongst colleagues, asking more experienced colleagues about things they have tried before:

...any difficult patients, or any patients that we're not sure of, if we want to gather ideas, we will always discuss that in and amongst colleagues as well... asking someone who might have had more clinical experience, just to grab ideas off them, things they've tried before that have worked or having worked. (Speech therapist, 022)

The exposure to the breadth of clinical cases in the department is another reason for communication with colleagues:

...I don't cover neurosurgery and I was helping other OTs that were very busy. So, I went to my clinical supervisor, who specializes in neurosurgery, and said "I just wanna talk about this patient, talk about what assessments I should be doing, 'cause you would expect his cognition to be very poor." (Occupational therapist, 027)

Communication acts as a teaching tool in clinical practice. There is a lot of knowledge passed from one clinician to another through communication:

...you learn a lot at Uni, and you learn a lot about assessment, but once you start working, you learn a lot too. You learn a lot from your senior clinicians... (Occupational therapist, 027)

11.3.3 Summary

Written and spoken communication are tools that are used constantly for allied health clinicians. Communication acts as a teaching tool, a support mechanism and a way to provide optimum support for patients.

11.4 Chapter summary

There are a few different types of communication in clinical practice in trauma, including formal and informal, and written and spoken. The participants gave accounts of numerous examples of communication within craft groups and between craft groups. Communication often takes the form of face to face spoken exchanges but it has value as a teaching tool and as a way of communicating to other clinicians what assessments and progress has been made in more formal written documents.

Chapter Twelve

Summary and discussion

12.1 Overview of results

The second study aimed to explore the different kinds of evidence that are drawn on in clinical decision making in trauma care. Its specific objectives were: (1) to explore the variations among the kinds of information for decision making used by different clinical groups; (2) to describe the information-seeking behaviour of clinicians; and (3) to describe the different ways of understanding evidence from clinicians' points of view.

The results from Study 2 have shown that although trauma clinicians from different craft groups work in the same environment and provide care to the same patient group, they differ in the ways they use evidence at the point of care. There are many different kinds of evidence used in the course of clinical decision making. Further, clinicians interact with evidence in many different ways.

The thematic analysis of the interview data identified six themes: (1) ways of understanding the concept of evidence; (2) how evidence contributes to clinical decisions; (3) the clinical situations that require new evidence; (4) the actions clinicians undertake to find new evidence; (5) the communication of evidence between craft groups; and (6) the communication of evidence within craft groups.

Our results have shown that despite a commitment to understanding the concept of evidence in a very specific and narrow framework, the evidence actually used in clinical decision making takes many different forms. A frequently mentioned source of evidence was the opinions of colleagues. Colleagues were a major source of information for all our participants. Equally valuable and frequently referenced was a belief in the importance of personal experience and the intuitive knowledge that accompanies it.

Clinicians described a range of experiences with the research literature, in terms of how frequently they used it in their clinical decision making and the ways in which they applied it. Some clinicians consulted

the literature frequently and others only rarely. Some expressed their view that there was a lack of research literature specific to their needs in relation to the actual decisions they were called on to make in everyday clinical practice.

“Protocols” and “intranet materials” are grouped together as a source of evidence because it is usual practice to place hospital protocols on the hospital intranet. The participants used the terms *guidelines*, *policy*, and *protocol* interchangeably unless referring to published guidelines, e.g. Brain Trauma Foundation Guidelines. These sources of evidence were particularly important for the nurse participants. A protocol is a document that is produced by a department, or hospital, encompassing a set of rules or guiding principles for specific tasks, including clinical decision making. Such documents can be relatively comprehensive. Examples of more comprehensive documents were the protocols referred to by physiotherapists and those used in the ICU department. The former contained both guiding principles and detailed instructions relating to a wide range of clinical decisions in their field of work.

Intranets and the Internet are the sources of evidence adduced in many other settings. An intranet is a repository of knowledge within an organisation, either hospital-wide or department specific. Access to it is freely available within the hospital and or the department. Unlike the Internet, the intranet provides information that has been curated by the hospital administration or departmental heads. An intranet is more likely to have content that relates specifically to clinicians’ clinical environments as they have been selected for their relevance to clinical decision making. The information on the intranet is narrowed to the requirements of the hospital. Clinicians also use the Internet to search for information, sometimes using a targeted approach where they go straight to known and trusted websites.

I use the term “home grown” evidence to describe the knowledge that is created in the department where clinicians conduct small research projects to fill specific evidence gaps. During the interviews I was given a number of examples of research projects aiming to answer a clinical question that came up for participants or their colleagues in the process of clinical care where no guidelines or research evidence could be found.

Evidence was also derived directly from patients and their families by many of the participants. As a neurosurgeon said, even a technically well done operation would not work if the patient's preferences were not taken into consideration.

Textbooks and formal education were another source of evidence for the participants. In clinical practice, for example in neurosurgery, clinicians resort to finding knowledge for themselves. They consult textbooks for some basic things, such as how to set up the theatre and the operating table so that during the operation the surgeon will have the best possible view and access to the operating field. The textbook gives the range of possible options that can be combined into a more complex setup depending on the requirements of the operation.

12.2 Overlaps with the literature

My research has found that when called upon to define the term "evidence" clinicians almost exclusively refer to the formal research literature that describes the results of RCTs and SRs. When, however, an inquiry was made into how they used the literature in clinical practice I found that clinicians very rarely or never refer to the research literature as their preferred source of evidence at the point of care. When they had questions or encountered limitations regarding their own knowledge, clinicians went to their colleagues for the information that they needed for their clinical decisions. These key findings agree with pre-existing studies, which have shown that when faced with clinical questions clinicians of all kinds consult their colleagues as one of the first options. (Coumou and Meijman 2006, Doran 2007).

Some published research has also shown that when the care that is recommended by experts is not actually delivered to patients it is typically assumed to be the result of clinicians being ignorant of the latest clinical research findings. This is often referred to as the "gap between research and clinical practice". The World Health Organization described the existence of the supposed gap as "one of the most important challenges for public health in this century" for some parts of the world (WHO 2005). The findings of my study show that the research literature is in practice consulted and used infrequently. However, clinicians provided an explanation for this: that the research literature often does not give an answer to the clinical question they wish to ask. My findings therefore support reports of a "gap" between

research and clinical practice in trauma care (Rayan 2012, Shafi, Rayan et al. 2012), albeit with this proviso.

The clinicians in my study provided examples of clinical decision making in which a patient's circumstances took priority over a guideline or protocol. That this is a frequent phenomenon is confirmed by the published literature regarding patients who do not receive recommended care according to guidelines and latest research (McGlynn, Asch et al. 2003, Faul, Wald et al. 2007, Rayan 2012). Patient based evidence is one of the most important contributors to nurses' clinical decisions (Bucknall 2000, Gertz 2001, Bucknall 2003), and nurses' decisions appear to be especially sensitive to environmental and individual variables (Bucknall 2000, Thompson, Bucknall et al. 2007). However, it is the case that all other clinical groups also recognise the need to respond to local contextual circumstances.

The participants in my study gave examples of clinical decisions they made in which they used their "gut feelings" and "intuition", instead of guidelines or research findings. This phenomenon is recognized and described in the literature (Rew and Barrow Jr 2007). In fact, some authors have concluded that intuition is an important kind of clinical expertise and should be carefully taught to neophyte clinicians (Montgomery 2005, Miles 2007, Rew and Barrow Jr 2007).

My study has shown that expert opinion plays an important role in clinical practice. This finding agrees with the study of Hofmeijer (Hofmeijer 2014), who concluded that expert opinion should be complementary rather than hierarchically ranked in relation to the evidence from RCTs. In my study, clinicians in all craft groups used the opinion of a more experienced colleague or a consultant in their clinical decisions. In complex trauma cases the clinical decisions are made by the consensus of experts.

12.3 Differences from the literature

There is much in my study that is novel and departs in fundamental ways from many of the positions and concepts assumed in the literature summarised in Chapter 2. My finding of the coexistence of multiple forms of evidence embedded in a teeming plurality of discourses is new. My finding of the open and creative richness of much of the decision making that takes place in everyday practice is new. My finding of the lack of relevance of the formal research literature to much of what happens in the core

process of providing a flux of infinitesimal, rapid, immediate responses to urgent context-specific decision-moments, fundamentally departs from much thinking about evidence in the clinical practice setting.

Here, I will mention just a few additional differences with the established body of knowledge. The first concerns barriers to a formalised approach to “evidence based medicine”. Clinicians face a number of challenges when trying to keep up to date with the latest research literature. Recognised barriers to the use of research information at the point of care include lack of time, lack of access, not knowing where and how to find evidence, and not being aware of the existence of relevant research (LaPelle, Luckmann et al. 2006).

In my study I did not specifically ask clinicians why they do not use research information, but from the free flowing discussions I was able to infer that some clinicians simply find an abundance of research information not relevant to their clinical decisions. Some clinicians claim that there are no definitive research findings that can inform their clinical decision making or that when there are research findings in their broad field they may not relate to their specific patient population. Just as the plastic surgeon ascertained that RCT evidence mostly did not apply to the specific, comparatively small number of patients with whom he was involved, in clinical practice more broadly it is often difficult to make the necessary links between the standardised populations of the research literature and the actual patients in respect of whom one is called up on to decide in their individuality and specificity.

Our interviews were conducted in a large metropolitan hospital that has a dedicated trauma centre and an educational academic institution. Most of the participants described activities that were designed to increase awareness about research amongst the clinicians within the department. Many clinicians referred to the on-going research projects being conducted in their departments. In addition to these projects there were lectures, specially allocated “education hours”, and various informative presentations.

The study by Green (2000) found that in clinical practice only 29% of clinical questions were being pursued in order to find relevant and practical answers. By contrast, the results of my survey showed

that in 96% of cases the participants have pursued, and tried to answer, their question. In only 4% of cases, participants did not pursue clinical questions and did not look for answers. The high rate of pursuing a clinical question in my study could be explained by the fact that the questions were directly linked to patient care. These questions needed to be answered in order to provide care to the patient. My qualitative study further investigated the sources of information used to answer clinical questions, including the range of possible questions that arose during a patient encounter.

The literature concerning the barriers to keeping up with the continually expanding research literature (LaPelle 2006) is built on the assumption that clinicians should use the latest research findings in their practices in order to improve the quality of the care they provide. According to a trauma physician participating in one of the interviews, the quality of care is linked primarily to the experience of the treating clinicians; he stated that the outcomes for severely injured patients were better because they had a high chance of being attended by an experienced member of staff as compared to a less severely injured patients seen by a junior clinician.

Knowledge in clinical practice is generated continuously. Knowledge creation happens between clinicians from different clinical groups when there is an interaction between different discourses during a patient encounter. Knowledge creation also occurs between clinicians within the same clinical group using the same discourse, as in the example, described in the previous chapter, of the neurosurgeon having his colleague standing at the operating table with him. My research explores the various sources of information used at the point of care. It shows that research-derived information is a small contributor to the total information that is used during patient care. The findings highlight the importance and value of all information clinicians use during clinical decision-making.

12.4 Implications of findings

The process of clinical decision making involves the collection and use of many different kinds of evidence that are brought together in the transient specificity of an actual clinical setting. The diversity of both the clinical circumstances and the resources on which clinicians can and do draw is almost without limit. A surgeon makes very different kinds of decisions compared with a physician providing care to the same patient. And the decisions of the physician differ profoundly from those of a radiologist,

or a nurse, or a dietitian, or a social worker. But even within a craft group the forms of evidence are multiple. Single clinicians may draw on resources that derive from their educational and cultural backgrounds, from their personal—professional and non-professional—experience, from the rules and protocols of the organisation for which they work, from the body of wisdom constituted by the shared experiences and knowledge of their colleagues, and from accounts of formally conducted RCTs or other studies of broad relevance to their field.

Every decision made in a clinical setting is conditioned by highly complex arrays of different kinds of evidence. Different clinicians weigh different sets of facts, gather different evidence, and make different clinical decisions. Each clinician operates within a specific discourse system that both defines both the questions that need to be asked and the kinds of answers that will be considered to be valid. The conditions of validity are generally linked to concepts of “evidence” which, as we have shown, now has to be understood as multi-faceted and pluralistic, drawing on deep sources of theory, experience and tradition.

The current model of EBM, widely promoted in the literature and in popular discussions, does not reflect the reality of clinical practice and—even more importantly—does not serve either medicine or the community well. Research-derived evidence (in the narrow sense) makes only a small contribution to the decisions made in clinical practice. Clinicians are aware of the “importance” of research evidence and they speak *for* it, but they vote with their actions for the multiple other kinds of evidence, including especially evidence derived from direct contact and dialogue with patients, and evidence derived from reflective discussions with other clinicians.

My research adds to the literature that speaks against the concept of a hierarchy of evidence in clinical practice, at least in the manner in which this concept is widely used. The idea underlying a “hierarchy of evidence” is that some kinds of evidence are superior to others and naturally take precedence over them. Usual formulations of the hierarchy idea in medicine claim that the evidence of RCTs and SRs stands at the peak, unambiguously outweighing that of opinion, personal experience, individual reflection, conversations between colleagues and direct dialogue with patients. The findings of my study draw attention to the fact that clinical decision making itself is extremely pluralistic and heterogeneous,

with most issues to be decided arising in an ongoing flux of interchanges and exchanges, in which it is rare for a question to be formulated as a “dilemma” to be resolved by a decision for or against a defined set of alternative courses of action. This in itself is sufficient to explain the readiness of clinicians to draw flexibly on whatever resources are available to assist them with their practical judgments. But my study also highlights the fact that the kind of evidence derived from RCTs and similar, large scale data gathering processes is often disconnected from the concrete, context specific decision making processes in which clinicians are engaged at the actual clinical practice.

EBM is a particular school of thought that is built on the premise that every doctor needs to use research evidence in their clinical decision making. This has led to the assumption that doctors must use research evidence, a philosophy which is often limiting and has led to the apparent de-emphasising or side-lining of all other kinds of evidence.

My findings show, therefore, that the existing framework of a hierarchy of evidence is of little use for clinical practice. In the hierarchy pyramid the clinician’s expertise and experience—including that derived from direct dialogue with the patient—is placed below all research derived evidence. However, as I have shown, this does not truly reflect the information needs of the clinicians (Tonelli 1999, Ho, Peterson et al. 2008), or how they use evidence in clinical practice and decision making. My study highlights the limitations of the narrow concept of evidence that is often promoted in discussions about clinical decision making. The study demonstrates a disconnection between the language used by clinicians when asked to talk explicitly about evidence and the much richer, expanded concept of evidence they habitually apply implicitly in their clinical practice.

A further comment might be added of an epistemological nature. The kind of evidence that is derived from an RCT refers to and emerges from an epistemology that is different from that of clinical practice. There is a discontinuity, or a “rupture”, between the kind of knowledge obtained in RCTs and that which characterises clinical understanding and the judgments associated with it. RCTs provide probabilistic information relevant to a sample population, which is necessarily expressed in abstract, highly schematic terms and may be very large. By contrast, clinical practice requires knowledge that is finely attuned to the multi-dimensional circumstances of an individual, including his or her multiple medical

problems and medications, religion and values, cultural circumstances, psychological state etc. Abstract, “generalizable” findings are often not applicable to an individual patient in his or her absolute specificity. This is not to say that the two bodies of knowledge do not interact. It does, however, highlight the fact that they are separate and—at least from the point of view of the clinician—if a choice has to be made the greater weight lies with the clinical process.

My conclusions suggest the need for a reformulation of what is often taken to be the fundamental questions relating to evidence in medicine. The real problems do not relate to how each decision can be justified in relation to one particular species of evidence or body of data. Rather, they pose a—much more complex—series of questions about how clinicians can most effectively identify, mobilise and employ evidence that derives from multiple sources, and may vary from person to person and fluctuate in relation to time and changing circumstances. The question of evidence is a question of knowledge, of practice, of culture and of education. It goes deep to the heart of medicine and to its ancient traditions.

12.5 Limitations

My study proposes a conception of evidence that provides an approximation of the clinical reality that is more accurate than previous accounts. However, it has certain limitations. The study employed a modest sample of participants. Not all professional groups involved in trauma care were represented. The study did not have access to some particular disciplines: for example, requests for access to the paramedics and ambulance workers were declined. The data were generated exclusively in the setting of trauma care, so there may be uncertainty about the extent to which the findings are generalizable to other clinical disciplines. All participants came from one trauma centre, which might have led to institutional bias.

This project focused on the frequency of literature use and the breadth of types of evidence consulted. It did not investigate the different ways the literature was used. This could be an important distinction which may lead to further refinements in the understanding of how clinical judgments are derived in practice.

The nature of the enquiry did not include an in-depth examination of some aspects of decision making. For example, in the case of “asking a colleague” in the context of care for a trauma patient I did not

undertake the analysis of information transfer from one clinician to another clinician. This is therefore another important domain of decision making that was incompletely investigated in this study.

12.6 Future directions

Further enquiries into the nature and use of different kinds of evidence in clinical practice will further highlight the richness and complexity of the clinical decision making process.

There remain major gaps in our knowledge which are unfilled by either the literature or my study. The need to expand the investigation to include the full range of clinical disciplines has been mentioned above, as have the needs to expand beyond trauma care and to different hospital and health care settings. A close examination of the nature of clinical dialogues within craft groups is also needed, as well as investigation of the processes underlying the observation of and communication with patients by clinicians.

The diversity and complexity of evidence brings together many clinicians. The harmonious—and sometimes not so harmonious—interplay of clinical decisions made by different clinicians attending the same patient is another area of decision-making that requires further investigation. Indeed, the communication of experience between clinicians is not well understood and needs further study. The understanding of how clinicians from different craft groups operating within different discursive frameworks communicate knowledge to one another is another potential major topic for both theoretical and empirical elucidation.

It would be hoped that such extended studies could contribute significantly to better knowledge dissemination at all levels of clinical practice and, therefore, to enhanced clinical outcomes.

12.7 Chapter summary

In summary, Study 2 comprised a qualitative investigation of the nature and use of evidence among a variety of clinicians in the trauma care setting in a large urban hospital. My findings included some overlaps with the literature and some disagreements. They suggest some significant limitations in current concepts of EBM commonly discussed in the literature. An important conclusion relates to the diversity and complexity of evidence used during clinical decision making. I have shown that clinicians tending the same patient use different kinds of evidence, supporting and being supported by different kinds of knowledge. As striking as it is, this fact frequently goes unnoticed by the clinicians themselves, being tacitly taken for granted.

One practical implication of my findings is the need for a change in the current thinking about evidence in clinical practice as being one kind of evidence, derived from a particular kind of research. The data showed that it is necessary to move from this view to an understanding of the more complex array of different kinds of evidence and how they fit together and interact.

PART IV – Conclusions

Chapter Thirteen

Concluding Chapter

The overall aim of this project has been to enhance the use of evidence in clinical practice in the setting of trauma care. I started with the vision that a greater appreciation of the different kinds of evidence that come into play in clinical practice could be used to increase understanding of the complexity of clinical decision-making and thereby to improve both the evidence itself and its use in clinical practice.

I set out to answer two research questions: (1) How do clinicians in trauma care currently address their informational needs? and (2) What evidence is used in clinical decision-making in trauma care? To answer these questions I undertook two studies. The first was a quantitative survey of the information needs of a large sample of clinicians involved in trauma care and how they responded to these needs. Specifically, I sought to assess what proportions of clinical questions remain unanswered, what sources of information were used at the point of care, the views of clinicians about how best to answer clinical questions, and the use of published research and the Internet in relation to patient encounters.

I found that the vast majority of clinicians recognised the need to seek information to answer questions that arose in their practice and they responded to this need in a variety of ways. They sought the advice or opinions of colleagues; they consulted medical and other databases; and they consulted textbooks, protocols, guidelines. The survey revealed a number of key, surprising features: not only were there many different approaches to finding and applying evidence but these differed greatly amongst the different health professional groups. The way nurses responded to the need for evidence was different from that of doctors, which was different from that of allied health practitioners. In fact, even within the disciplines there were differences. In addition, it was apparent that appeals to the formal research literature—so heavily promoted by the EBM movement—were a relatively rare event.

I therefore undertook a further study, this time a detailed, fine-grained qualitative investigation of the ways in which clinicians understood, identified, sought and used evidence. Specifically, in my second study I sought to describe the ways that clinicians make their decisions, to explore the variations between different clinical groups with respect to information used, to describe the information-seeking behaviour of clinicians, to describe the perceptions and understanding of evidence from clinicians' points of view, and thereby to describe the conditions that influence their decision-making.

The results of the second study were consistent with those of the first. They supported the conclusion that different craft groups had different relationships with evidence. Furthermore, they highlighted the extraordinary variety and complexity of the kinds of evidence that are sought and deployed in the routine course of clinical practice. They presented a sober view of the extent to which clinicians felt able to draw on formal research data—especially the results of RCTs—to answer their clinical questions.

In other words, while I had started the project with an investigation of the *quality* of evidence used in clinical decision making, I concluded with an exploration of the *richness* of evidence in clinical practice. My starting point had taken for granted that it was possible to rank evidence (Ho, Peterson et al. 2008) in such a manner that it would be possible to guide clinicians to use the best possible evidence in their clinical practice. My conclusion led me to question some of the basis precepts of the entire construct of evidence based medicine.

The concept of EBM is based on the idea of informing clinical practice with good quality evidence. The term was coined in the early 90s (Sackett, Rosenberg et al. 1996) and defines the information needed for clinical decisions as a combination of patients' preferences, clinicians' experience, and research derived evidence. Since its inception, EBM has been actively promoted. It is widely proposed—and accepted—that good clinicians use research evidence in their clinical decisions. Research evidence itself is categorized and broken into levels of reliability and robustness (Ho, Peterson et al. 2008, Hoppe, Schemitsch et al. 2009), and is linked to an established concept of a “hierarchy of evidence”. From the EBM perspective it is the data from randomised controlled trials that are considered the “gold standard” of the information clinicians should be using for their decision making. RCTs are thought to produce evidence that is at the top of the hierarchy of research derived evidence. The science around RCTs is

based on a rigorous, highly developed methodology. Each RCT has well-defined inclusion criteria, a carefully conducted randomisation strategy, and methods for data gathering and data analysing.

Despite the huge effort that has gone into promoting EBM and RCTs, and despite the support that the movement has received from the most powerful institutions of medicine and government, the concepts underlying this approach encounter fundamental limitations. While formal research studies undoubtedly yield a great deal of valuable and interesting information, life with its richness often does not fit into the narrow framework of a clinical trial. RCTs represent a kind of knowledge that takes the form of statements of an abstract and highly generalised nature. This kind of knowledge does not necessarily apply to actual patients in the real world. What is more, if an RCT does not meet the criteria for a rigorous and reliable methodology, then it will not be included in the pool of evidence that is recommended for use in clinical decision making.

Evidence—whatever its source and nature—is always the outcome of an intense process of refining, distilling, and purifying. Only information that survives a process such as this can emerge to be called evidence. The problem is that refining the evidence to the pure state causes the loss of much information that could have been fruitfully utilised.

The EBM movement is built on the premise that all doctors need to use research evidence in their everyday clinical decision making. This can easily lead to an assumption that no doctor can make clinical decisions without research evidence, and this conclusion is in fact often asserted. However, the kind of evidence that is derived from an RCT refers to a specific and limited epistemology that, regardless of its breadth and power, is distinct in fundamental respects from the epistemology of clinical practice.

My research has repeatedly drawn attention to the fact that there is a discontinuity, or rupture, between the knowledge obtained in RCTs and the knowledge needed in clinical decision making. RCTs provide probabilistic information for a patient population, and clinical practice needs knowledge that is applicable to an individual patient. Ideally in clinical practice clinicians will have both: information about individual specificity and information that is generalizable to a larger population. This is needed because

clinicians providing care to individual patients are also ultimately involved in the health of the wider community.

Research differs from clinical practice in its basic concepts and the ways in which it poses the questions to be addressed. Generalizable findings are often not applicable to an individual patient. An example from my interviews can be used to illustrate the complex, multi-faceted nature of the decision making challenges faced in trauma care (Intensivist, 025). This was the case of a patient with elevated intracranial pressure, to which the clinician sought to respond by removing the collar to enable the patient to sit up. This clinical situation was complicated by the possibility of the patient having a spinal cord injury. However, a CT scan of the neck indicated some possible tissue injury. The usual way to deal with this situation would have been to send the patient for an MRI but this was not possible in view of the presence of an intracranial pressure monitor. In addition, the patient had a pelvic injury for which he was immobilised and provided with external fixation. The patient was immobilised for management of the spinal and pelvic injuries while he waited for surgery. Because anticoagulation could not be used the immobilisation put the patient at high risk of deep vein thrombosis.

This example draws attention to the co-existence of two epistemologies: the epistemology of clinical research and that of clinical practice. For every clinical issue that the patient had there was a piece of clinical research evidence that could be used to guide the clinicians regarding the best course of care. But in this case none of the “solutions” derived from research could be used because of the other health issues this patient faced. To the issues described in this case may often be added many others, including those relating to the patient’s cultural background, ethical framework, family and religion. The example depicts the complexity of clinical practice where clinicians are making decisions.

The distinction between epistemologies lies in the ideas behind their approaches. Research offers abstract, generalised conclusions drawn from calculations regarding probability, whereas clinicians deal with concrete patients, in concrete situations, and at single points of time.

In clinical practice, there is a difference between a particular nurse’s clinical decisions and the entire nursing group’s clinical preferences. Nursing practice is to a significant degree guided by protocols that

provide recommendations for the care that is expected to be given by nurses. There are lists of clinical situations and of recommendations of what nurses need to do in response. Despite the existence of such protocols, and their apparent rigidity, however, nurses will often seek ways 'around the protocols' because in their views their patients' situations do not fit the protocols.

In my interviews with clinicians in the Trauma Centre I found that the quality of the information employed by clinicians is a minor factor affecting clinical decision making. Rather, it was the diversity and the range of information that mattered most.

It remains an interesting line of enquiry to try to understand how clinicians decide what information to use and how they gather that information. In gathering the information needed for clinical decision making there are generally two pathways available to clinicians. These are: (i) looking for evidence, and (ii) turning the available information into evidence.

In the first approach, a "realist" one, clinicians search for evidence believing in the existence of data that accurately match the reality. Here, it is assumed that the best evidence will produce the best decision and that it is a professional responsibility of clinicians to find, match, and use the 'best' evidence. This in turn will ensure the best clinical decision and the best patient outcomes.

It is one of the conclusions of this project that the realist approach is flawed and that an alternative approach, to which we refer as "constructivist", is to be preferred. From this viewpoint, clinicians construct their decisions as they gather whatever evidence is available to them. No type of information is excluded and decisions are shaped by every bit of available evidence, each having some weight in the decision-making process. Here, there is no hierarchy of evidence. Clinicians gather a variety of information. All the information used in clinical decision becomes the evidence utilised for decision-making. The evidence is not something existing independently; it is not an ultimate truth. Instead, it is a building block that helps to construct a decision for the particular patient, in the particular situation, and at the particular point of time. From this perspective, in clinical practice evidence occurs as an organic component of decision making process.

One of the most fundamental questions about clinical decision making refers to how evidence is identified, mobilised and employed amidst the rich plenum of available information. A good clinician does not consider individual symptoms in isolation but examines all the data directly and indirectly related to the symptoms and to the patient. Evidence is a bridge between empirical experience and knowledge. Converting sensory experience (empirical data) into knowledge is only possible when the link between the experiential and theoretical platforms is formed. Evidence forges that link.

I conclude this thesis by summarising in a visual image the model of clinical decision making that has emerged from my project (Figure 12.1). Imagine a scene in the trauma room. A patient is wheeled in on a trolley with extensive injuries following a major car accident. As he enters, the various members of staff who are to attend to him also prepare themselves for the dramatic events that are about to occur. They have been through it before many times, but for them the novelty never wears off.

Our patient is positioned in the middle of the room, barely conscious, dimly aware of the pain and other symptoms he is experiencing. The team springs into action. The members of the trauma team go about their tasks with ruthless efficiency. The patient is assessed by each of them, one by one, in their own way. The doctors—there is the trauma consultant in charge and her registrar—the nurses—there are two of them—quickly assess the situation and call for help from other relevant members of the team. A radiologist is quickly on the scene, arranging his investigations. An orthopaedic surgeon is examining the patient. A neurosurgeon is on her way. The critical care nurse leader is arranging for a pathology nurse to collect samples, and for other members of the team to be put on standby. The patient is connected to monitoring equipment. Drugs are prepared.

Only a few minutes have gone by and the patient is now the centre of an intense flurry of actions. People come and go. The talk between them is sparse but effective. Machines are whirring, beeping and flashing. Investigations are undertaken. Treatments are administered. Preparations are made for surgery. A team member is dispatched to talk with the family waiting outside. Every step in the process is documented. The patient himself lies there, only dimly aware of the tumult around him. All he knows is that he is in hospital, and in safe hands.

Let us reflect on what has happened.¹ The patient is at the centre of a remarkable and complex series of actions, relationships and events. He is attended to by multiple clinicians, each with his or her own highly refined and specific interests and range of competencies. The doctors, the nurses, the allied health professionals, the ward assistants, the chaplains—and all the other members of the team—go about their tasks with focus and determination. Each has a job to do, about which they are already clear, or which is quickly clarified for them by a few sparse words from the doctors and nurses directing the action with discreet efficiency.

Each clinician applies the knowledge and skills with which they have been trained. They ask the questions they have learned to ask—about injuries, symptoms, clinical observations, physical signs, investigation results, the messages constantly presented to them by the equipment, or by advice and comments from their colleagues. Each clinician goes about his or her business, asking questions and looking for answers. For their multiple questions they seek multiple answers, as required by their own tasks and circumstances, looking in the places so well known to each of them. With unerring efficiency they draw on the various sources of information and evidence available to them. The observations and physical examinations of the patient yields their ancient results to the many carers who come and go. The pathology results, the radiological investigations, the data being flashed on the machines, are scrutinised and evaluated. Some team members are consulting with each other. Some are on the phone talking with colleagues or making preparations for the actions to follow. Some are looking on various computers for answers to questions about procedures, protocols, and maybe guidance about responses to the data they have already compiled.

Each clinician is operating within their own system of discourse, asking their own questions in the languages familiar to them. Each is seeking—and finding—the evidence needed to answer their own needs. Each is responding within the terms of their discipline and communicating with their colleagues within their own disciplines or in others disciplines as required by the unfolding circumstances.

The patient, of course, is unaware of the complexity of the quiet tumult he has unleashed around him. He cannot know the extent to which he is at the epicentre of a largely silent series of conversations, involving multiple participants, speaking multiple languages, asking multiple questions, finding multiple

¹ For the passage that follows I acknowledge the advice and assistance of Professor Komesaroff.

answers, generating multiple actions. He cannot know how within a few minutes the massive resources of centuries of tradition, of personal wisdom and experience, of carefully recorded and stored data, guidelines, protocols, summaries and reviews and coordinated analysis, reasoning and reflection have been mobilised in his favour. All that he is aware of are the outward signs—the people coming and going in a bewildering succession, and the effects of the various procedures and treatments to which he finds himself subjected.

This is the miracle of trauma care. Discourses, epistemologies, local cultures, communication, decisions, multiple perspectives, questions, forms of evidence, practice. A system of irreducible complexity but impressive efficiency and effectiveness. It is hoped that this thesis may have contributed in some small way to deciphering its various codes and to enhancing the appreciation and further refinement of its valuable achievements.

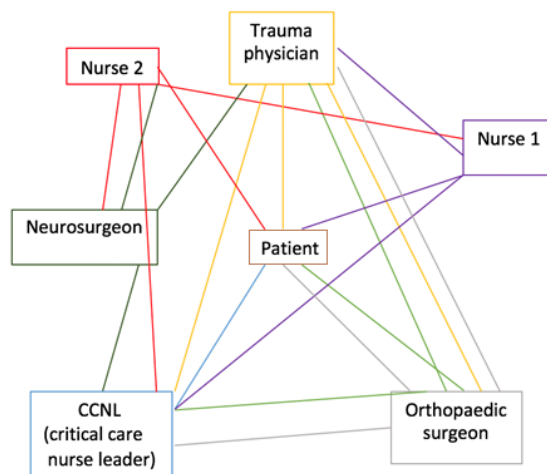


Figure 12.1: Schematic representation of the processes underlying trauma care

List of references

- Anderson, M., Fitzgerald, M., Martin, K., Santamaria, M., Arendse, S., O'Reilly, G., & Marasco, S. (2015). A procedural check list for pleural decompression and intercostal catheter insertion for adult major trauma. *Injury*, 46(1), 42-44.
- Angus, D. C. (2015). Fusing randomized trials with big data: The key to self-learning health care systems? *JAMA*, 314(8), 767-768.
- Anscombe, G. E. M. (1996). *An introduction to Wittgenstein's Tractatus*. Bristol: Thoemmes Press.
- Ashcroft, R. E. (2004). Current epistemological problems in evidence based medicine. *Journal of Medical Ethics*, 30(2), 131-135.
- Atkin, C., Freedman, I., Rosenfeld, J. V., Fitzgerald, M., & Kossmann, T. (2005). The evolution of an integrated State Trauma System in Victoria, Australia. *Injury*, 36(11), 1277-1287.
- Barry, C. A. (2006). The role of evidence in alternative medicine: contrasting biomedical and anthropological approaches. *Soc Sci Med*, 62(11), 2646-2657.
- Bastian, H., Glasziou, P., & Chalmers, I. (2010). Seventy-five trials and eleven systematic reviews a day: how will we ever keep up? *PLoS Med*, 7(9), e1000326.
- Berg, M. (1997). Problems and Promises of the Protocol. *Soc Sci Med*, 44(8).
- Berg, M. (1992). The construction of medical disposals Medical sociology and medical problem solving in clinical practice. *Sociology of Health & Illness*, 14(2), 151-180.
- Boissel, J. P., Haugh, M., Fardeheb, M., Nony, P., Gueyffier, F., & Strang, N. (2003). How should therapeutic information be transferred to users? *Fundam Clin Pharmacol*, 17(4), 495-503.
- Bragge, P., Chau, M., Pitt, V. J., Bayley, M. T., Eng, J. J., Teasell, R. W., Gruen, R. L. (2012). An Overview of Published Research about the Acute Care and Rehabilitation of Traumatic Brain Injured and Spinal Cord Injured Patients *Journal of Neurotrauma*, 29(8), 1539-1547.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Bucknall, T. (2000). Critical care nurses' decision-making activities in the natural clinical setting. *Journal of clinical nursing*, 9(1), 25-35.
- Bucknall, T. (2003). The clinical landscape of critical care: nurses' decision-making. *Journal of advanced nursing*, 43(3), 310 - 319.
- Bulger, E. M., Nathens, A. B., Rivara, F. P., MacKenzie, E., Sabath, D. R., & Jurkovich, G. J. (2007). National variability in out-of-hospital treatment after traumatic injury. *Ann Emerg Med*, 49(3), 293-301.
- Bulger, E. M., Nathens, A. B., Rivara, F. P., Moore, M., MacKenzie, E. J., & Jurkovich, G. J. (2002). Management of severe head injury: institutional variations in care and effect on outcome. *Crit Care Med*, 30(8), 1870-1876.
- Cartwright, N. (2011). A philosopher's view of the long road from RCTs to effectiveness. *The Lancet*, 377(9775), 1400-1401.
- Chambers, D., Wilson, P. M., Thompson, C. A., Hanbury, A., Farley, K., & Light, K. (2011). Maximizing the impact of systematic reviews in health care decision making: a systematic scoping review of knowledge-translation resources. *Milbank Q*, 89(1), 131-156.

- Charmaz, K. (2004). Premises, principles, and practices in qualitative research: revisiting the foundations. *Qual Health Res*, 14(7), 976-993.
- Clancy, C. M., & Cronin, K. (2005). Evidence-based decision making: global evidence, local decisions. *Health affairs*, 24(1), 151-162.
- Clarke, V., & Braun, V. (2014). Thematic analysis *Encyclopedia of Critical Psychology*, pp. 1947-1952. Springer.
- Coumou, H. C., & Meijman, F. J. (2006). How do primary care physicians seek answers to clinical questions? A literature review. *J Med Libr Assoc*, 94(1), 55-60.
- Covell, D. G., Uman, G. C., & Manning, P. R. (1985). Information needs in office practice: are they being met? *Ann Intern Med*, 103(4), 596-599.
- Crabtree, B. F., & Miller, W. F. (1992). *A template approach to text analysis: developing and using codebooks*, 93-109. Newbury Park, CA: Sage Publications.
- Creswell, J. W. (2012). *Qualitative inquiry and research design: Choosing among five approaches*: Sage.
- Crowther, M. A., & Cook, D. J. (2007). Trials and tribulations of systematic reviews and meta-analyses. *Hematology Am Soc Hematol Educ Program*, 493-497.
- Cullen, R. J. (2002). In search of evidence: family practitioners' use of the Internet for clinical information. *J Med Libr Assoc*, 90(4), 370-379.
- Curran, J. A., Grimshaw, J. M., Hayden, J. A., & Campbell, B. (2011). Knowledge translation research: the science of moving research into policy and practice. *J Contin Educ Health Prof*, 31(3), 174-180.
- Currie. (2003). Clinical Information Needs in Context: An Observational Study of Clinicians While Using a Clinical Information System. *AMIA*, 190 - 194.
- Davies, K., & Harrison, J. (2007). The information-seeking behaviour of doctors: a review of the evidence. *Health Info Libr J*, 24(2), 78-94.
- Davis, D. (2005). Quality, patient safety and the implementation of best evidence: provinces in the country of knowledge translation. *Healthc Q*, 8 Spec No, 128-131.
- Davis, D., Evans, M., Jadad, A., Perrier, L., Rath, D., Ryan, D., Zwarenstein, M. (2003). The case for knowledge translation: shortening the journey from evidence to effect. *BMJ*, 327(7405), 33-35.
- Dawes, M., & Sampson, U. (2003). Knowledge management in clinical practice: a systematic review of information seeking behaviour in physicians. *Int J Med Inform*, 71(1), 9-15.
- Dawes, M., Summerskill, W., Glasziou, P., Cartabellotta, A., Martin, J., Hopayian, K., Osborne, J. (2005). Sicily statement on evidence-based practice. *BMC Med Educ*, 5(1), 1.
- De Vito, C., Nobile, C. G., Furnari, G., Pavia, M., De Giusti, M., Angelillo, I. F., & Villari, P. (2009). Physicians' knowledge, attitudes and professional use of RCTs and meta-analyses: a cross-sectional survey. *Eur J Public Health*, 19(3), 297-302.
- Doran. (2007). Evidence in the Palm of Your Hand: Development of an Outcomes - Focused Knowledge Translation Intervention. *Worldviews on Evidence - Based Nursing*, 69 - 77.
- Duguid, P. (2005). "The art of knowing": Social and tacit dimensions of knowledge and the limits of the community of practice. *The information society*, 21(2), 109-118.

- Egger, M., Smith, G. D., & Sterne, J. A. (2001). Uses and abuses of meta-analysis. *Clin Med*, 1(6), 478-484.
- Ely, J. W., Osherooff, J. A., Chambliss, M. L., Ebell, M. H., & Rosenbaum, M. E. (2005). Answering physicians' clinical questions: obstacles and potential solutions. *J Am Med Inform Assoc*, 12(2), 217-224.
- Engelbrechtsen, E., Vøllestad, N. K., Wahl, A. K., Robinson, H. S., & Heggen, K. (2015). Unpacking the process of interpretation in evidence-based decision making. *Journal of evaluation in clinical practice*, 21(3), 529-531.
- Estabrooks, C. A., Chong, H., Brigidear, K., & Profetto-McGrath, J. (2005). Profiling Canadian nurses' preferred knowledge sources for clinical practice. *Can J Nurs Res*, 37(2), 118-140.
- Faul, M., Wald, M. M., Rutland-Brown, W., Sullivent, E. E., & Sattin, R. W. (2007). Using a cost-benefit analysis to estimate outcomes of a clinical treatment guideline: testing the Brain Trauma Foundation guidelines for the treatment of severe traumatic brain injury. *J Trauma*, 63(6), 1271-1278.
- Fontana, A., & Frey, J. (1994). The art of science. *The handbook of qualitative research*, 361-376.
- Foucault, M. (1972). *Archaeology of Knowledge*. (A. Sheridan, Trans.). London: Tavistok.
- Gabbay, J., & le May, A. (2004). Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ*, 329(7473), 1013.
- Gerdtz, M. F., & Bucknall, T. K. (2001). Triage nurses' clinical decision making. An observational study of urgency assessment. *Journal of Advanced Nursing*, 35(4), 550-561.
- Gillett, G. (2004). Clinical medicine and the quest for certainty. *Soc Sci Med*, 58(4), 727-738.
- Glasgow, R. E. (2008). What types of evidence are most needed to advance behavioral medicine? *Annals of Behavioral Medicine*, 35(1), 19-25.
- Glasziou, P., & Haynes, B. (2005). The paths from research to improved health outcomes. *Evid Based Nurs*, 8(2), 36-38.
- Glasziou, P., & Heneghan, C. (2008). Epley and the slow boat from research to practice. *Evid Based Med*, 13(2), 34-35.
- Goldenberg, M. J. (2006). On evidence and evidence-based medicine: lessons from the philosophy of science. *Soc Sci Med*, 62(11), 2621-2632.
- Green, L. W. (2008). Making research relevant: if it is an evidence-based practice, where's the practice-based evidence? *Fam Pract*, 25 Suppl 1, i20-24.
- Green, M. L., Ciampi, M. A., & Ellis, P. J. (2000). Residents' medical information needs in clinic: are they being met? *Am J Med*, 109(3), 218-223.
- Green, M. L., & Ruff, T. R. (2005). Why do residents fail to answer their clinical questions? A qualitative study of barriers to practicing evidence-based medicine. *Acad Med*, 80(2), 176-182.
- Greenhalgh, T. (1999). Narrative based medicine in an evidence based world. *BMJ*, 318(7179), 323-325.
- Greenhalgh, T. (2002). Intuition and evidence--uneasy bedfellows? *Br J Gen Pract*, 52(478), 395-400.
- Grol, R., & Grimshaw, J. (2003). From best evidence to best practice: effective implementation of change in patients' care. *Lancet*, 362(9391), 1225-1230.

- Grol, R., & Wensing, M. (2004). What drives change? Barriers to and incentives for achieving evidence-based practice. *Med J Aust*, 180(6 Suppl), S57-60.
- Guindon, G. E., Lavis, J. N., Becerra-Posada, F., Malek-Afzali, H., Shi, G., Yesudian, C. A., & Hoffman, S. J. (2010). Bridging the gaps between research, policy and practice in low- and middle-income countries: a survey of health care providers. *CMAJ*, 182(9), E362-372.
- Hartley, J. (2004). Current findings from research on structured abstracts. *J Med Libr Assoc*, 92(3), 368-371.
- Haynes, R. B., Sackett, D. L., Gray, J. M., Cook, D. J., & Guyatt, G. H. (1996). Transferring evidence from research into practice: 1. The role of clinical care research evidence in clinical decisions. *ACP J Club*, 125(3), A14-16.
- Henderson, A., Winch, S., Holzhauser, K., & De Vries, S. (2006). The motivation of health professionals to explore research evidence in their practice: An intervention study. *J Clin Nurs*, 15(12), 1559-1564.
- Higgins, J. P. T. G., S. (editors). . (2011). *Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 The Cochrane Collaboration*.
- Ho, P. M., Peterson, P. N., & Masoudi, F. A. (2008). Evaluating the evidence: is there a rigid hierarchy? *Circulation*, 118(16), 1675-1684.
- Hofmeijer, J. (2014). Evidence-based medical knowledge: the neglected role of expert opinion. *Journal of evaluation in clinical practice*, 20(6), 803-808.
- Hoppe, D. J., Schemitsch, E. H., Morshed, S., Tornetta, P., 3rd, & Bhandari, M. (2009). Hierarchy of evidence: where observational studies fit in and why we need them. *J Bone Joint Surg Am*, 91 Suppl 3, 2-9.
- Hurwitz, S. (2010). Should We Be Teaching Information Management Instead of Evidence-based Medicine? *Clin Orthop Relat Res*, 468, 2633 - 2639.
- Ioannidis, J. P. (2005a). Contradicted and initially stronger effects in highly cited clinical research. *JAMA*, 294(2), 218-228.
- Ioannidis, J. P. (2005b). Why most published research findings are false. *PLoS Med*, 2(8), e124.
- Ioannidis, J. P., & Trikalinos, T. A. (2005). Early extreme contradictory estimates may appear in published research: the Proteus phenomenon in molecular genetics research and randomized trials. *J Clin Epidemiol*, 58(6), 543-549.
- Kannampallil, T. G., Franklin, A., Mishra, R., Almoosa, K. F., Cohen, T., & Patel, V. L. (2013). Understanding the nature of information seeking behaviour in critical care: implications for the design of health information technology. *Artif Intell Med*, 57(1), 21-29.
- Kelly, T. (2014). Evidence. *Stanford Encyclopedia of Philosophy*. Retrived from <https://plato.stanford.edu/archives/win2016/entries/evidence/>
- Kerse, N., Arroll, B., Lloyd, T., Young, J., & Ward, J. (2001). Evidence databases, the Internet, and general practitioners: the New Zealand story. *N Z Med J*, 114(1127), 89-91.
- King, N. (2012). Doing template analysis. *Qualitative organizational research: Core methods and current challenges*, 426-450.
- Krishnan, A., Kapoor, S. K., & Pandav, C. S. (2014). Clinical medicine and public health: Rivals or partners? *Natl Med J India*, 27(2), 99-101.

- Lambert, H. (2006). Accounting for EBM: notions of evidence in medicine. *Soc Sci Med*, 62(11), 2633-2645.
- LaPelle, N. R., Luckmann, R., Simpson, E. H., & Martin, E. R. (2006). Identifying strategies to improve access to credible and relevant information for public health professionals: a qualitative study. *BMC Public Health*, 6, 89.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge university press.
- Lavis, J., Davies, H., Oxman, A., Denis, J. L., Golden-Biddle, K., & Ferlie, E. (2005). Towards systematic reviews that inform health care management and policy-making. *J Health Serv Res Policy*, 10 Suppl 1, 35-48.
- Lavis, J. N. (2009). How can we support the use of systematic reviews in policymaking? *PLoS Med*, 6(11), e1000141.
- Loughlin, M. (2009). The basis of medical knowledge: judgement, objectivity and the history of ideas*. *Journal of evaluation in clinical practice*, 15(6), 935-940.
- Masters, K. (2008). For what purpose and reasons do doctors use the Internet: a systematic review. *International journal of medical informatics*, 77(1), 4-16.
- McGlynn, E. A., Asch, S. M., Adams, J., Keesey, J., Hicks, J., DeCristofaro, A., & Kerr, E. A. (2003). The quality of health care delivered to adults in the United States. *N Engl J Med*, 348(26), 2635-2645.
- Miles, A. (2007). Science: a limited source of knowledge and authority in the care of patients*. A Review and Analysis of: 'How Doctors Think. Clinical Judgement and the Practice of Medicine.' Montgomery, K. *Journal of evaluation in clinical practice*, 13(4), 545-563.
- Milner, F. M., Estabrooks, C. A., & Humphrey, C. (2005). Clinical nurse educators as agents for change: increasing research utilization. *Int J Nurs Stud*, 42(8), 899-914.
- Montgomery, K. (2005). *How doctors think: Clinical judgment and the practice of medicine*. Oxford University Press.
- Mykhalovskiy, E., & Weir, L. (2004). The problem of evidence-based medicine: directions for social science. *Soc Sci Med*, 59(5), 1059-1069.
- Nutley, S., Davies, H., & Walter, I. (2002). Evidence based policy and practice: cross sector lessons from the UK. *ESRC UK Centre for evidence based policy and practice: working paper*, 9.
- Oermann, M., Floyd, J., Galvin, E., & Roop, J. (2006). Brief reports for disseminating systematic reviews to nurses. *Clin Nurse Spec*, 20(5), 233-238; quiz 239-240.
- Papaioannou, A., Giangregorio, L., Kvern, B., Boulos, P., Ioannidis, G., & Adachi, J. D. (2004). The osteoporosis care gap in Canada. *BMC Musculoskelet Disord*, 5, 11.
- Pelaccia, T., Tardif, J., Tribby, E., & Charlin, B. (2011). An analysis of clinical reasoning through a recent and comprehensive approach: the dual-process theory. *Med Educ Online*, 16.
- Pellegrino, E. D. (1997). Praxis as a Keystone for the Philosophy and Professional Ethics of Medicine: The Need for an Arch-Support: Commentary on Toulmin and Wartofsky *Philosophy of medicine and bioethics* (pp. 69-84): Springer.
- Polanyi, M. (1958). *Personal knowledge*. London: Routledge & Kegan.
- Polanyi, M. (1966). *The tacit dimension*. Gloucester, Mass: Peter Smith.

- Program, A. T. Q. I. (2014). *Caring For the Severely Injured in Australia*.
- Putnam, H. (2002). *The collapse of the fact/value dichotomy and other essays*. Cambridge, MA ; London: Harvard University Press.
- Rayan, N. (2012). Barriers to compliance with evidence-based care in trauma. *J Trauma*, 72(3).
- Rew, L., & Barrow Jr, E. (2007). State of the science: intuition in nursing, a generation of studying the phenomenon. *ANS. Advances in nursing science*, 30(1), E15.
- Rew, L., & Barrow Jr, E. M. (2007). State of the science: intuition in nursing, a generation of studying the phenomenon. *Advances in Nursing Science*, 30(1), E15-E25.
- Rolfe, G. (1993). Closing the theory—practice gap: a model of nursing praxis. *Journal of clinical nursing*, 2(3), 173-177.
- Rowe, B. H., Diner, B., Camargo, C. A., Jr., Worster, A., Colacone, A., Wyer, P. C., & Knowledge Translation-Consensus Conference Theme 1b, M. (2007). Effective synthesized/preappraised evidence formats in emergency medicine and the use of supplemental knowledge translation techniques. *Acad Emerg Med*, 14(11), 1023-1029.
- Runciman, W. B., Hunt, T. D., Hannaford, N. A., Hibbert, P. D., Westbrook, J. I., Coiera, E. W., & Braithwaite, J. (2012). CareTrack: assessing the appropriateness of health care delivery in Australia. *Med J Aust*, 197(2), 100-105.
- Rycroft-Malone, J., Seers, K., Titchen, A., Harvey, G., Kitson, A., & McCormack, B. (2004). What counts as evidence in evidence-based practice? *Journal of advanced nursing*, 47(1), 81-90.
- Saarni, S. I. (2004). Evidence based medicine guidelines: a solution to rationing or politics disguised as science? *Journal of Medical Ethics*, 30(2), 171-175.
- Sackett, D. L., Rosenberg, W. M., Gray, J. A., Haynes, R. B., & Richardson, W. S. (1996). Evidence based medicine: what it is and what it isn't. *BMJ*, 312(7023), 71-72.
- Sackett, D. L., & Straus, S. E. (1998). Finding and applying evidence during clinical rounds: the "evidence cart". *JAMA*, 280(15), 1336-1338.
- Sandelowski, M. (2000). Focus on research methods-whatever happened to qualitative description? *Research in nursing and health*, 23(4), 334-340.
- Shafi, S., Rayan, N., Barnes, S., Fleming, N., Gentilello, L. M., & Ballard, D. (2012). Moving from "optimal resources" to "optimal care" at trauma centers. *J Trauma Acute Care Surg*, 72(4), 870-877.
- Shuval, K., Linn, S., Brezis, M., Shadmi, E., Green, M. L., & Reis, S. (2010). Association between primary care physicians' evidence-based medicine knowledge and quality of care. *Int J Qual Health Care*, 22(1), 16-23.
- Smith, R. (1996). What clinical information do doctors need? *BMJ*, 313, 1062-1068.
- Stern, D. G. (2004). *Wittgenstein's Philosophical Investigations: An Introduction* (Vol. 2). Cambridge University Press.
- Sturmberg, J. P., & Martin, C. M. (2008). Knowing—in medicine. *Journal of evaluation in clinical practice*, 14(5), 767-770.
- Swennen, M. H., van der Heijden, G. J., Boeije, H. R., van Rheeën, N., Verheul, F. J., van der Graaf, Y., & Kalkman, C. J. (2013). Doctors' perceptions and use of evidence-based medicine: a systematic review and thematic synthesis of qualitative studies. *Acad Med*, 88(9), 1384-1396.

- Swinglehurst, D. A. (2005). Information needs of United Kingdom primary care clinicians. *Health Info Libr J*, 22(3), 196-204.
- Thompson, C., Bucknall, T., Estabrookes, C. A., Hutchinson, A., Fraser, K., de Vos, R., & Saunders, J. (2007). Nurses' critical event risk assessments: a judgement analysis. *J Clin Nurs*, 18(4), 601-612.
- Timmermans, S., & Kolker, E. S. (2004). Evidence-based medicine and the reconfiguration of medical knowledge. *J Health Soc Behav*, 45 Suppl, 177-193.
- Timmermans, S., & Mauck, A. (2005). The promises and pitfalls of evidence-based medicine. *Health Aff (Millwood)*, 24(1), 18-28.
- Tonelli, M. R. (1998). The philosophical limits of evidence-based medicine. *Academic Medicine*, 73(12), 1234-1240.
- Tonelli, M. R. (1999). In defense of expert opinion. *Acad Med*, 74(11), 1187-1192.
- Tsoukas, H. (2005). *Complex knowledge: Studies in organizational epistemology*. Oxford University Press.
- Tsoukas, H., & Vladimirou, E. (2001). What is organizational knowledge? *Journal of management studies*, 38(7), 973-993.
- Ulvenes, L. V., Aasland, O., Nylenna, M., & Kristiansen, I. S. (2009). Norwegian physicians' knowledge of and opinions about evidence-based medicine: cross-sectional study. *PLoS One*, 4(11), e7828.
- Walker, A. E., Grimshaw, J., Johnston, M., Pitts, N., Steen, N., & Eccles, M. (2003). PRIME--PRocess modelling in ImpleMEntation research: selecting a theoretical basis for interventions to change clinical practice. *BMC Health Serv Res*, 3(1), 22.
- Ward, V., Smith, S., House, A., & Hamer, S. (2012). Exploring knowledge exchange: a useful framework for practice and policy. *Soc Sci Med*, 74(3), 297-304.
- Watts, D. D., Hanfling, D., Waller, M. A., Gilmore, C., Fakhry, S. M., & Trask, A. L. (2004). An evaluation of the use of guidelines in prehospital management of brain injury. *Prehosp Emerg Care*, 8(3), 254-261.
- Weedon, C. (1989). Discourse, power, and resistance. *Feminist practice and poststructuralist theory*, 107-135.
- Westbrook, J. I., Gosling, A. S., & Coiera, E. (2004). Do clinicians use online evidence to support patient care? A study of 55,000 clinicians. *Journal of the American Medical Informatics Association*, 11(2), 113-120.
- WHO. (2005). Bridging the "Know-Do" Gap: Meeting on Knowledge Translation in Global Health. *World Health Organization, Geneva, Switzerland*.
- Wittgenstein, L. (1951). *Tractatus logico-philosophicus*. London: Routledge and Kegan Paul.
- Wittgenstein, L. (1953). *Philosophical investigations*. New York: Macmillan.
- Worrall, J. (2002). What evidence in evidence-based medicine? *Philosophy of Science*, 69(S3), S316-S330.
- Worrall, J. (2007). Evidence in medicine and evidence-based medicine. *Philosophy Compass*, 2(6), 981-1022.

- Worrall, J. (2010). Evidence: philosophy of science meets medicine. *Journal of evaluation in clinical practice*, 16(2), 356-362.
- Young, J. M., Leong, D. C., Armstrong, K., O'Connell, D., Armstrong, B. K., Spigelman, A. D., Solomon, M. J. (2007). Concordance with national guidelines for colorectal cancer care in New South Wales: a population-based patterns of care study. *Med J Aust*, 186(6), 292-295.
- Younger, P. (2010). Internet-based information-seeking behaviour amongst doctors and nurses: a short review of the literature. *Health Info Libr J*, 27(1), 2-10.

Appendix A

EVIDENCE USE IN THE CARE OF INJURED PATIENTS IN VICTORIA



THANK YOU FOR COMPLETING THIS SURVEY

It shouldn't take you more than **5-10 minutes**.

The aim of this survey is to understand how Victorian health professionals, who treat trauma patients, use information to make their clinical decisions.

This survey will inform the design of an innovative tool to provide the latest research information where and when it is needed.

This survey is being supported by National Trauma Research Institute.

If you have any questions or comments regarding this survey, please contact **Elena Shek** on (03) 9076 2824 or email elena.shek@monash.edu

PART 1

Think back to the last time you were treating an injured patient and you had a question about their management that you did not know the answer to.

1.1 Did you TRY to find an answer? [Tick one only]

☐ YES [Go to Q 1.2]

☐ NO **Why not? [Tick the best one only]**

I did not know how to find the answer

☐

I knew how to find an answer, but I did not have enough time

☐

I forgot about it

☐

Other (please specify) _____

☐

[Go to Q 1.5]

1.2 What did you do to find the answer? [Tick all that apply]

☐ I asked a colleague

☐ I looked up a text book

☐ I looked up a local Intranet (e.g. hospital internal web)

☐ I looked up a general Internet Search Engine (e.g. Google)

☐ I looked up an Internet Medical Literature Database (e.g. Pubmed)

☐ I looked up a published Clinical Practice Guideline (e.g. Brain Trauma Foundation)

☐ I looked up a printed internal/departmental protocol

☐ I looked up the Cochrane Library

☐ I looked up a medical review website (e.g. UpToDate)

☐ Other (please specify) _____

1.3 Was your question answered? [Tick one only]

☐ YES

☐ NO

1.4 How easy or difficult was the PROCESS of trying to find an answer? [Tick one only]

☐ Very easy

☐ Easy

☐ Difficult

☐ Very difficult

1.5 What would be your 'IDEAL PROCESS' for finding answers to clinical questions?

[Please write below]

PART 2

Think back to the last time you looked for a clinical journal or review article.

2.1 When was the last time you LOOKED FOR a clinical journal or review article?

[Tick one only]

In the last week	In the last 2-4 weeks	In the last 2-6 months	More than 6 months ago
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.2 When in relation to a patient encounter, did you look for a clinical journal or review article? [Tick one only]

Before a patient encounter	During a patient encounter	Immediately after a patient encounter (within 30 mins)	Some time after a patient encounter (e.g. at the end of the day/the next day)	Unrelated to a patient encounter
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.3 When would it have been most helpful for you to obtain a clinical journal or review article? [Tick one only]

Before a patient encounter	During a patient encounter	Immediately after a patient encounter (within 30 mins)	Some time after a patient encounter (e.g. at the end of the day/the next day)	Unrelated to a patient encounter
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.4 Think of the last time you LOOKED AT a clinical journal or review article.

Rate the importance of each section in this article. [Tick one only for each row]

	Very important	Somewhat important	Not important	I did not look at all
Abstract	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Introduction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Results	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Discussion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conclusion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.5 What means of accessing the Internet are available to you in your place of clinical duties (including devices you own)? [Tick one only for each row]

	This is not available to me at my work place	This is available but I rarely use it at my work place	This is available and I use it frequently at my work place
Desktop Computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laptop Computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tablet (e.g. Windows based, iPad)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smart Phone (e.g. Blackberry, iPhone)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) _____		<input type="checkbox"/>	<input type="checkbox"/>

PART 3

Demographic information.

3.1 What is your profession? _____

3.2 What is your gender?

☐ Female ☐ Male

3.3 What is your age? _____ years

3.4 Have you obtained/enrolled in a research – based Course/Degree?

☐ YES Course/Degree: _____
☐ NO

3.5 Which of the following best describes your PRINCIPAL clinical work place? [Tick one only]

☐ Pre-hospital
☐ Acute Hospital
☐ Inpatient/ Outpatient Rehabilitation
☐ Community-based Care

3.6 Where is your PRINCIPAL clinical work place located? [Tick one only]

☐ Metropolitan Melbourne
☐ Outside Metropolitan Melbourne

3.7 Over the LAST MONTH how was your work load distributed? [Should add up to 100%]

_____ % Clinical _____ % Academic/Research _____ % Admin/Other

3.8 How many years have you been providing care to trauma patients? _____ years

3.9 In your most RECENT WEEK of clinical duties what % of patients you have treated had suffered severe INJURY OF ANY TYPE? [Tick one only]

< 10 % 10-50 % >50 %
☐ ☐ ☐

3.10 In your most RECENT WEEK of clinical duties what % of patients you have treated had suffered moderate to severe HEAD INJURY? [Tick one only]

< 10 % 10-50 % >50 %
☐ ☐ ☐

3.11 In your most RECENT WEEK of clinical duties what % of patients you have treated had TAC cover? [Tick one only]

< 10 % 10-50 % >50 %
☐ ☐ ☐

PLEASE RETURN TO:

National Trauma Research Institute
Level 4, Burnet Tower
89 Commercial Road
Melbourne VIC 3004