

# How does feedback influence professional behaviour in healthcare? A mixed methods investigation using case studies

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# Statement of originality and contribution

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Due to overlap and collaboration with broader research programmes some of the work included in this thesis had been previously initiated. For the research studies presented in the thesis, the following elements of original, unique work were undertaken by the PhD candidate:

- Partial data collection and complete analysis of survey data for research study one
- Analysis of qualitative data for research study two
- Conceptualisation, design, data collection and analysis of research study three
- Conceptualisation, design, data collection and analysis of research study four
- Analysis of qualitative data for research study five
- Conceptualisation, design, data collection and analysis of research study six

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My original interest in this topic was sparked by my experiences working in the Trust Governance Department at Imperial College Healthcare NHS Trust and therefore I would like to thank Ms Anne Mottram for her professional guidance and expertise. I would also like to show my appreciation for the support and friendship that I have received from my colleagues in the Centre for Patient Safety and Service Quality throughout my time as a researcher here.

Finally, on a more personal level I would like to express my deepest gratitude to my parents, Beverley and Tony D’Lima for their ongoing support and encouragement throughout my education.

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# Abstract

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Health systems internationally are attempting to address the issue of how to monitor and regulate quality of care in order to maintain and drive up standards. In the UK, policy initiatives focused upon revalidation for clinicians and incident reporting raise questions around how best to feedback and use data to support improvement at professional level. Considerable research has been undertaken to outline the processes by which valid, reliable and useful quality indicators can be defined. The evidence base for how to maximise the influence of feedback on professional behaviour, however, remains heterogeneous. Greater research effort needs to be devoted to understanding the underlying mechanisms through which feedback achieves its goals. This PhD therefore aims to describe and investigate the characteristics and mechanisms by which feedback influences professional behaviour in healthcare. Two perspectives are selected to provide alternative viewpoints. The first is focussed upon personalised feedback interventions in anaesthesia and the second centres around organisational level feedback from incident reporting systems. Within the thesis case study feedback interventions from each of the two perspectives are investigated and evaluated using a mixed methods approach. Qualitative analysis draws upon inductive and theoretically informed deductive reasoning whilst both descriptive and inferential statistics are employed to explore survey data. Participants include consultant anaesthetists, safety science experts and risk managers, among others. Synthesis of results demonstrates that providing feedback is a complex, social, quality improvement intervention. Its influence on professional behaviour is a multifaceted interaction between design characteristics/pre-conditions, psychological processes and intermediary outputs. These mechanisms can be better understood from a sociotechnical perspective drawing upon the fields of psychology, human factors, organisational studies and health services research. This thesis presents an integrative model for understanding the mechanisms through which feedback influences professional behaviour in healthcare.

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## 1. INTRODUCTION

With repeated examples of failure across the healthcare system there is a need to understand how we can better uphold and improve upon the quality of care that is being provided to patients (Francis, 2013). Improving quality of care requires monitoring and understanding existing levels of variation and the reasoning behind them. This information can then be used to guide quality improvement through professional behaviour change.

Feedback is one way through which information can be used to guide quality improvement. Feedback as a quality improvement method in a healthcare context has been described as ‘any summary of clinical performance of health care over a specified period of time, given in a written, electronic or verbal format’ (Jamtvedt, Young, Kristoffersen, O’Brien, & Oxman, 2006). Effective data monitoring and feedback has been stated as one of the ten key challenges to improving quality in healthcare based upon programme evaluation and literature review (Dixon-Woods, McNicol, & Martin, 2012b).

The principles of feedback as a quality improvement method are based upon traditional learning theory. Behaviourism, for example, suggests that people learn through processes of reward and punishment. Desirable actions are rewarded and undesirable actions are punished. We learn because we want to be rewarded and not punished! This is known as operant conditioning (Skinner, 1948). Feedback therefore acts as a reward or punishment for its recipient. Cognitivism, on the other hand, is based upon the idea that individuals learn when they are provided with new material to assimilate into their existing mental models of understanding. Therefore, their current experience is combined with past knowledge to form an updated view and conceptualisation (Piaget, 1964). The provision of feedback is one way of providing individuals with new knowledge that can be integrated with their existing understanding of their own performance. More advanced learning theory such as social constructivism suggests that we learn by interacting with others about a problem (Bandura & Cervone, 1986). Therefore we negotiate meaning through social interaction. Learning takes place when we are given the opportunity to construct knowledge as part of a community of practice in which our cognitions are situated (Brown, Collins, & Duguid, 1989). Teachers or experts may facilitate this process but they do not control it. In this sense, the success of feedback may be more dependent upon the way in which it is constructed by recipients and discussed with relevant others (i.e. peers) (Archer, 2010; Baker & Buckley, 1996).

## 1.1 Background: Theories of feedback and professional behaviour change

In order to provide a core background to the PhD research topic, this initial section provides a general overview of feedback and professional behaviour change theory, relevant to the research question. In subsequent sections of the thesis, further, more specific, literature reviews will be presented to develop the research base specific to each stream of study.

Healthcare professionals are overwhelmed with information that requires effective processing, appraising and applying to ensure that they are compliant with evidence based practice (Grimshaw, Eccles, Walker, & Thomas, 2002). There are multiple mechanisms for improving professional practice in healthcare although “no magic bullets” in terms of ensuring that they are consistently effective (Oxman, Thomson, Davis, & Haynes, 1995). The recently emerging fields of Implementation Science and Knowledge Translation are devoted to understanding how the uptake of knowledge into clinical practice can be improved and draw upon a broader multidisciplinary base including social and clinical sciences (Eccles et al., 2009; Grimshaw, Eccles, Lavis, Hill, & Squires, 2012; Peters, Adam, Alonge, Agyepong, & Tran, 2014).

Social psychological theories have been used extensively in the field of health psychology to explore, understand and predict health behaviours (such as smoking or alcohol consumption). There has been recent interest in the extent to which such theories have the potential for exploring, understanding and predicting the behaviour of healthcare professionals. This could enable the identification and refinement of psychological constructs that need to be targeted by interventions that aim to change the behaviour of healthcare professionals (Davidoff, Dixon-Woods, Leviton, & Michie, 2015; Eccles et al., 2012; Grimshaw et al., 2002).

The core difference between behaviour change applied to health promotion and behaviour change applied to knowledge translation for healthcare professionals is the presence of direct consequences to the individual. For example, an individual who gives up smoking can expect to experience direct personal health benefits. A healthcare professional who improves his or her professional practice is instead likely to experience more indirect rewards (i.e. the satisfaction of knowing that he or she has delivered high quality patient care and contributed to better organisational outcomes) (Eccles et al., 2006). It is for this reason that the application of such theories to this field has been approached with caution and requires further understanding. However, a systematic review found that the relationship between intention and behaviour among healthcare professionals was comparable to that of non-healthcare professionals (Eccles et al., 2006). It is thought to be essential that

Implementation Science is more theoretically grounded and a number of researchers have already devoted time and resources to investigating which theories in particular may be of greatest relevance to understanding professional behaviour change in healthcare.

Godin et al conducted a systematic review of the use of social cognitive theories to explain the behaviour of healthcare professionals (Godin, Bélanger-Gravel, Eccles, & Grimshaw, 2008). Their results highlight the role of the Theory of Planned Behaviour in predicting behaviour. Other theories (e.g. Bandura's Social Cognitive Theory) appeared to be more effective at explaining the intentions of healthcare professionals. Survey designs have also been used to explore the application of various theoretical models to multiple clinical behaviours. Statistical analysis revealed that the Theory of Planned Behaviour, Social Cognitive Theory, Implementation Intentions and Learning Theory were predictive of intention, behavioural simulation and measures of behaviour itself (Eccles et al., 2012).

Goal setting theory is based upon the principle that people are motivated to improve their performance when they have a defined goal and understand how to achieve it with the resources that they have (Buetow, 2007). This author breaks the original theory down into two components; 'the business case' and 'the pride case'. The former is associated with extrinsic reward (i.e. money) and the latter with intrinsic reward (i.e. integrity). Buetow states that goal setting theory has been overly focussed upon for the purposes of motivating healthcare professionals (Buetow, 2007). The article puts forward a 'menu' of motivation theories that are believed to be of relevance in understanding how and why healthcare professionals are motivated to change their behaviour. More recently social constructivist learning theories have also been emphasised as being of importance to better understanding knowledge translation in healthcare professionals (Thomas, Menon, Boruff, Rodriguez, & Ahmed, 2014).

It has been suggested that the use of theory for improvement in healthcare requires 'demystifying' to encourage more explicit and transparent understanding and documentation of when and how it should be used (Davidoff et al., 2015). Social sciences theory can be used to develop a conceptual understanding of the theory of change or logic model through which complex social interventions have their effects (Dixon-Woods, McNicol, & Martin, 2012a; Dixon-Woods, Bosk, Aveling, Goeschel, & Pronovost, 2011). This understanding may evolve throughout the life of a project and multiple iterations may be required. It is also possible to explore theory of change from a post hoc perspective once an intervention is already underway. For example, Dixon-Woods et al (Dixon-Woods et al., 2011) adopted this approach to understand the positive effects of the Michigan

Intensive Care Unit Project and support successful application of the intervention to other contexts. Gardner et al (2010) highlight systematic reviews as a further area in which theoretical intervention components are rarely classified and explained (Gardner, Whittington, McAteer, Eccles, & Michie, 2010).

In order to make social psychological theory more accessible to broader disciplines, psychologists have been working towards the development of taxonomies in which all relevant theoretical constructs can be located and reviewed. The theoretical domains framework was created, validated and refined to support the application of theory to implementation research (Cane, O'Connor, & Michie, 2012; Michie et al., 2005). This series of work resulted in fourteen domains of theoretical constructs for use in designing and evaluating interventions to modify the behaviour of healthcare professionals. This work did not, however, comment upon the specific ways in which the theoretical constructs should be linked in order to explain the causal mechanisms of behaviour change. More recently, the Behaviour Change Wheel was put forward as a further means of categorising interventions and policies designed to change the behaviour of healthcare professionals (Michie, van Stralen, & West, 2011). This model additionally addresses the pre-requisites that are necessary in order for behaviour change to take place (capability, opportunity and motivation). It has been suggested that the development of a menu of theoretical constructs could be beneficial to better understanding and applying knowledge translation interventions such as feedback (Brehaut & Eva, 2012).

A small number of models have been proposed in order to understand the process through which feedback impacts on professional behaviour and the factors that mediate this relationship (Ilgen, Fisher, & Taylor, 1979; Kinicki, Prussia, Wu, & McKee-Ryan, 2004; Kluger & DeNisi, 1996; Sapyta, Riemer, & Bickman, 2005). Table 1 below summarises the existing models of the mechanisms through which feedback impacts on behaviour. Ilgen et al (1979) proposed that the receipt of feedback triggers specific psychological processes in its recipients. They presented **The Feedback Process Model** which is based upon a number of cognitive variables mediating the relationship between feedback and behaviour (perceived accuracy of feedback, desire to respond to feedback and intended response to feedback) (Ilgen et al., 1979). These psychological processes are determined by the characteristics of the feedback itself (e.g. source credibility). Kinicki et al (Kinicki et al., 2004) applied this model in an empirical study of employees responses to performance feedback.

**Control Theory** (Carver & Scheier, 1982) is based upon the idea that individuals change their behaviour as a reaction to identifying discrepancies between current behaviour (as indicated by feedback) and a pre-existing goal or standard. The information provided by feedback therefore becomes a prompt for action in order to lessen the discrepancy and progress towards goal achievement. **Feedback Intervention Theory** (Kluger & DeNisi, 1996) was proposed as a development of Control Theory and is based upon five fundamental principles that build consecutively upon one another. The first principle is that feedback is compared with goals or standards in order to identify any gaps between the two. The second principle is that goals or standards are organised hierarchically. Therefore, and thirdly, gaps between feedback and goals must receive adequate attention in order to lead to behaviour regulation and overall attention is limited. The fourth principle is that attention tends to be focussed upon a moderate level of the hierarchy of standards. Feedback interventions are therefore successful by effectively changing the locus of attention of their recipients which represents the final principle of the theory.

**Contextual Feedback Intervention Theory** extended this understanding further by highlighting the importance of prior commitment to the goal and applying Cognitive Dissonance Theory (Festinger, 1957) to explain the experience of individuals when feedback highlights a discrepancy between their performance and a goal that they are committed to (Sapyta et al., 2005).

There has been a call for a stronger understanding of the theoretical underpinnings of feedback as an intervention to change behaviour (Foy et al., 2005; Gardner et al., 2010; Larson, Patel, Evans, & Saiman, 2013). Effects are inconsistent and therefore a better understanding of the mechanisms through which interventions work and interact with the local context is essential (Kluger & DeNisi, 1998).

Table 1. Summary of existing models

Model	Psychological processes through which feedback impacts on behaviour
Feedback Process Model (Ilgen et al., 1979; Kinicki et al., 2004)	<ul style="list-style-type: none"> <li>• Perceived accuracy of feedback</li> <li>• Desire to respond to feedback</li> <li>• Intended response to feedback</li> </ul>
Control Theory (Carver & Scheier, 1982)	<ul style="list-style-type: none"> <li>• Identification of discrepancies between current behaviour (as indicated by feedback) and a pre-existing goal or standard</li> </ul>
Feedback Intervention Theory (Kluger & DeNisi, 1996)	<ul style="list-style-type: none"> <li>• Comparison of feedback with hierarchically organised goals or standards in order to identify any gaps between the two</li> <li>• Change in the locus of attention as a result of this</li> </ul>
Contextual Feedback Intervention Theory (Sapyta et al., 2005)	<ul style="list-style-type: none"> <li>• Identification of discrepancies between current behaviour (as indicated by feedback) and a pre-existing goal or standard that the individual is highly committed to</li> <li>• Experience of cognitive dissonance</li> </ul>

There has been a recent call for greater research effort to be focussed upon understanding the underlying mechanisms through which feedback is effective in healthcare specifically (Ivers et al., 2014). The evidence base for how to maximise the effects of feedback on learning and professional behaviour change amongst the complexity of a healthcare context remains heterogeneous.

Therefore further work is needed to support healthcare professionals and organisations specifically, in the broader drive for effective quality monitoring and improvement. Feedback in a healthcare context poses additional challenges such as limited time and resources for data analysis and statistical interpretation, data overload, competing professional perspectives and pressure from regulators.

The field of Improvement Science emphasises the importance of adopting evidence based methods for improving quality of care. It is based on the belief that the methods and approaches that are selected to encourage quality improvement should be as closely linked to scientific understanding as the clinical processes that they are trying to improve (The Health Foundation, 2011). This further demonstrates the importance of developing an improved theoretical understanding of the mechanisms through which feedback, as a quality improvement method, influences professional behaviour. In order for feedback to be successful it must promote some form of learning in its recipient. An incorporation of educational learning theory is therefore vital in order to understand,

develop and apply feedback in the most optimal way (Archer, 2010; Baker & Buckley, 1996; Shute, 2008). Understanding the ways in which theories of learning can explain the effects of feedback on professional behaviour has implications for the development of more effective systems. In order for learning from feedback to have an effect on patient care and clinical outcomes it must successfully translate into professional behaviour change. Behaviour change models and the constructs that they are based upon may therefore go some way in explaining which factors influence whether or not end-users will change their individual professional behaviour based on learning from feedback (Brehaut & Eva, 2012).

In summary, the field of feedback and behaviour change theory suggests that a number of characteristics and mechanisms may be able to explain the influence of feedback on behaviour. Recent advances in the application of theoretical constructs from social science to the field of knowledge translation provide additional support for the development of an integrated understanding of the processes through which feedback impacts on professional behaviour in healthcare specifically.



## 1.2 Research aim

The primary research aim for this PhD is:

- To describe and investigate the characteristics and mechanisms by which feedback influences professional behaviour in healthcare

This is achieved by exploring case study feedback interventions in healthcare from the perspective of their end users and combining insights to form an improved understanding of the characteristics and mechanisms by which feedback influences professional behaviour. The term 'end user' is employed to refer to the individuals who ultimately use or are intended to ultimately use feedback as a product as opposed to the individuals who design, develop and implement the feedback. The issue of what constitutes a characteristic and a mechanism is something that is explored throughout the thesis. A characteristic is defined as a property of the feedback intervention itself as per the approach taken in a recent systematic review of audit and feedback in healthcare (Ivers et al., 2012). A mechanism is defined as the process through which the characteristics of feedback interact with the local context to impact on professional behaviour as the desired goal (outcome) (Pawson & Tilley, 2008). As per the previously presented background literature and rationale, it is expected that the mechanisms through which feedback influences professional behaviour may include the psychological processes that occur in the recipient of feedback.

More specific research aims and objectives will be described in more detail later in the thesis within the context of each individual research study as it is presented.

### 1.3 Personal reflection on the research problem

I am a health psychologist by background with a strong interest in the theoretical underpinnings of behaviour change. My MSc dissertation was centred on a specific theory called Self-Affirmation Theory (Steele, 1988). This theory is closely related to Cognitive Dissonance Theory (Festinger, 1957) and centres around the fact that information that we receive that causes cognitive dissonance is less likely to influence future behaviour compared with information that does not cause cognitive dissonance. The theory proposes that cognitive dissonance can be reduced through processes of self-affirmation in which the core identity and beliefs of an individual are re-affirmed. Previously, my interest in behaviour change had been more centred on health promotion and improvement (i.e. smoking cessation, sun protection etc.).

After completing my MSc, and before starting this PhD programme of research, I held a joint research assistant post between the Centre for Patient Safety and Service Quality (CPSSQ) and the Imperial College Healthcare NHS Trust Governance Department. The primary purpose of introducing this joint post was to use and apply academic research skills in order to develop the effective use of organisational level data (i.e. contained within scorecards and committee/board reports) to improve quality and safety across the Trust. I worked in this position for two years, undertaking a variety of projects such as developing and collating new versions of the Governance team's monthly scorecard, quarterly and annual board reports and Quality Accounts. Working in this position developed my understanding of how complex organisational data can be interpreted and used in practice to guide improvements in patient care. However, it also emphasised the need for a stronger understanding of the ways in which data can be used to effectively drive improvement. It was clear from my involvement with the Governance team that the wealth of available data was not consistently being used to an optimal effect. For example, quality and safety reports were of a high level and aggregated nature which made them difficult for individuals working on the ground to access and interpret. I realised that in order to lead to improvements in patient care, organisational level data needed to have the ability to change the behaviour of individuals. This contributed to a strong interest in how organisational level performance data in healthcare can be used to change behaviour at different levels of the system.

Simultaneously to these experiences my academic line manager was leading on a project centred on feedback of individual level performance data as a quality improvement method in healthcare. This provided me with a number of opportunities for involvement and collaboration and I became familiar with the medical literature on the characteristics of effective feedback at the individual

level. Working with this literature emphasised to me even further the need for an incorporation of behaviour change theory to better understand the underlying mechanisms through which receiving feedback on performance can change clinical practice.

These opportunities and experiences resulted in the development of a PhD programme of research around the influence of feedback on professional learning and behaviour change.

## 1.4 Overview of work streams

Two core perspectives were chosen in order to provide alternative viewpoints on the processes through which feedback influences professional behaviour in a complex healthcare system. The selection and design of the work streams for inclusion in the PhD were theoretically driven (as well as being informed by the previous experiences reported in section 1.3 above), to provide complementary perspectives upon the core research aim. Work stream one is focussed upon 'feedback at the individual level' (i.e. personalised feedback delivered to an individual healthcare professional) and work stream two is focussed upon 'feedback at the organisational level' (i.e. aggregated feedback provided to an organisation based on the performance of multiple individuals). There are a number of core differences between these perspectives. Firstly, the purpose of data collection at the organisational level is more likely to be associated with external judgement and mandatory regulation compared with individual level monitoring of improvement over time. Feedback at the organisational level is also less likely to directly reflect the individual actions and experiences of professionals. It is for these reasons that it was thought to be important and interesting to divide the thesis according to these levels of feedback and their influence on professional behaviour change. A more detailed introduction to and justification for each work stream (including accompanying literature reviews) is included later in the thesis in sections 2 and 3.

## 1.5 Structure of the thesis

Having outlined the main research aim in section 1.2 above, the current section will now provide an overview of how the main research was structured in order to address the aim. An overall breakdown of the individual research studies and how they build up into case studies and work streams is demonstrated in Figure 1 below. This diagram is repeated throughout the thesis to demonstrate the focus of each section and contextualise it within the thesis as a whole.

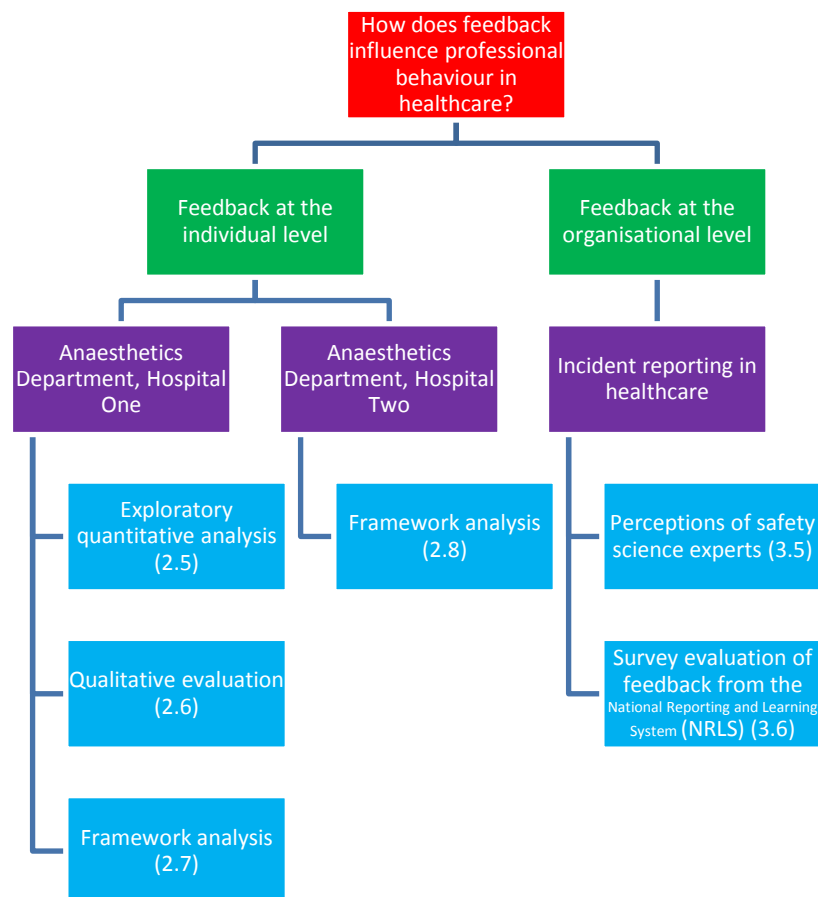


Figure 1. Structure of the thesis

The thesis itself is made up of five overarching sections. Section one introduces the rationale for the programme of research, the primary research question and the general methodological stance adopted to pursue it. Sections two and three present and synthesise the individual research studies categorised under work stream one and work stream two respectively. Within each work stream, the relevant background literature is reviewed, the methodology defined, results presented and discussed, relative to the specific sub-study and broader work stream aims.

Section four synthesises the research conceptually and practically across both work streams as part of the development of an integrative model of the impact of feedback on professional behaviour in healthcare. In this sense, elements of the structure of the thesis are iterative and build upon previous sections.

Finally, section five discusses the proposed model in the context of the prior literature, explores the limitations, implications for future research and practical applications of the research findings and proposes a summary of key conclusions in relation to the original research question.

## 1.6 General methodological stance and analytic framework

A case study approach was selected in order to support in depth, intensive exploration of the phenomenon that is feedback (Yin, 2013). Case study interventions were selected based on relevance to the chosen work streams and local opportunity for access, participation and operational development.

A mixed methods design, employing statistical/quantitative elements alongside both inductive and deductive qualitative work, was selected for the PhD because it supports the study of a complex and under explored phenomenon in a real life and every day context (Creswell, Klassen, Plano Clark, & Smith, 2011). A variety of research methods were able to contribute something to the common research question and the ability to identify key themes across the datasets was attractive and intuitive. The use of mixed methods provided the opportunity to draw upon the complementary strengths of the two approaches.

Mixed methods research provides strengths that offset the individual weaknesses of both qualitative and quantitative approaches (Creswell & Clark, 2007). For example, the restrictive nature of defined variables in quantitative work can be offset by the exploratory approach of qualitative work whilst the limits on sample size in qualitative studies can be offset by broad reaching quantitative studies.

The selection of a mixed methods design called for the integration of two epistemologically diverse traditions. Positivism is based upon the belief that all phenomena can be reduced to empirical indicators which represent the truth, independent of the perceptions and experiences of the researcher. Social constructivism, on the other hand, is centred upon the belief that there are multiple truths based on an individual's construction of reality which in itself will become intertwined with the researcher's own construction of reality (Guba & Lincoln, 1994; Sale, Lohfeld, & Brazil, 2002). There has been much debate in the literature over the appropriateness of combining positivist paradigms with social constructivist paradigms (Dixon-Woods, Agarwal, Young, Jones, & Sutton, 2004; Swanwick, 2011). Such debates are centred around the argument that work originating from different paradigms are incompatible with one another and therefore cannot and should not be integrated (Creswell & Clark, 2007; Kavanagh, Campbell, Harden, & Thomas, 2012; O'Leary, 2004; Sale et al., 2002). The view taken for the purpose of this thesis is that it is possible to pragmatically draw upon multiple paradigms whilst simultaneously demonstrating fidelity to their

underlying principles and the ways in which they interact with one another (Bryman, 2015; Creswell & Clark, 2007; Kavanagh et al., 2012; Patton, 2002).

The mixed methods design would therefore allow for both the connecting of data across individual research studies (i.e. allowing the design and findings of one study to drive and influence the design of another study through sequential processes) and the overall merging of data using a convergent approach to provide a synthesised understanding of the research problem (Creswell & Clark, 2007; Creswell et al., 2011). In this sense, a variety of opportunities for mixing the data would be available for use and a multiphase mixed methods design was deemed as being most appropriate. Further detail concerning which studies were based on evaluation of prior hypotheses, which concepts were carried forwards from one study to be implemented in a subsequent study and which analyses were based on ex post theoretical interpretation of prior data is provided in the individual methods sections of each study and the case syntheses at the end of each work stream.

In terms of the epistemological position for the PhD research question as a whole, the emphasis placed upon the value of end user perspectives is well aligned with a constructivist viewpoint. End user viewpoints on case study feedback interventions will be used throughout the thesis to understand the phenomenon of feedback and the impact that it has on professional behaviour. This rests on the assumption that their personal perceptions and experiences (which inevitably vary from person to person) are sufficient to understand the mechanisms through which feedback impacts on professional behaviour.

However, it could also be argued that the attempt made in this thesis to develop a defined model which explains the mechanisms through which feedback impacts on professional behaviour reflects a more positivist standpoint. This is because it suggests that there is a generalisable reality or truth that can be captured, agreed upon and applied in new contexts.

The overarching view that I have taken to reconcile these differences is that there is a reality of the influence of feedback on professional behaviour (as will be represented in the model that the thesis presents) but that it is a socially constructed one (as represented by the core role of end user perspectives to develop and refine the model). Therefore the model is not taken to be a final and definite answer to the research question but instead should evolve over time in line with additional case study feedback interventions and end user perspectives upon them (which is reflected in the



recommendations for both future research and practice presented at the end of this thesis in section 5).



## **2. WORK STREAM ONE: FEEDBACK AT THE INDIVIDUAL LEVEL**

### **2.1 Introduction**

Section one of the thesis, above, introduced the overarching rationale and research question. Section two of the thesis is centred on work stream one, feedback at the individual level. The work stream will be introduced with a literature review of feedback at the individual level and an overview of quality monitoring in the specific research context of anaesthesia. Following from this the methods and findings from each of the four individual research studies will be presented and discussed. The section will conclude with a case synthesis which combines insights from all studies and contributes to early model building and conceptual development against the primary research question.

## 2.2 Literature review: Feedback at the individual level

Systematic reviews demonstrate that performance feedback to clinicians has a positive impact on behaviour and outcomes, resulting in small to moderate positive effects (Ivers et al., 2012; Jamtvedt, Young, Kristoffersen, O'Brien, & Oxman, 2006). Such effects have been displayed in terms of reduction of mortality rates and improved compliance with guidelines, amongst other outcomes (Benn, Burnett, Parand, Pinto, & Vincent, 2012; Kluger & Van Dijk, 2010; O'Reilly, Talsma, VanRiper, Kheterpal, & Burney, 2006; Wright et al., 2006). Quality improvement initiatives that do not use performance feedback have been shown to be less effective at stimulating improvement in performance and professional behaviour change than those that do (De Vos et al., 2009; N. Ivers et al., 2012; Jamtvedt, Young, Kristoffersen, Thomson O'Brien, & Oxman, 2005).

Tailoring feedback to the specific clinical setting has been shown to have a positive influence on its effectiveness along with ensuring that those issuing the feedback are perceived as experts (Alvero, Bucklin, & Austin, 2001; Chaillet et al., 2006; van der Veer, de Keizer, Ravelli, Tenkink, & Jager, 2010; Veloski, Boex, Grasberger, Evans, & Wolfson, 2006). High intensity and frequency of feedback improves outcomes along with sustained monitoring (Alvero et al., 2001; De Vos et al., 2009; Hysong, 2009; Ivers et al., 2012; Jamtvedt et al., 2006; Veloski et al., 2006). A further review found that feedback was more likely to influence practice if it was part of a wider strategy to promote improvement among individuals who were positive about reviewing their performance (Mugford, Banfield, & O'Hanlon, 1991). A number of strategies have been identified to support the effectiveness of performance feedback, including providing recipients with information on specific areas for improvement, action planning and educational components (Alvero et al., 2001; Chaillet et al., 2006; De Vos et al., 2009; Hysong, 2009; Ivers et al., 2012; Jamtvedt et al., 2006; van der Veer et al., 2010; Veloski et al., 2006). A review on the characteristics of formative feedback stated that it should be nonevaluative, supportive, timely, and specific. It also identified a number of potential factors that interact with the success of formative feedback. These include the characteristics of the recipient and the task upon which feedback is based (Shute, 2008). It has been suggested that the departmental context in which feedback is administered may also be of importance (Kaplan, Provost, Froehle, & Margolis, 2012; Ovretveit et al., 2011).

Hysong et al (Hysong, Best, & Pugh, 2006) produced a model of actionable feedback based upon qualitative investigation of the differences between use of clinical audit data for feedback purposes between high and low performing medical facilities. Their model proposes that actionable feedback should be timely, individualised, non-punitive and customisable in order to have an optimal effect on

behaviour. More specifically, it suggests that timeliness is essential in order to see any effects on behaviour whilst the other characteristics are ranked in terms of their potential for a detrimental effect on outcome.

Part of the rationale for this component of the PhD originated from a recent systematic review of reviews which I was previously a collaborator on (Benn, Arnold, Wei, Riley, & Aleva, 2012). The objective of the review was to summarise the existing evidence for the effectiveness of feedback in improving quality of healthcare and to identify the characteristics of feedback that make it successful. Results demonstrated that 73 of 102 primary studies (72%) showed significant improvements of feedback as an intervention to improve quality of care. However, the effects of performance feedback to healthcare professionals were generally small to moderate. Taking into account all of the published literature, factors that were found to enhance feedback effectiveness were: 1) feedback linked to a quality improvement plan; 2) pairing feedback with additional components; 3) feedback at a high frequency; 4) monitoring over a sustained period; 5) low baseline compliance at the start of the intervention.

Being actively involved in quality monitoring and improvement is an identified dimension of good medical practice (GMC, 2006). In the UK, clinician revalidation has been introduced as a mechanism to uphold and improve practice through continuous professional development (Hocking, Weightman, Smith, Gibbs, & Sherrard, 2013; Moonesinghe & Tomlinson, 2011). As part of the revalidation programme, clinicians are required to produce evidence of their fitness to practice. Healthcare professionals therefore require appropriate support to understand and interpret their performance and engage in improvement efforts over time.

Comprehensive feedback upon important aspects of an individual's personal professional practice should enable continuous professional development and provide evidence of fitness to practice. Implementing feedback initiatives in clinical units may therefore represent a viable quality improvement intervention. Supporting professional development requires effective design of quality monitoring systems capable of delivering accurate, timely and useful feedback to clinicians based upon valid and reliable quality indicators (Wollersheim et al., 2007).

Despite the introduction of revalidation little systematic research exists to guide development of quality monitoring and feedback mechanisms that clinicians themselves regard as effective (Benn et al., 2012; Wollersheim et al., 2007). One study of this type used a qualitative methodology and identified a number of characteristics for effective feedback according to clinical and administrative

staff. They included: the perceived validity and credibility of the data; their source and timeliness; the way units are benchmarked and the avoidance of individual profiling that could be misconstrued as punitive (Bradley et al., 2004). Other relevant studies focussed on evaluating existing approaches to feedback from the perspective of clinicians. These include multisource feedback (Burford, Illing, Kergon, Morrow, & Livingston, 2010; Overeem et al., 2009; Sargeant, Mann, Sinclair, Van der Vleuten, & Metsemakers, 2007; Violato, Lockyer, & Fidler, 2008), benchmarked feedback of patient reported outcome measures (Boyce, Browne, & Greenhalgh, 2014) and audit and feedback in the Intensive Care Unit (Sinuff, Muscedere, Rozmovitz, Dale, & Scales, 2015).

### 2.3 Research context: Quality monitoring in anaesthesia

Many professional organisations and governmental agencies are promoting the use of indicators, particularly in anaesthesia where mortality and morbidity is multi-factorial (Haller, Stoelwinder, Myles, & McNeil, 2009). However, in anaesthesia, there are few verified quality indicators, and discrepancies exist regarding which outcome indicators should be measured and reported to meet targets (Moonesinghe & Tomlinson, 2011). A recent review of quality indicators for anaesthesia concluded that conventional perioperative morbidity and mortality data largely lacks the sensitivity and specificity necessary for analysis of variation in quality and safety of anaesthesia (Haller et al., 2009). In Haller's review, 108 quality indicators in use within the anaesthetics research literature were identified. Around half of the indicators looked specifically at anaesthesia; the other half also measured surgical or post-operative ward care. Only 1% of indicators looked at structure of care; the majority (57%) measured outcome and 42% measured process of care.

Work in the areas of professional standards development and excellence in anaesthesia highlights the need to define criteria by which practicing anaesthetists can monitor and review their own performance (Smith & Greaves, 2010). Currently, anaesthetists rarely receive continuous, systematic feedback on anaesthetic quality to support professional behaviour change and service improvement (Barnett et al., 2013; Benn et al., 2012). In reality anaesthetists tend to have limited opportunity for engagement with patients as they move along the perioperative pathway from admittance to recovery unless there are specific issues that require follow up. There is considerable specialty interest in developing national standardised guidance for perioperative quality monitoring and reporting in anaesthesia (Royal College of Anaesthetists, In Press).

Within this work stream two case study feedback interventions in anaesthetic departments are explored and evaluated from the perspective of their end users. Detailed explanations of the interventions are included in the methods sections of the relevant research studies. The interventions are centred around two physical hospital sites. These will be referred to as Hospital One and Hospital Two.

## 2.4 Work stream aims

The primary research aim for this PhD is to describe and investigate the characteristics and mechanisms by which feedback influences professional behaviour in healthcare. The specific aim of this work stream is to investigate the perceptions and experiences of healthcare professionals using personalised feedback interventions in anaesthetics departments. In doing this, the objective is to understand and enhance the effectiveness of personalised feedback from clinical quality indicators in anaesthetics and extract the characteristics and mechanisms by which it influences professional behaviour.



## 2.5 Research Study One: Exploratory quantitative analysis

Research study one has been previously published in a peer reviewed journal (D’Lima et al., 2015).

Figure 2 below provides a breakdown of the individual research studies and how they build up into case studies and work streams. Circles are included to demonstrate the focus of this section and contextualise it within the thesis as a whole.

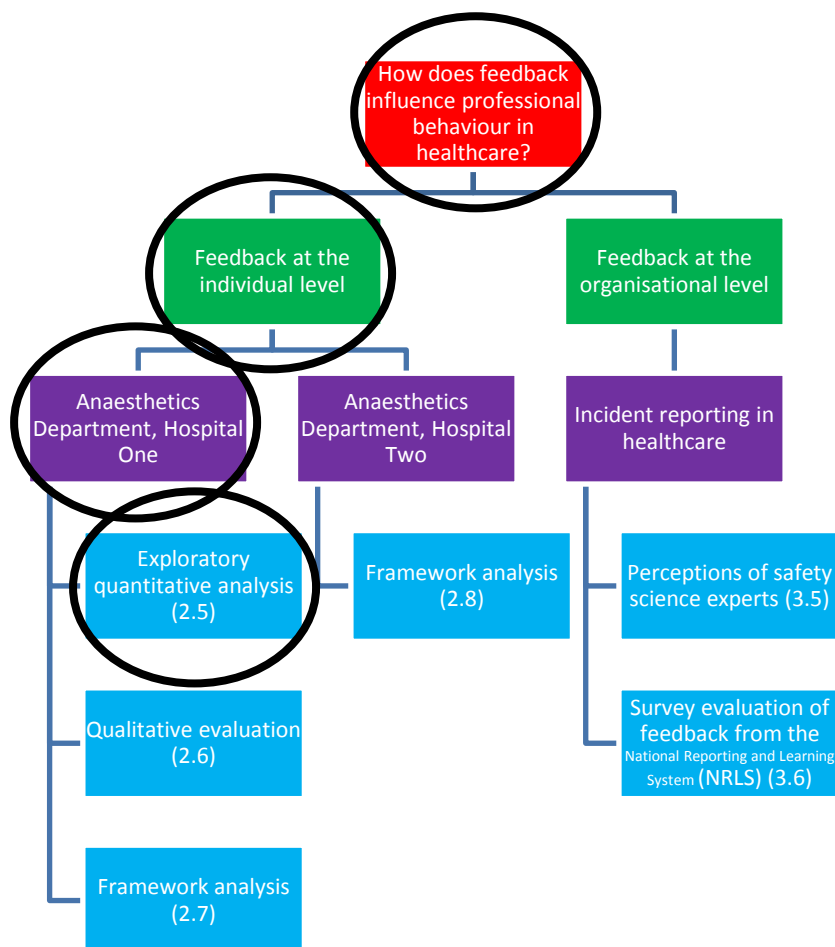


Figure 2. Structure of the thesis

### 2.5.1 Introduction

Given the limited evidence as to the important characteristics of feedback from a clinician's perspective, the aim of the current study was to statistically investigate which characteristics are of most value to clinicians. The analysis uses baseline data collected as part of a broader evaluation of a feedback initiative for anaesthetists. Its specific purpose is to explore the role of a range of

demographic, contextual and design characteristics (identified by the initial literature review in section 2.2 as being important) in predicting anaesthetists' perceptions of utility of data feedback.

A positivist approach was selected at this stage of the PhD to test the 'truth/reality' that had been presented by the existing quantitative literature. The previously presented literature review of feedback from quality indicators in anaesthesia identified a number of factors which may be important in understanding the impact of feedback on professional behaviour. Given the likelihood that feedback mechanisms are linked to organisational and departmental quality assurance, it was hypothesised that perceptions of feedback are likely to vary as a function of tenure, organisational context and local unit climate for quality improvement. The role of the level of feedback being received, its intensity and the previously identified specific design characteristics were thought to additionally influence perceived utility.

## **2.5.2 Methods**

### *2.5.2.1 Research ethics*

Following Research Ethics Committee advice, the research study was not considered to require local Research Ethics Committee approval as the work fell within the remit of a previously approved service evaluation project. Informed consent was gained from all participants in this study.

### *2.5.2.2 Study design*

A cross-sectional survey design was used with data collected at a single time-point.

### *2.5.2.3 Participants and data collection*

Two UK NHS organisations with large anaesthetics departments were selected as the basis for the study sample. These sites were chosen because research leads based at both sites were collaborators on a programme to develop perioperative quality indicators as part of a national initiative in the UK.

Data were collected from consultant anaesthetists prior to any local development of quality monitoring programmes.

#### *2.5.2.4 Research measures*

The survey measure had previously been developed by the primary supervisor of this PhD. Initial survey items were developed based upon literature review of emerging theory in the area of data feedback for quality improvement. Questions were designed to quantify specific characteristics that have been identified as important, e.g. relevance, validity, reliability and applicability (Wollersheim et al., 2007). The approach taken was that anaesthetists should evaluate outcome measures against their potential to lead to improvements in standards of care and benchmarking (Moonesinghe & Tomlinson, 2011).

Iterations of the survey items were discussed and refined by a multidisciplinary team including three consultant anaesthetists and a social sciences researcher with experience in survey design. The survey was piloted using a cognitive walkthrough technique with two additional consultant anaesthetists in which presentation, item interpretation and wording were clarified through a structured interview in which participant interpretations and responses to the survey items were verbalised and discussed with the researchers. Survey items were refined based upon the results from this exercise.

The survey measure comprised four categorical (yes/no) items assessing the comprehensiveness of local quality monitoring, i.e. whether or not clinicians received regular quantitative feedback on a number of quality dimensions. These items were summed into a scale score representing comprehensiveness of monitoring for the purposes of the regression analysis. The higher the aggregated score the more dimensions of quality an individual answered yes to receiving regular quantitative feedback on. The level of care that the feedback focused upon (i.e. care at the departmental/individual level) was then assessed.

Twenty-five items evaluated three key areas: 1) perceptions of current quality indicators (comprehensiveness/relevance/reliability/improvability), 2) perceptions of current feedback from quality indicators (level of analysis/timeliness/means of communication/data presentation/data credibility), and 3) local departmental climate (comprising 16 items designed to assess features of the local departmental context and climate for quality improvement). Responses to items evaluating the effectiveness and usefulness of quality indicators and feedback were measured on an 8-point Likert scale ranging from 1 (completely inadequate) to 8 (excellent). Responses to items evaluating the departmental climate for quality improvement were measured on an 8-point Likert agreement scale ranging from 1 (strongly disagree) to 8 (strongly agree) and aggregated into a single

scale score. Table 2 provides examples of the variables included, along with an internal consistency metric (Cronbach's alpha) for the aggregated score. The dependent measure for the study was based upon a single survey item: "the degree to which current data feedback is useful in monitoring variations and improving care" and rated on an eight point scale ranging from 1 (completely inadequate) to 8 (excellent).

**Table 2. Departmental climate for quality improvement**

<b>Examples of variables included in a 16 item scale to measure departmental climate for quality improvement</b>
<ul style="list-style-type: none"> <li>• Processes of monitoring and quality improvement at departmental level</li> <li>• Constructive response to observed variations in care</li> <li>• Openness of professional climate for discussing failures</li> <li>• Organisational support for departmental quality improvement initiatives</li> <li>• Professional competency with quality improvement and statistics amongst clinicians</li> <li>• Responsibility for acting on observed variations in care</li> <li>• Willingness to disclose personal performance data to the department</li> </ul>
Cronbach's alpha of the combined items = 0.91

A copy of the survey can be found in Appendix A. Please note that the measure has been psychometrically validated using principal components analysis as part of the broader research project (Benn, Arnold, D'Lima, Wei, Moore, Aleva, Smith, Bottle, & Brett, 2015).

### **2.5.2.5 Analysis**

Multiple linear regression analysis with hierarchical variable entry was performed. The following hypotheses were tested using hierarchical entry of specific predictors in steps. For details of the predictors that were entered to test each hypothesis please refer to Table 6 in the results section.

- Hypothesis 1: Length of time since qualification (tenure) will influence perception of the degree to which current local data feedback is useful for monitoring variation and improving care in anaesthesia.
- Hypothesis 2: Organisational membership will influence perception of the degree to which current local data feedback is useful for monitoring variation and improving care in anaesthesia.
- Hypothesis 3: The reported local departmental climate for quality improvement will influence perception of the degree to which current local data feedback is useful for monitoring variation and improving care in anaesthesia.

- Hypothesis 4: The reported scope of local quality monitoring will influence perception of the degree to which current local data feedback is useful for monitoring variation and improving care in anaesthesia.
- Hypothesis 5: The design characteristics of feedback will influence perception of the degree to which current local data feedback is useful for monitoring variation and improving care in anaesthesia.

The statistical significance of the additional proportion of variance in the dependent measure accounted for by each successive entry of variables was assessed in order to establish the role of each specific hypothesised predictor, having controlled for previously entered factors (Cohen, 2003). Forced entry regression was selected as the most appropriate method as pre-existing research findings and theory (outlined above in section 2.2) are available to support the order of causal and temporal priority amongst the independent variables.

### **2.5.3 Results**

#### ***2.5.3.1 Descriptives***

Eighty-nine respondents from two Acute Healthcare Organisations participated in the study. This represents a response rate of 59% (70% for Organisation A and 48% for Organisation B). Eighty-two (92.1%) participants were consultants, 6 (6.7%) were trainees and one (1.1%) was non-consultant faculty. Anaesthetists included were from a mixture of specialties typical of a large, urban, academic teaching hospital. Following exclusion due to missing data, 78 survey responses were included in the regression analysis.

Seventy six per cent of participants had been qualified (Medical Undergraduate Degree) for between 11 and 30 years and the mean length of time since qualification was 20 years (SD = 8.1). Respondent characteristics are presented within Table 3.

The overall scope of local quality monitoring, with a mean value of 0.85 (SD = 1.20), was notably low (from a range of zero to four). This was reflected in the amount of feedback being received by participants on both levels of care (departmental and individual). The dependent variable, with a mean value of 2.83 (SD = 2.01), indicates that perceived usefulness of feedback for monitoring

variations and improving care at these organisations was generally low. Table 4 presents categorical items and their frequency of responses whilst Table 5 presents mean scores and standard deviations of all scale items included in the regression model.

**Table 3. Respondents' characteristics: Descriptive information about the clinicians that were included in the analysis**

Length of time since Qualification (Tenure)	Acute healthcare organisation A	Acute healthcare organisation B
0-10 years	5	5
11-20 years	22	9
21-30 years	21	7
31-40 years	4	4
41-50 years	0	1
Total	52	26

**Table 4. Descriptive statistics of survey items: Percentage responses to categorical variables, with number of responses shown in brackets, split by Acute Healthcare Organisation**

		Percentage (N)		
		Acute Healthcare Organisation A	Acute Healthcare Organisation B	Total
Level of care focussed upon by quality monitoring	<b>I receive monthly or more regular feedback concerning the care delivered by my department</b>			
	True	23 (12)	19 (5)	22 (17)
	False	77 (40)	81 (21)	78 (61)
	<b>I receive monthly or more regular feedback concerning the care that I delivered personally</b>			
	True	15 (8)	8 (2)	10 (13)
	False	85 (44)	92 (24)	68 (87)

**Table 5. Descriptive statistics of survey items: Mean responses to scale variables, with standard deviation shown in brackets, split by Acute Healthcare Organisation**

Survey Item	Mean (SD) Acute Healthcare Organisation A	Mean (SD) Acute Healthcare Organisation B	Mean (SD) Total
<b>Scope of local quality monitoring (0-4)</b>			
Aggregated scale of categorical responses to the four quality dimensions (clinical effectiveness of care; compliance with best practice guidelines; patient safety; patient experience)	0.83 (1.15)	0.88 (1.31)	0.85 (1.20)
<b>Perceptions of the current quality</b>			

	<b>indicators in your area (1-8)</b>		
Comprehensiveness: The degree to which the data you receive is comprehensive and covers all important dimensions of care quality	2.48 (1.58)	2.46 (1.66)	2.47 (1.59)
Relevance: The degree to which care quality indicators are unambiguous and specific to our service area and the care we routinely deliver to patients	2.63 (1.74)	2.42 (1.72)	2.56 (1.73)
Reliability: The degree to which indicators are objective and reliable indicators of current standards of care, promoting confidence in the accuracy of the data over time	2.77 (1.83)	2.54 (1.79)	2.69 (1.81)
Improvability: The degree to which indicators measure aspects of care that you and your unit can have a direct impact upon through changing behaviour, the care process or local systems	3.21 (2.12)	2.58 (1.84)	3.00 (2.04)
	<b>Perceptions of the current feedback that you receive (1-8)</b>		
Level of analysis: The degree to which the data that you receive is broken down to a level that is directly relevant to you (e.g. for your team, your ward, your operating theatre, your patients)	2.46 (1.71)	2.35 (1.83)	2.42 (1.74)
Timeliness: The degree to which the frequency of feedback you receive helps you to monitor how care quality varies over time	2.50 (1.76)	2.50 (1.88)	2.50 (1.79)
Means of communication: The degree to which the channel and method for dissemination (e.g. meetings, email, reports, posters) are useful and engaging	2.87 (1.86)	3.35 (2.10)	3.03 (1.94)
Data presentation: The degree to which the format in which data is presented (e.g. tables, graphs, scorecards) is clear and easy to use with the right amount of data presented	2.56 (1.81)	3.04 (2.01)	2.72 (1.88)
Data credibility: The degree to which the data is viewed as credible and from a trustworthy, unbiased source	2.56 (2.07)	2.50 (1.77)	2.54 (1.97)
	<b>Local departmental climate for quality improvement (1-8)</b>		
Aggregated scale of all sixteen scale items	4.67 (1.25)	4.77 (1.36)	4.71 (1.28)
	<b>Dependent variable: Usefulness of current local data feedback (1-8)</b>		
Overall usefulness for improvement: The degree to which current data feedback is useful in monitoring variations and improving care	2.83 (2.09)	2.85 (1.87)	2.83 (2.01)

### **2.5.3.2 Regression Analysis**

The statistical model parameters of the different stages of the regression analysis examining the significance of the hypothesised predictors of usefulness of data feedback are given in Table 6. Regarding study hypotheses one and two, neither tenure nor organisational membership

significantly predicted perceived usefulness of current data feedback. The departmental climate for quality improvement (hypothesis three) explained an additional 27.5% of the variance in the usefulness measure ( $p < .0001$ ). The stronger the perception of a departmental climate for quality improvement, the greater the perception of the degree to which current local data feedback was viewed as useful for monitoring variations and improving care. In the third model in Table 6, partialling out the effects of all prior predictors resulted in departmental climate for quality improvement making a significant positive contribution to the dependent variable ( $\beta = 0.83$ ,  $p < .0001$ ). When hypothesis four was investigated, the scope of local quality monitoring explained a further significant 11.2% of the variance in local usefulness of data feedback ( $p = 0.006$ ). In this model, both comprehensiveness of feedback received ( $\beta = 0.45$ ,  $p = 0.02$ ) and provision of feedback at the level of the individual clinician ( $\beta = 1.19$ ,  $p = 0.049$ ), as opposed to department level feedback, were significant predictors of local usefulness, once prior factors had been controlled for.

In the final fitted model (hypothesis five), a number of variables representing feedback design characteristics were entered in the model, after controlling for all prior entered factors, including tenure, organisational membership, local contextual factors and the scope of any local quality monitoring initiatives. Feedback characteristics explained a further 26.4% of the variance in perceived local usefulness ( $p < .0001$ ). The final model demonstrated that with the effects of all other factors held constant, two characteristics were significant predictors of usefulness (Table 7). These were the perceived relevance of the quality indicators to the specific service area ( $\beta = 0.64$ ,  $p = 0.01$ ) and the perceived credibility of the data as coming from a trustworthy, unbiased source ( $\beta = 0.55$ ,  $p = 0.01$ ).

**Table 6. Model Summary: Overview of statistics illustrating model fit for each of the five study hypotheses**

<b>Model sequence and description</b>	<b>R</b>	<b>R Square</b>	<b>R Square Change</b>	<b>Significance of F Change</b>
Tenure (hypothesis one)	0.14	0.02	0.02	0.21
Tenure + Trust (hypothesis two)	0.14	0.02	0.00	0.97
Tenure + Trust + Departmental climate for quality improvement (hypothesis three)	0.54	0.30	0.28	<.0001
Tenure + Trust + Departmental climate for quality improvement + Scope of local quality monitoring/Level of care focussed upon (hypothesis four)	0.64	0.41	0.11	0.006
Tenure + Trust + Departmental climate for quality improvement + Scope of local quality monitoring/Level of care focussed upon + Generic characteristics of feedback (hypothesis five)	0.82	0.67	0.26	<.0001



Table 7. Coefficients: Model parameters for final fitted model with all variables entered

Final model with all variables entered	Unstandardized coefficients	Standardized coefficients	Sig	95% confidence interval for $\beta$	
	$\beta$	$\beta$		Lower bound	Upper bound
Constant	-0.40		0.58	-1.85	1.04
Tenure	-0.01	-0.03	0.74	-0.05	0.03
Trust	0.01	0.001	0.99	-0.68	0.68
Departmental climate for quality improvement	0.30	0.19	0.07	-0.03	0.62
Comprehensiveness of dimensions of feedback received	0.12	0.07	0.49	-0.22	0.46
Departmental feedback	-0.52	-0.11	0.25	-1.41	0.37
Personal feedback	-0.43	-0.07	0.47	-1.64	0.77
The degree to which data is comprehensive	-0.19	-0.15	0.39	-0.62	0.24
The degree to which indicators are relevant to the specific service area	0.64	0.55	0.01	0.14	1.13
The degree to which indicators are reliable and accurate	-0.05	-0.04	0.84	-0.52	0.42
The degree to which indicators measure aspects of care that can be improved	0.02	0.02	0.94	-0.38	0.41
The degree to which data analysis is at a level which is relevant to you	-0.36	-0.31	0.06	-0.73	0.01
The degree to which frequency of feedback helps monitor trends	0.07	0.06	0.69	-0.26	0.39
The degree to which feedback is communicated effectively	0.001	0.001	0.996	-0.26	0.27
The degree to which data presentation is adequate for effective use	0.09	0.089	0.67	-0.34	0.53
The degree to which the source of the data is credible	0.55	0.54	0.01	0.12	0.98

#### 2.5.4 Discussion

This study aimed to investigate the characteristics of feedback that are perceived by clinicians to be of most value. In doing this, the objective was to understand and enhance the effectiveness of personalised feedback from clinical quality indicators in anaesthetics.

Neither tenure nor organisational membership significantly influenced perceptions of usefulness, demonstrating that there were no significant differences in perceptions of current local feedback attributable to professional experience or due to location at either study site. Variations in perceptions of local departmental climate for quality improvement, however, was a significant predictor accounting for a large proportion of the variance in the dependent measure (27.5%). This finding is interesting as it suggests that without a supportive local context, providing information on variations in care may not result in improvement. It is additionally compatible with prior research, which suggests that having a local operating culture conducive to quality and safety improvement is an important contextual factor influencing the success of local initiatives (Kaplan et al., 2012; Ovretveit et al., 2011; Pronovost et al., 2006).

Both the scope of local quality monitoring and the level of feedback were significant predictors of perceived usefulness. This suggests that the more dimensions of care on which an individual receives feedback the more useful information they have to interpret and from which to learn. Higher overall intensity of feedback has been shown to increase its effectiveness (Ivers et al., 2012). The model presented by Ilgen et al (Ilgen et al., 1979; Kinicki et al., 2004) emphasises the significance of a data rich environment. In our model, receiving feedback on care delivered by the individual practicing clinician was a strong positive predictor of perceived usefulness. This finding reinforces the notion that personal professional feedback is important in learning and improving practice (Benn et al., 2012; van der Veer et al., 2010).

The final regression model investigated the role of feedback design characteristics, which were found collectively to explain a large proportion (26.4%) of the remaining variance in perceived usefulness, once all prior factors had been controlled for. As expected, the design of feedback is clearly the most important predictor of its utility. When all design characteristics were entered into the model simultaneously, only two factors were found to have a significant unique effect upon perceived usefulness of feedback. These were the relevance of the quality indicators to the specific service area and the credibility of the data as coming from a trustworthy, unbiased source.

Prior research has highlighted the importance of the perceived credibility of data from quality indicators and the extent to which it originates from a trusted source (Ilgen et al., 1979; Ivers et al., 2012; Kinicki et al., 2004; van der Veer et al., 2010; Wollersheim et al., 2007). Qualitative findings highlight the importance of investing time to establish the credibility of performance data and

involving respected members of senior staff to achieve this (Bradley et al., 2004). Two systematic reviews support this concept further by identifying feedback provided by experts as being more effective (Alvero et al., 2001; Veloski, Boex, Grasberger, Evans, & Wolfson, 2006).

The local relevance of quality indicators has additionally been highlighted as an important characteristic of effective feedback. Two systematic reviews concluded that tailoring a feedback intervention to the local setting augmented its effectiveness (Chaillet et al., 2006; van der Veer et al., 2010). In anaesthesia, a recent national survey study in the UK has demonstrated that current practice in monitoring and feedback is focussed upon high-level outcomes, productivity and efficiency indicators, rather than quality of care or patient experience measures (Royal College of Anaesthetists, In Press). The findings from the current study suggest these types of indicators may be perceived as less useful for quality improvement due to their limited local or clinical relevance.

Research study one has a number of limitations which should be acknowledged at this stage of the thesis. The overall sample was relatively small and the response rates differed greatly between the two participating organisations. However, they were both large hospitals and overall response rate was good. Whilst perceived usefulness (the item used as the dependent variable for regression analysis) is not synonymous with effectiveness, it is likely to govern engagement and uptake of the results from quality monitoring programmes. This survey had previously been validated using principal components analysis as part of a broader programme of work (Benn, Arnold, D'Lima, Wei, Moore, Aleva, Smith, Bottle, & Brett. 2015).

Please note that overarching limitations of the PhD and thesis as a whole are explored in section 5.3.

### **2.5.5 Key findings against research question**

In order to extract and compile key findings against the primary research question, these short sections are included consistently throughout the thesis at the end of each research study. They also contribute to the intermittent case syntheses (sections 2.9 and 3.7) and the overarching synthesis of results in section 4.

The key characteristics and psychological processes that emerged through this research study are presented in Table 8 below.

Table 8. Key findings from study one against research question

<b>How does feedback influence professional behaviour in healthcare?</b>	
<b>Characteristics of effective feedback</b>	<b>Psychological processes through which feedback impacts on professional behaviour</b>
<ul style="list-style-type: none"> <li>• Feedback is based upon relevant and meaningful quality indicators</li> <li>• Feedback comes from a credible source</li> <li>• Feedback is personalised (based on individual level performance)</li> <li>• Feedback takes place within a supportive local context</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users experience a reduction in scepticism/defensiveness</li> </ul>

## 2.6 Research study two: Qualitative evaluation

Research study two has been previously published as part of a broader final project report to NIHR HS&DR (Benn, Arnold, D’Lima, Wei, Moore, Aleva, Smith, Bottle, & Brett. 2015).

The work presented below corresponds to chapter six in the broader report to the funders.

Figure 3 below provides a breakdown of the individual research studies and how they build up into case studies and work streams. Circles are included to demonstrate the focus of this section and contextualise it within the thesis as a whole.

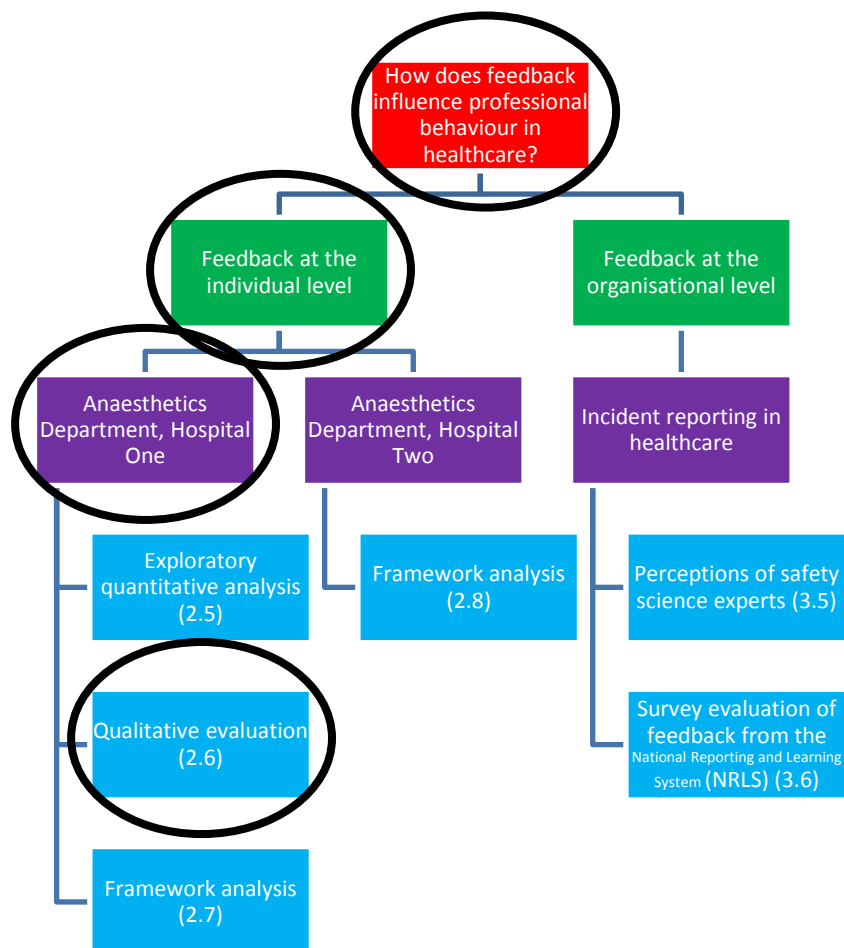


Figure 3. Structure of the thesis

## **2.6.1 Introduction**

The previous research study used survey data to explore the characteristics of feedback that clinicians perceive to be effective. The survey itself and the hypotheses that structured the regression analysis were developed and based upon review of the existing literature around feedback from clinical quality indicators presented in section 2.2. As discussed previously there is a current lack of understanding in the literature around the subjective experiences of clinicians in using personalised feedback and the characteristics and mechanisms through which this results in learning and behaviour change. It is for this reason that research study two is a qualitative exploration of the experiences of end users of a personalised feedback initiative in anaesthesia.

Qualitative evaluations have been conducted in other clinical areas using various forms of feedback but not in an anaesthetics department using personalised, individualised feedback based on quality indicators measured in the recovery room (Boyce et al., 2014; Bradley et al., 2004; Burford et al., 2010; Violato et al., 2008). Given the broader specialty focus on clinician revalidation and establishing quality indicators for anaesthesia, understanding end user perceptions of the causal mechanisms by which feedback might result in learning and changes to professional practice and outcomes is an important aim and precursor to further development of systems (Royal College of Anaesthetists, In Press).

This study reports the qualitative exploration of a quality monitoring and feedback initiative in anaesthesia implemented at Hospital One. The aim of the exploration was to investigate the ways in which clinicians engaged with an initiative of this nature, their perceptions of its level of usefulness and the influence of the feedback on their professional learning and associated behaviour change.

## **2.6.2 Method**

### ***2.6.2.1 Research ethics***

Following Research Ethics Committee advice, the research study was not considered to require local Research Ethics Committee approval as the work fell within the remit of a previously approved service evaluation project. Informed consent was gained from all participants in this study.

### *2.6.2.2 Theory of the intervention*

The intervention comprised a data feedback initiative based on quality indicators collected for all elective surgical patients at a large academic hospital. The aim was to improve patient flow, quality of anaesthetic care and patient experience through providing timely data on variations in care to Perioperative Service Leads, Consultant Anaesthetists and Surgical Nursing Leads. Ultimately, the objective was to stimulate improvement through enhanced and constructive use of available data to reduce delays in transfers from recovery to ward, enhance compliance with best practice guidelines in normothermia, improve appropriate use of analgesics and antiemetics and improve patient-reported outcomes in the post-operative phase. The secondary objective was to develop, embed and evaluate a sustainable continuous monitoring and feedback initiative within local anaesthetic services drawing upon input from anaesthetists and other key user groups, whilst engaging the broader professional group of anaesthetists in the programme. The feedback comprised monthly personalised reports generated for individual anaesthetists and each main surgical ward, comprising detailed break-down of individual level data, trends and comparisons with peers/units. Data from a number of routinely collected quality indicators were used, including patient temperature, ward transfer delay, post-operative nausea and pain, and patient-reported quality of recovery scale score (Haller et al., 2009; Myles et al., 1999; NICE, 2008). In addition to targeted reports, feedback was distributed via presentation at audit meetings, bulletin board postings and personal email distribution and cascaded through the management hierarchy.

### *2.6.2.3 The qualitative exploration*

#### *2.6.2.3.1 Participants*

Forty-four Consultant Anaesthetists were invited to participate along with specific Perioperative Service Leads (including the lead nurse for the Post-Anaesthetic Care Unit) and Surgical Nursing Leads. These individuals were invited to participate because they represent a variety of actors in the processes of the above described feedback initiative and enabled a full exploration of the different mechanisms of change that were underway. The initiative had been running for a period of approximately 18 months when the interviews were conducted. Respondents were approached to give feedback to assist in developing the programme and as users of the information it provided, representing a range of stakeholder perspectives.

### 2.6.2.3.2 Data Collection

Interviews had been previously conducted by a research team including the primary supervisor of this PhD, one Research Assistant in Quality and Safety, and one clinician in training undertaking a research placement. Interviews determined the perceived value of specific quality indicators in anaesthesia and impact of feedback design. Furthermore, factors optimising engagement with the initiative were investigated as well as the mechanisms by which data was used to create behaviour change. The research team received strong clinical input into the design of the interviews. The initial interview schedule was piloted with a senior Consultant Anaesthetist using a cognitive walkthrough technique in which the interviewers' questions were first answered, and then discussed in depth in terms of wording, relevance and duplication. Table 9 provides a simplified overview of the topic areas with example questions covered whilst the full interview schedule is included in Appendix B. The research team engaged in ongoing reflexivity throughout the data collection process. This involved individual researchers continuously reflecting upon and discussing their own personal influence on the interviews that they were conducting and how this impacted on their understanding and interpretation of the data. The fact that the interviewers were already engaged in the operational process of delivering feedback to end-users raised potential issues of subjectivity and bias. This was counteracted by ensuring that multiple researchers engaged in the interview process and any arising issues associated with the action research style approach to the project were discussed and reviewed at regular steering group meetings.

**Table 9. Simplified overview of topic areas with example questions covered**

Topic	Example Questions
General views upon feedback	<ul style="list-style-type: none"> <li>• In your view, what are the most important aspects of quality of care relevant to anaesthetics practice?</li> <li>• Do you think anaesthetists/PACU staff/ward staff generally get adequate feedback upon these aspects of quality of care?</li> </ul>
Evaluation of the initiative	<ul style="list-style-type: none"> <li>• What are your general thoughts about this initiative and the feedback reports that you receive?</li> <li>• What was your initial reaction to seeing your data?</li> <li>• How do you use the information contained within the reports?</li> </ul>
Departmental perspective	<ul style="list-style-type: none"> <li>• What is the potential value of this initiative to the Department?</li> <li>• How do you think the Department itself should use the data?</li> </ul>
Project stakeholder questions	<ul style="list-style-type: none"> <li>• What are the implications of this initiative for the anaesthetics specialty?</li> <li>• Can you see a role for initiatives of this type in revalidation?</li> </ul>
Future development	<ul style="list-style-type: none"> <li>• Are there any measures, features or functionality that you would like to see included in future versions of the reports?</li> <li>• What further support could be provided for</li> </ul>



	anaesthetists/PACU/wards to use this data to improve care?
Broader context	<ul style="list-style-type: none"> <li>• Do you see any barriers to engagement with and utilisation of this initiative?</li> <li>• Is there anything about the organisation or context in which you work that might make a system like this one more or less successful?</li> <li>• Do you think there is an atmosphere of transparency here amongst the clinical group/nursing directorate concerning quality?</li> </ul>

### 2.6.2.3.3 Analysis

The analysis was conducted using an inductive and thematic approach, informed by some of the principles of grounded theory (Strauss & Corbin, 1990). Due to the exploratory nature of the study this approach was deemed as being most appropriate. Interview recordings were transcribed, read and re-read until the data were familiar. The transcripts were then open-coded into units of meaning using NVivo software (version 10). Units of meaning were later coded and grouped into broader themes and sub-themes through processes of constant comparison and category refinement in order to ensure mutual exclusivity and similarity. The emerging qualitative template was reviewed and discussed with clinical input from three Consultant Anaesthetists and a Junior Doctor, as well as on-going academic input from the primary supervisor in order to gain multiple perspectives on the coding and categorisation processes. Results were presented to the wider project steering group on two occasions to gain further senior academic perspectives upon the work and findings with high relevance to the development of the feedback reports were regularly sent to operational leads. A number of iterations were developed until no new categories of meaning were derived and saturation had been achieved.

### 2.6.3 Results

Interviews lasted between 30 and 60 minutes. The analysis comprised 13 hours of interviews with five Perioperative Service Leads, 10 Consultant Anaesthetists and six Surgical Nursing Leads. Interviewees reported a range of experiences of local quality monitoring and improvement. Six key themes emerged from the dataset. The analysis presented below represents three levels of thematic analysis, with 51 low-level codes identified, which were subsequently structured into 22 mid-level categories and finally subsumed within six high-level themes for reporting purposes. An overview of the coding and thematic structure is provided below in Figure 4, before commentary and example quotations for each of the six high level thematic areas.

- **Value of feedback for clinicians**
  - Need for this feedback initiative – why is it important?
    - This project represents the first step towards effective feedback on anaesthetic care
    - Anaesthetists want to deliver high quality care for their patients
    - Importance of measuring patient experience and satisfaction
    - It is important that anaesthetists receive feedback on the quality of care that they are providing to their patients
  - Levels/existence of feedback before initiative begun
    - It is not standard practice to quantify how patients recover after anaesthetic
    - Anaesthetists at this Trust generally did not receive feedback
  - Conceptualisation of ‘the good anaesthetist’
    - Vision of anaesthetic practice – anaesthesia viewed as a form of art
    - Using feedback associated with professionalism
    - Role of efficiency Vs quality
- **Selection of quality indicators**
  - Conceptualisation of quality of care
    - Suggested additional/alternative metrics
    - People have different views on what quality of care with anaesthetics is
    - Quality of care covers a broad range of factors and some of them are very difficult to capture/measure
  - Specificity of feedback
    - Request for more information on reports
  - Meaningfulness of data
    - Need for a greater focus on outcome measures
    - Ability to control outcomes of quality indicators
    - Importance of nausea as a quality indicator for feedback
    - Importance of pain as a quality indicator for feedback
  - Trust in the metrics
    - Nausea measure needs increased accuracy
    - Data aren’t always linked to the correct anaesthetist – data quality issues
    - The way that we measure pain is subjective
- **Reporting format**
  - Format of reports/data
    - Comparisons would be more useful if case mix was considered
    - Need combination of normative feedback and individual feedback over time
    - It would be useful to be able to instantly see own feedback over time
    - Need for anonymity
    - In favour of normative feedback
  - Presentation of reports/data
    - Preference for graphics over numbers and statistics
- **Application of feedback to departmental quality improvement**
  - Role of the department – department level involvement in the initiative
    - There is a practical function to feedback for service managers
  - Contrast between quality improvement and performance management
    - Data must be identifiable at some level if it reflects potential patient safety issues
    - Severe outliers need to be dealt with via governance procedures
    - Reports should not be viewed punitively
    - Case mix needs to be incorporated in order to use feedback reports for any type of performance management

- Ease of translation from data to improvement/role of feedback for quality improvement
  - Variation on judgement as to when an improvement is necessary
  - Examples of feedback in action – practical examples of improvement linked to feedback initiative
  - Conceptualisation of the improvement process
- **Application of feedback to professional behaviour change**
  - Conceptualisation of own performance
    - Feedback reports provide reassurance to anaesthetists
    - People generally think that they are performing better than they actually are
    - Feedback reports quantify/objectify an anaesthetist's conceptual understanding of their own performance
  - Affective reaction to receiving feedback – how do people feel about the feedback that they are receiving?
    - Having feedback reports increases the motivation of anaesthetists to improve quality of care
    - People are comfortable with the collection of performance data
    - Anaesthetists care about their feedback reports and want to do well on them
  - Cognitive reaction to feedback – how do people think about the feedback that they are receiving?
    - Feedback reports promote thoughts about practice and potential improvement
  - Need for additional support/involvement
    - Anaesthetists need further support translating feedback into improvements
  - Practical application of feedback reports
    - Feedback reports useful for revalidation/appraisal
- **The context for feedback initiatives**
  - External influences on quality of recovery
    - Other members of the team influence quality of recovery
    - Influence of specific operation on quality of recovery
    - Effect of patient factors on quality of recovery
  - Demands of feedback initiative on time and resources
    - Maintaining the feedback increases workload
  - Effect of the individual on the perception of feedback. Personal characteristics of the recipient
    - Feedback reports serve different purposes for different people
    - Some people will not even look at the feedback data that they are being provided with
  - Effect of levels of transparency within the organisation
    - There is currently a high level of transparency in relation to this project in the organisation
  - Methodological issues surrounding feedback initiative
    - Issues surrounding the effect that sample size (i.e. the number of cases that each anaesthetist does) has on feedback reports

Figure 4. Overview of coding and thematic structure

### 2.6.3.1 Themes

#### 1. The value of feedback for clinicians

This section has been aggregated from three mid-level categories and nine low-level codes. It comments upon the overall perceived utility of having this type of information system and its acceptability to end-users in its initial format. It also explores the reasoning behind these judgements which emerge through categories on the levels and existence of feedback before the initiative was introduced and the interaction between receiving feedback and conceptualisations of professional identity.

Interviewees were asked about their general perceptions of the value of providing routine feedback upon quality of care to healthcare professionals. They unanimously stated their support and agreement for the motivating principles underlying the initiative; that there was a need to monitor and provide intelligence upon current quality of care to the responsible care professional in a timely and useful way:

**Anaesthetist 2:** *“I think it is very important because you really don’t know, you walk away, you don’t know whether the patient is vomiting after half an hour, and is back in theatre, nobody really tells you so I discover sometimes after that my patient actually was sick because I don’t see him being sick once I wake him up and I walk away.”*

**Surgical Nursing Lead:** *“We’ve got access to data now; we know how long it takes for every single patient to be collected from recovery and I can communicate to staff and investigate any issues surrounding, you know, any delays.”*

The main reason that the clinicians found the initiative of value was because they saw it as facilitating improvement:

**Perioperative Service Lead 2:** *“No, it’s brilliant; and I think feedback is very important for us to improve and look back on our practice and to change things that aren’t working properly.”*

**Surgical Nursing Lead 5:** *“I have no qualms with it being used because if we haven’t got the information and the evidence then how can you improve? So no, it needs to be done and I hope it carries on...”*

It was also associated with the concept of being a ‘good’ clinician. The effective use of the feedback to change behaviour and make improvements was associated with professionalism in the sense that it represented acting upon the needs of patients in a systematic and rigorous way:

*Anaesthetist 2: "It is professionalism taking into account that if you don't treat pain properly, you probably need to do something more"*

*Surgical Nursing Lead 1: "The whole point that we're here is to improve things and to make the patient flow, patient pathway, patient experience much better."*

The significance of the initiative was often linked to the fact that levels/existence of formal feedback before the project began were extremely low. Respondents felt that they did not generally get systematic and objective feedback upon the quality of care that they provided. Instead interviewees reported having to rely on anecdotal feedback from patients and informal discussion with colleagues. This did not provide them with the opportunity to modify their behaviour based on accurate and reliable information:

*Anaesthetist 10: "There's been no history of individualised feedback, so having data that relates to my own practice is phenomenally useful."*

*Surgical Nursing Lead 6: "Well yeah, they give me the actual times which I wouldn't be 100% aware or if it wasn't for the reports."*

In that sense the project was framed as a first step towards effective feedback on anaesthetic care and therefore represented a change in itself:

*Perioperative Service Lead 3: "My intense support for this project is the fact [that] this is a start. This is showing it can be done and we can build on this and create much greater things for the future."*

## **2. Selection of quality indicators**

**This section has been aggregated from four mid-level categories and 11 low-level codes. It comments upon end-user preferences for the selection of metrics. Qualitative categories emphasise the importance of meaningfulness when providing feedback that accurately represents clinicians' conceptualisations of quality of care in anaesthesia.**

Clinicians discussed characteristics of monitoring and feedback that increased its usability and effectiveness. It was evaluated that quality indicators and the data that they provide should be meaningful and trustworthy in order to increase engagement. However, it was emphasised that there is individual variation and ambiguity in definitions of quality in the area of anaesthesia:

*Anaesthetist 10: "Quality of care with anaesthetics depends on who you talk to...So its quality very much depends on the, you know, beauty is in the eye of the beholder, and that's very true of quality."*

The view was put forwards by a number of interviewees that “quality of care” covered a broad range of areas and some of these were extremely difficult to capture and measure effectively. Clinicians suggested a number of factors that were not being measured as part of the initiative but that they perceived to be relevant and comprehensive:

**Anaesthetist 1:** *“We get them out of theatre and out of the recovery and then we think that they are okay but then they have headaches, sore throats or constipation, these little things that patients remember, so anything that we can do to improve that makes a big difference I think.”*

**Surgical Nursing Lead 3:** *“Maybe I’d like to see how many patients were called for and weren’t ready. That would be quite valuable from my point of view. I don’t know whether you can do that or not.”*

Interviewees suggested that future feedback should be developed to report on non-technical as well as technical skills and highlighted a need for measures of the quality of pre-operative as well as post-operative care to provide a more holistic representation of the care received:

**Anaesthetist 7:** *“I think that’s something that might also be useful how you lead your team in theatre, how the people perceive you as the team leader or the team member, because that could also be quite useful.”*

Interviewees highlighted the importance of being able to control the outcomes of the quality indicators that are being monitored in order to maintain motivation to engage with the project. They wanted to be able to identify differences in the data when they modified their behaviour and emphasised the significant role of perceived improvability in encouraging changes:

**Anaesthetist 1:** *“Whatever you do sometimes they are still sick, although I think we can make a difference to it”*

The current indicators of post-operative nausea and vomiting and pain were perceived to be both meaningful and important quality indicators because of the insight that they provided to anaesthetic care:

**Perioperative Service Lead 1:** *“So from that point of view, yeah, I think actually the one that nags me the most is this one, because I don’t think anyone should wake up sore.”*

**Anaesthetist 10:** *“Yes. I’ve found post-op nausea and vomiting as a very clear outcome and it’s got very clear, it’s got a very clear treatment to control perioperatively. So it’s very easy to know what to address to improve it.”*

However, concerns were raised around the measurement of both of these metrics. Issues of subjectivity in interpretation were raised alongside a need to consider the psychological component of pain and nausea perception. Therefore the reliability of these measures as a basis for improvement actions was questioned:

**Anaesthetist 3:** *“And it’s about what people expect. And so if they expect it to have no pain whatsoever and they had a bit of pain, now that’s a catastrophe. But if they expected it to be hugely painful then that’s a different number.”*

Data quality issues were also raised as something that reduces the level of trust that clinicians have in the quality monitoring system:

**Surgical Nursing Lead 5:** *“It’s been very useful, although as I say I do sometimes dispute whether it’s accurate by what time we leave the ward and what time, hence we did our own survey, and showed quite big discrepancies in that.”*

In particular, interviewees reported cases of data not being linked to the right anaesthetist when trainees perform a case under the supervision of a consultant:

**Anaesthetist 6:** *“If I am at home or on call and they are anaesthetising it, they are doing their standard anaesthetic as a trainee, and I might not even know the trainee! So it is probably not strictly fair.”*

In terms of the level of data that is fed back to individuals, clinicians emphasised the need for effective specificity and detail. Respondents expressed an interest in a longer report with a more detailed breakdown that would increase the comprehensiveness of the metrics. Requests were made for more detailed information on feedback reports to enable clinicians to funnel down further to case/patient specific information and as an aid to recall and learning. This was viewed to be particularly important for the pain and WWT indicators:

**Perioperative Service Lead 1:** *“Because if you do 99 things well and 1 thing bad, you kind of can’t remember the bad thing and you think, “Oh, maybe it didn’t happen”, whereas if you had the information on that and you went, “Okay, so that day I didn’t do that”. That, you’d learn from it.”*

**Surgical Nursing Lead 4:** *“It mainly just gives the timings, doesn’t it? I don’t think it gives any reasons. Like for example when a recovery nurse has to bring the patient back up to the ward, it doesn’t really say what the reason for that was. Maybe some more information or a comments section might be good, like maybe we were short staffed that day.”*

### 3. Reporting format

This section has been aggregated from two mid-level categories and six low-level codes. It comments upon end-user preferences for the presentation of feedback reports. Qualitative categories emphasise the importance of specificity and anonymity when providing feedback that accurately represents clinicians' conceptualisations of quality of care in anaesthesia.

Further evaluation was directed at the presentation and format in which the feedback reports were delivered to individuals. Respondents felt that in order for the reports to reach their potential they needed to contain a combination of normative (peer comparison) feedback and individual trends over time. This enabled end-users to benchmark their performance both against their own baseline and within a comparable peer group:

*Anaesthetist 4: "Yes, I think, for me to improve my practice I would need to first have my comparable data over a month or over a year. And also how does my data compare to other anaesthetists that do exactly the same thing? And I think then you'd get a more accurate idea of how you can improve or whether you should improve or whether you need to improve."*

Interviewees felt that normative comparisons would become much more useful if case mix was better accounted for. Comparing one's own performance with others who do not have a similar case mix was viewed as disengaging and demotivating as it did not provide meaningful information:

*Anaesthetist 5: "The difference is comparing yourself... you need to compare like to like. It's pointless comparing my practice with a colleague who does nothing like me, who does different kinds of cases, different kinds of pathologies. So that's a difficult one; you need to compare like with like."*

*Surgical Nursing Lead 6: "I think it's very difficult to compare to other wards because everywhere is different and has its own set of problems. So I look at my ward, and I don't really care how I'm performing against other areas because everyone's different."*

The importance of anonymity was also emphasised as a factor that naturally increases initial engagement with the project. Interviewees felt that the removal of anonymity could potentially cause end-user resistance:

*Perioperative Service Lead 2: "Only consultant resistance and, I suppose, almost embarrassment at having your own figures published. And I think that's where having it anonymised works quite well."*

Clinicians expressed a preference for graphics and figures over numbers and statistics. These were viewed to be more effective at successfully transmitting useful information to the recipient:



**Anaesthetist 1:** *“First of all I like the fact that it is a graphic, it is not a number. I found this much more effective.”*

**Surgical Nursing Lead 2:** *“Especially, you know, graphics, they are very, you know, for someone to see it, it’s very easy to spot the difference and, you know, what’s going on.”*

#### **4. Application of feedback to departmental quality improvement**

**This section has been aggregated from three mid-level categories and eight low-level codes. It comments upon the mechanisms through which groups have interacted with and used the data that the feedback reports provide them with. Categories are based around attaining the balance between quality improvement and performance management.**

The feedback initiative was perceived to be useful for quality improvement at the clinical unit level, particularly in terms of providing evidence for reporting changes in overall performance over time:

**Anaesthetist 5:** *“That would be useful to know, whether the whole department scored differently last month in one thing. That should be quite useful.”*

**Surgical Nursing Lead 5:** *“It’s good to see what they are and where the trust is and where you need to improve, and against the national. And it does make competition dare I say it within the NHS but it’s not always for the better but it just gives you, like I say, a quantitative to where you are and where you need to be.”*

Having the data to be able to evidence claims about the state of care being delivered locally was perceived as useful for a clinical unit or department embedded within a broader healthcare system:

**Perioperative Service Lead 3:** *“Well, first of all, I can ask for a big bonus because, let’s be honest, if I can show that my team have decreased nausea and vomiting, pain, increased temperature over time, that’s a result.”*

**Surgical Nursing Lead 4:** *“Yeah. They will send me a message saying, “Well done [surgical ward],” and the staff, I don’t receive messages back but that’s just good for them to see what we’re doing and where we’re at.”*

This also provided a firm basis for connecting with senior levels of the organisation and requesting the necessary support for further improvement:

**Perioperative Service Lead 4:** *“I would get the heads of nursing for each of the CPGs. And then sit down with them.... And say, you know, we send this out to you every month, do you read it, do you take it on board, how do you think we can start making these changes?”*

There was much discussion around the need for an effective balance between quality improvement and performance management. Some interviewees felt that reports should not be viewed punitively or associated with performance management if they were going to be successful in engaging people in reflection and improvement:

*Anaesthetist 10: "People have tried to do quality improvement processes by being more confrontational and ended up with absolutely nothing out of it, so I think things are improving."*

However, there was also a strong view expressed by the department leads that when it came to patient safety there was a responsibility to act upon data that indicated low quality care or that provided evidence of poor compliance with best practice guidelines:

*Perioperative Service Lead 4: "But I think what we ought to do is sit down... with the heads of nursing and some of the senior nurses and go through the data, the ones in particular who are not doing so well."*

It was thought to be important that anonymity could be bypassed if there was a risk of unsafe care being delivered:

*Perioperative Service Lead 3: "I think you have to have a crackable code if somebody can make the case that patient safety may be at risk if it's uncrackable."*

Where interviewees discussed use of the data for performance management purposes, this raised a range of additional concerns regarding the importance of data quality and comparability between different professionals with different case mixes:

*Anaesthetist 8: "If you took a guy who did day case surgery, so high turnover, low ASA grade, low time of surgery, in terms of duration, low complication, age range that is reasonable, and compared it to a guy who just did a cardiac and a vascular list, the day case guy's going to look brilliant, and the vascular guy is going to look rubbish."*

## **5. Application of feedback to professional behaviour change**

**This section has been aggregated from five mid-level categories and nine low-level codes. It comments upon the mechanisms through which individuals have interacted with and used the data that the feedback reports provide them with. It captures specific narratives and use case scenarios whilst evaluating the impact of the programme upon staff capability to use data from quality indicators effectively. Categories cover both affective and cognitive reactions to individualised feedback.**

Clinicians expressed a number of different reactions to receiving individual level feedback on the quality of care that they provide. Interviewees reported that peer group comparisons had a motivating effect when it came to changing personal practice and made individuals aware of what was possible in terms of high performance:

**Perioperative Service Lead 3:** *“And if we see we are down here in the lower ranks of quality in terms of nausea, vomiting and pain relief, that’s a tremendous incentive to move ourselves up to there. And if everybody is so motivated to move ourselves up, then the median is going to get pushed up and up and up and up.”*

**Surgical Nursing Lead 2:** *“I’m quite competitive so I wanted to make it better. And then it was the question, why can’t we do it as others, you know?”*

There was a strong sense that people had a genuine desire to perform well on the feedback reports. This was linked to the fact that negative feedback could result in a feeling of alarm and disappointment for the recipient:

**Perioperative Service Lead 1:** *“I think if I ended up in the bottom or sort of below at least that line, I’d be like, “Oh my gosh, what am I doing wrong?”... Well no one likes to be criticised do they.”*

**Surgical Nursing Lead 1:** *“I think for me I was really shocked to see the time the patient stayed in recovery. I think that was a big eye opener, definitely.”*

The reports were perceived to be effective at automatically promoting thoughts about practice and potential improvement. Clinicians felt that the data encouraged them to pause and consider how they may need to alter their practice for the benefit of the patient:

**Perioperative Service Lead 3:** *“And you look at it initially and you think, ‘No, that can’t be right. How can I be down here? Down at the bottom.’ And the mature response is, ‘Well, actually, perhaps I am. Let’s go and really have a look at those patients and let’s see if I can improve.’”*

**Surgical Nursing Lead 3:** *“They’ve made me think. I wouldn’t say they’ve made me change my practice because I think I’ve always been aware probably not of the amount of minutes the patients have to wait, but there’s nothing much I can do to make things any smoother than... I think we’ve tried quite hard to get our patients back.”*

Interviewees discussed the impact of the feedback reports on their conceptualisation of their own performance. Receiving the reports gave them the opportunity to quantify and objectify what was previously an abstract representation of their practice:

**Anaesthetist 1:** *“Well yes, it tells me ... it puts a percentage on it which I didn’t know before... it put some more exact science behind it and some figures which, you know, I quite liked actually.”*

**Surgical Nursing Lead 6:** *“Having data is always helpful when trying to improve practice because then you’ve got a starting point and then if you make improvements you’ve got figures that show you improvement, which is always the best way to measure anything.”*

Individuals had strong beliefs around what the improvement process consisted of and how people should be acting upon the feedback reports that they receive to monitor variation, prioritise action and improve care:

**Anaesthetist 1:** *“I think they should look at their numbers and check they are achieving good standards of care really and do something about it if they weren’t.”*

**Surgical Nursing Lead 4:** *“...Suppose if there was an area that was always scoring low then they’d need to look into why that was happening and see if they could address the reasons.”*

**Perioperative Service Lead 5:** *“If I was a ward manager I would look at the report and see that I’m doing very badly and I’d look into what is it that is causing me to reflect so badly compared to other wards? And if I’m honest with myself I would eliminate the reasons one by one to improve.”*

There was variation on judgement as to when an improvement was actually needed based on the data in the reports. This generally came down to the fact that scores across the board were very high and therefore it fell down to personal preference whether improvements were seen as necessary:

**Anaesthetist 5:** *“But unless I had a patient who was extremely cold or extremely... then I’m not too worried. If they’re just a little bit cold, well that’s not a major concern of mine.”*

**Anaesthetist 4:** *“No, I don’t really make any changes because they all get bair huggers, they all get fluid warmers, they all get all the post op nausea and vomiting bits. The pain thing, I’m usually on top of, so don’t, that’s not usually a problem.”*

Ultimately, many interviewees took the opportunity to discuss specific improvements that they had made to their own or observed in others’ practice based on the data that had been fed back to them:

**Perioperative Service Lead 2:** *“I thought: ‘My goodness, I do quite a lot of patients’; ‘my goodness, oh, some of them are in more pain than I thought they would be in’. And I did some things to change it; so I changed my own practice a little bit, particularly on the gynaecology patients...I do an abortion list on a Thursday, and we were using a Diclofenac suppository which doesn’t really start working in recovery – it’s working about half an hour later; whereas I changed it to an intravenous preparation of Ketorolac, which is working in recovery and works quite nicely.”*

**Surgical Nursing Lead 5:** *“It’s had an impact there and drastically reduced it by them having to be more organised. Because it used to be a pattern of trying to send patients down here who were actually going home later that day just to make a bed up there, so that’s going to stop. So that option won’t be there. But it’s good to see that HDU [High Dependency Unit]*

*has vastly improved, so that has which is great, because it's good for the trust, for the targets, so yeah."*

It was suggested that individual users of the feedback reports may benefit from further support in the translation of their feedback data into effective information that can be applied to make improvements. This could potentially be provided through increased interaction with colleagues and wider dissemination and discussion of outcomes of the project which may help individuals to prioritise action, set measurable objectives and monitor progress:

**Anaesthetist 1:** *"But if there is a problem like that, and you can't see how you can improve it, then you have got to work out what the barrier is and I suppose you might then need to talk to a colleague about that, because if you are having pain problems and you are doing everything you could do, it could be your epidural technique, it could be something."*

**Perioperative Service Lead 5:** *"Not really. But we could have such meetings. It would be nice to be able to meet with managers on [other surgical wards] and just share this data with them, and just hear their side of the story, you know."*

Respondents felt that the reports had strong potential for use as part of the upcoming revalidation process. Clinicians identified the benefit of automatically receiving data that demonstrated their caseload and performance:

**Anaesthetist 1:** *"Yes I think it will definitely be, well like I say you take these numbers to my appraisal and then the next stage is going to be revalidation, and I think that will, absolutely, it is going to ... you can show how many cases you have done, your case mix and your results to a certain extent so yes I think it will be very useful."*

It was also recognised that the reports have a role to play in appraisals as a demonstration of high and consistent performance:

**Perioperative Service Lead 3:** *"And also, you know, for appraisal and revalidation this is just golden because you can say, 'I'm above average...I'm above average...I'm above average...I'm good.'"*

## **6. The context for feedback initiatives**

**This section has been aggregated from five mid-level categories and eight low-level codes. It comments upon the key barriers and enablers to the successful development, implementation and utilization of this type of quality monitoring and feedback system within a specific service context. Categories are combined to represent the interaction between external influences on a patient's**

**quality of recovery, the availability of time and resources to support an initiative of this type and the personal characteristics of the clinicians receiving feedback.**

In addition to procedural variations and patient-specific factors, interviewees reported a number of factors that were external to the feedback initiative but which impacted upon its success by having a contextual influence. These interactions included the influence of other members of the team:

**Perioperative Service Lead 3:** *“I think, actually, our capacity to influence overall patient outcome is immense but because we are part of a very large team it’s very difficult to single out what difference that individual anaesthetist makes.”*

**Surgical Nursing Lead 2:** *“I haven’t got any control in relation to medical staff, obviously. If they’re not coming and they’re not discharging patients on time, you know, obviously this is the most difficult part of this.”*

The availability of time and resources was also thought to impact on the sustainability of the initiative in the future and the ability to make improvements based upon it:

**Perioperative Service Lead 1:** *“Well, just work. It’s quite a lot of work for the recovery nurse, it’s a lot of work for whoever analyses it all, so, you know, it’s not something I’d be happy to do to sit down and trawl through all those bits of paper, it’s an awful lot of work.”*

**Surgical Nursing Lead 6:** *“Obviously time is always a barrier, but there’s certainly no barriers from a point of view that I don’t think they’re important, it’s just time, and having to share my attention to a number of different areas that all want things improved.”*

However, transparency within the organisation in relation to the project was reported to be high which allowed for open discussion and a constructive response to existing variation:

**Perioperative Service Lead 2:** *“I don’t think we’re particularly adversarial here, and I think we generally, kind of, discuss things and we’re quite open with each other about our data and about how we do things.”*

Characteristics of the recipient of the feedback report were thought to influence the way in which it is used. The reports served different purposes for different people and different personalities were prone to engage in different mechanisms of change:

**Anaesthetist 10:** *“Any feedback mechanism requires that an individual opens the envelope and has a look at the information and processes it. So there’s some people who just won’t be interested in it and there’s not much we can do about that.”*

#### 2.6.4 Discussion

This study explored clinician perspectives and experiences of a complex quality monitoring and feedback initiative in anaesthesia. Results provide a rich understanding of user preferences and the causal mechanisms of effectiveness for monitoring performance and making improvements to practice based on clinical quality indicators.

The results demonstrate that this initiative was clearly desired by the clinicians and viewed as a definite first step in the right direction towards making lasting improvements to patient care based on systematic performance data. Due to modern productivity pressures for longer theatre lists and higher patient throughput, there is considerable organisational pressure on anaesthetists to focus their attention solely on the intra-operative process and not follow up on patients in the later stages of recovery. Recovery-based indicator feedback therefore provides a means of learning from anaesthetic outcomes in the immediate post-operative period that was previously delivered through irregular patient contact.

In this sense the end-users recognised the existence of a problem and the need for a solution (which in itself can be a challenge for new interventions) (Dixon-Woods, Leslie, Bion, & Tarrant, 2012). This is supported by the fact that very few professional monitoring programmes for anaesthetists currently exist in healthcare organisations. There is a clear need for this to change in light of the revalidation agenda and demand for effective quality monitoring processes in anaesthesia (Royal College of Anaesthetists, In Press). Interviewees clearly identified a role for this initiative in revalidation and this appeared to significantly increase levels of engagement. Ultimately, aligning the feedback with local departmental processes and broader specialty policy agendas was an important engagement factor. Therefore, the whole exercise is a useful organisational corrective to put quality back 'on the agenda' from a clinical point of view and increase the visibility and credibility of anaesthesia within the hospital.

Interviewees reported that trust in the data was primarily determined by the appropriate selection of specific and relevant quality indicators. Notably, the previously reported regression analysis of the factors predicting perceived usefulness of data feedback (in section 2.5) similarly demonstrated the primacy of local relevance of quality indicators and credibility of data above other factors (D'Lima et al., 2015). The importance of these characteristics is further supported by two systematic reviews and a qualitative study as well as the model presented by Ilgen et al (Bradley et al., 2004; De Vos et al., 2009; Ilgen et al., 1979; Kinicki et al., 2004; van der Veer et al., 2010).

In particular, the relevance of using post-operative pain and nausea and vomiting as indicators of quality of care was emphasised in this evaluation. These indicators have been shown to be two of the most important dimensions of quality of recovery and have been empirically linked to prolonged post-operative stay after ambulatory surgery (Smith & Mahajan, 2009) and overall patient satisfaction (Eccles et al., 2006). The soft nature of quality outcomes for the anaesthetic process makes it difficult to capture effectively and measure quality of care. Even well formulated measures may be open to interpretation due to the experiential and subjective nature of phenomena such as pain. This may limit a measure's ability to guide action.

Features of the dataset and feedback reports themselves served as important engagement mechanisms in capturing the attention of busy health care professionals and ensuring that individuals engaged with the information contained within their reports. Presenting the data back to clinicians in the right format to support them in transforming it into clinically meaningful information that has meaning and gives out an actionable message is therefore equally important. This qualitative analysis suggests that a combination of normative comparison (i.e. peer benchmarking) and individual level trends over time may have the greatest effect. Aggregated data did not identify where improvement efforts could be directed and was open to individual anaesthetist bias and subjective interpretation. Effective data feedback should therefore report outliers as well as aggregated measures and should include analysis at varied levels of granularity.

The area of performance measurement systems is particularly vulnerable to inevitable issues of sensitivity around utility, fairness and unintended consequences (Benn et al., 2012; Dixon-Woods et al., 2013; Rosenbaum, 2015). Feedback that is confidential and presented with a non-judgemental tone has been found to be most effective (Shute, 2008; van der Veer et al., 2010). This intervention model was designed to be supportive, rather than punitive or an exercise in performance management. Anaesthetists reported that framing this initiative as a managerially-led financial or productivity drive would have rendered it less appealing than a clinically-led exercise centred upon patient experience. The obvious engagement of the clinicians may therefore have been influenced by the way in which the initiative was led. The literature has emphasised the importance of appropriate leadership and in particular the need for peer led feedback rather than feedback provided by an external group (Dixon-Woods et al., 2012). This initiative was led by a Consultant Anaesthetist working within the department alongside the other end-users.



Even once the data have successfully been interpreted to result in meaningful information, there is still a need to transform that information into practical action that channels through to patient care. Anaesthetists reported experiencing substantial perceived social pressure to conform to norms for acceptable performance within the department, from the stimulus of an anonymised peer-comparative report and without the threat of formal sanctions for statistically deviant performance in the wrong direction. There was a strong understanding that ultimately patient safety had to be prioritised over the protection of individual employees. However, in order for this to be a fair process any feedback initiative must incorporate a thorough acknowledgement of case mix variations.

Interviewees reported a need for more support and guidelines in identifying exactly when information needs to be acted upon. This tended to be assigned to personality and approach to decision making rather than systematic analysis of the data and the meaning that they provide. This was particularly relevant in the light of consistently high scores across the majority of clinicians involved in the initiative. Research has shown that low baseline compliance with desired practice increases the effectiveness of feedback (Ivers et al., 2012).

The message that technical interventions in clinical information systems are embedded within a social or human and organisational context comes through strongly in the study findings. There is a need to ensure protected time and resources and increase transparency across organisations if initiatives such as this are going to flourish and be ultimately sustainable. In the design of future interventions there should be active consideration for how the impact of context will be captured and understood in relation to the outcomes (Ovretveit et al., 2011). A rigidly defined intervention model with set features may not fit all scenarios. For example, the level of anonymity and protection provided for individuals may need to be adjusted to fit with various institutional contexts.

Research study two has a number of limitations which should be acknowledged at this stage of the thesis. The sample studied was a relatively small opportunity sample and participants may have felt obliged to overplay the extent to which they were engaging with and making changes based upon their feedback. The likelihood of this is reduced, however, by the fact that the interviews were based upon a systematic process in which participants were probed for perceived limitations and barriers and were conducted by an external research team who were not part of the clinical unit.

Please note that overarching limitations of the PhD and thesis as a whole are explored in section 5.3.

### 2.6.5 Key findings against research question

In order to extract and compile key findings against the primary research question, these short sections are included consistently throughout the thesis at the end of each research study. They also contribute to the intermittent work stream syntheses and the overarching synthesis of results in section 4. The key characteristics and psychological processes that emerged through this research study are presented in Table 10 below.

Table 10. Key findings from study two against research question

<b>How does feedback influence professional behaviour in healthcare?</b>	
<b>Characteristics of effective feedback</b>	<b>Psychological processes through which feedback impacts on professional behaviour</b>
<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is novel and provides an additional resource</li> <li>• Feedback is based upon relevant and meaningful quality indicators</li> <li>• Feedback initiative is led by a trusted peer</li> <li>• Feedback is detailed and specific</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback is anonymous</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality improvement and performance management</li> <li>• Feedback is aligned with</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users identify with the purpose of receiving the feedback</li> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• The professional identities of end users are reinforced</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding (an instructional learning technique in which levels of support provided to learners are gradually reduced) and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users are actively engaged with feedback</li> </ul>

<p>broader policy</p> <ul style="list-style-type: none"><li>• Feedback is tailored/targeted to its audience</li><li>• Feedback is accompanied with goal setting and action planning</li></ul>	
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## 2.7 Research study three: Framework analysis

Research study three has been previously published as part of a broader report to NIHR HS&DR (Benn, Arnold, D’Lima, Wei, Moore, Aleva, Smith, Bottle, & Brett. 2015).

The work presented below corresponds to chapter six in the broader report to the funders.

Figure 5 below provides a breakdown of the individual research studies and how they build up into case studies and work streams. Circles are included to demonstrate the focus of this section and contextualise it within the thesis as a whole.

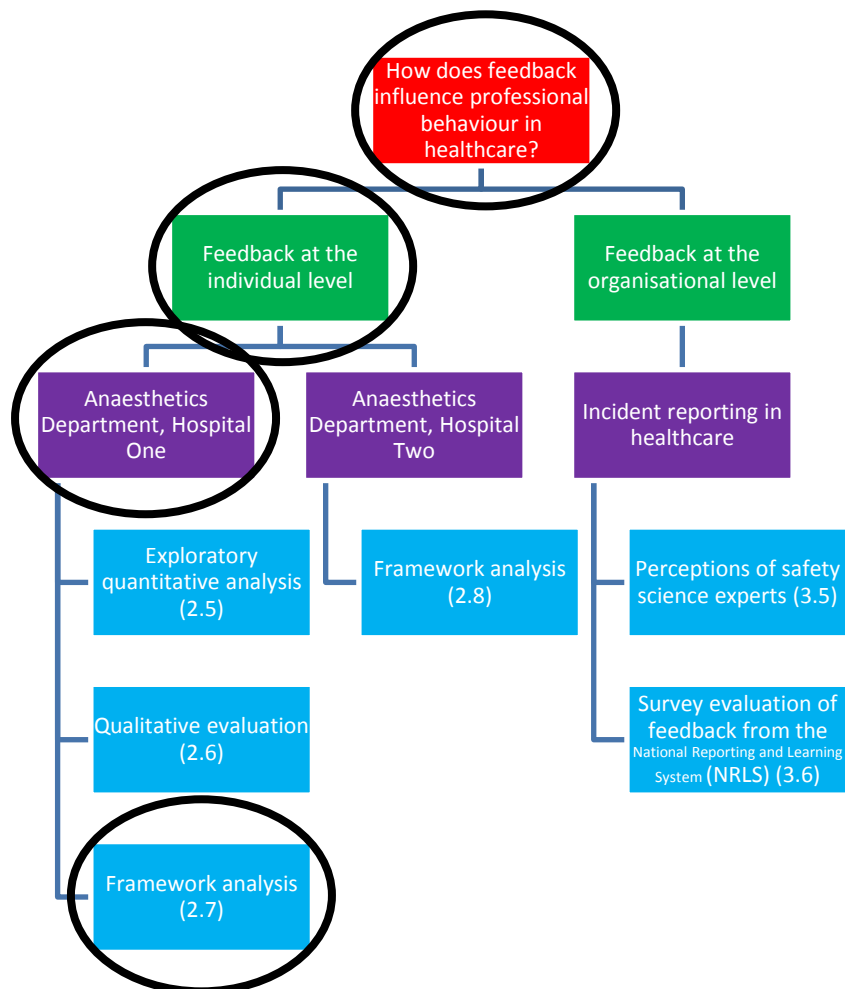


Figure 5. Structure of the thesis

### **2.7.1 Introduction**

The previous study explored clinician perceptions and experiences of a feedback initiative in anaesthesia through the analysis of qualitative data that had been originally collected as part of a broader evaluation project. Interpretation and discussion of findings from the initial inductive analysis, for the specific purposes of this PhD, suggested that pre-existing social science theory may be of relevance to better understanding the data and the way in which it comments on the fundamental mechanisms of data feedback effectiveness through the eyes of end-users. This provided an opportunity for ex post application of theory to understand the mechanisms of improvement within the feedback intervention (Dixon-Woods et al., 2011). It has been argued that qualitative case studies are able to contribute more to understanding a phenomenon when they are effectively related to broader theory (Mays & Pope, 1995).

The previous qualitative analysis emphasised the importance of perceived consequences, subjective norms and self-efficacy. The primary goal of data feedback is to encourage recipients to make appropriate changes to their practice based on review and interpretation of current performance levels. Theories of behaviour change, such as the Theory of Planned Behaviour (Ajzen, 1991), comment upon the psychological constructs that predict whether or not individuals are likely to change our behaviour. It is reasonable, therefore, to expect a relationship between those established psychological constructs and the way in which individuals engage with and respond to their feedback reports. A survey study explored the constructs of the Theory of Planned Behaviour in relation to feedback of clinical audit findings relating to miscarriage (Cameron, Penney, MacLennan, McLeer, & Walker, 2007). This study saw positive effects of feedback on attitudes, subjective norms and intentions to comply although they did not reach statistical significance. The study also noted that in some cases, effects of feedback on perceived behavioural control could be detrimental. This may be due to increased awareness of the local barriers surrounding improvement. By identifying, understanding and targeting the appropriate psychological constructs it may be possible to increase the likelihood of behaviour change in future initiatives and therefore have a positive impact on patient care. However, it should be noted that the Theory of Planned Behaviour has received much critique in the literature and this should be taken into consideration when applying it to the dataset and interpreting the results. For example, critics have suggested that the theory excludes many other important influences on behaviour and that it has limited predictive validity (Ajzen, 2011; Sniehotta, Presseau, & Araújo-Soares, 2014).

The initial qualitative analysis demonstrated strong emotional responses to receiving feedback on performance. This is also likely to have an impact on how people will go on to use it. Psychological theories such as Cognitive Dissonance Theory (Festinger, 1957) offer explanations for how clinicians may feel when they receive performance feedback and how these feelings may impact on both thoughts and behaviour. Cognitive dissonance occurs when people hold two or more contradictory beliefs, ideas or values simultaneously. In some cases this is prompted by the receipt of new information that contradicts existing beliefs, ideas or values. This experience results in mental stress because human beings naturally desire internal consistency. Therefore, the experience of cognitive dissonance often leads to motivation to change one of the beliefs, ideas or values in order to increase consistency. In the case of performance feedback, an individual may experience cognitive dissonance if the data that they receive contradicts their internal conceptualisations of their own performance. This may cause discomfort and lead to an attempt to resolve the inconsistency. Resolution may take place through an attempt to change behaviour and improve performance. Alternatively it may involve a more simple rejection of the information that causes the dissonance in the first place (i.e. the feedback report). The model presented by Sapyta et al emphasised cognitive dissonance as a key psychological process prompted by the receipt of feedback (Sapyta et al., 2005).

The primary analysis provides examples of feedback reinforcing professional identity and beliefs about excellence which frames feedback in line with the core principles of behaviourism (Skinner 1948). Self-affirmation theory (Steele, 1988) emphasises the role of identity and self-integrity in dealing with threatening information and preventing it from being a barrier to behaviour change. An individual's emotional response to finding out that they are not performing as well as they had hoped (i.e. receiving threatening information) may be offset by the affirmation that they are using such information to improve and therefore demonstrating fidelity to their professional identity.

The primary analysis recognised the ability of the feedback initiative to quantify conceptual ideas of performance. However, it also evidenced negative emotion occurring as a result of discrepancies and the potential for this to lead to behaviour change. Individuals may have to face discrepancies between their ideal and actual performance. The work that they imagine may not be the same as the work that they do. Similar issues may be faced by management of a clinical unit or organisation when reviewing departmental performance. Goal setting theory (Locke, Cartledge, & Koeppel, 1968) explains the process of forming goals for improvement and accompanying them with action plans designed to support achievement over time. The previous analysis emphasised the importance of receiving actionable feedback that can be monitored over time at both normative and individual level. Identification of gaps between feedback and pre-existing goals and standards has been

emphasised as a key psychological process through which feedback impacts on behaviour (Carver & Scheier, 1982; Kluger & DeNisi, 1996; Sapyta et al., 2005).

The primary analysis revealed a need for further social support in interpreting and acting upon feedback. Social constructivism suggests that we learn by interacting with others about a problem. Therefore we negotiate meaning through social interaction. Learning takes place when we are given the opportunity to construct knowledge as part of a community of practice. Teachers or experts may facilitate this process but they do not control it. It is important to view the initiative from the perspective of groups as well as individuals. Understanding the way in which people are likely to respond to feedback as a collective will also support the design and acceptance of future initiatives. For example, the organisational context will influence the way in which change is received and responded to (Kaplan, Provost, Froehle, & Margolis, 2012; Ovretveit et al., 2011). Social constructivist approaches to learning suggest that the way in which individuals interact with and support each other throughout the learning process will have a strong influence on overall outcomes.

In further identifying the ways in which these theories explain and interpret the processes and mechanisms surrounding personalised feedback it was thought to be possible to better understand the impact on learning and professional behaviour. The purpose of this research study was therefore to identify to what extent these theories were evidenced by the existing qualitative data and therefore may be of greatest relevance to understanding the mechanisms of data feedback and developing future initiatives of this kind. This stage of the PhD also provided the opportunity for further qualitative data collection (in accordance with a grounded theory informed approach) designed specifically for these purposes (rather than in line with the broader project goals).

## **2.7.2 Method**

### ***2.7.2.1 Research ethics***

Following Research Ethics Committee advice, the research study was not considered to require local Research Ethics Committee approval as the work fell within the remit of a previously approved service evaluation project. Informed consent was gained from all participants in this study.

### *2.7.2.2 Data collection*

All consultant anaesthetists in the local department (regardless of whether or not they had participated in the original interviews) were invited to a follow up interview. The overarching purpose of these interviews was to further explore the mechanisms through which anaesthetists were translating performance data into meaningful information and meaningful information into behaviour change.

A further advantage of conducting more interviews at this later stage was that it provided the opportunity to explore any longitudinal effects of the intervention in relation to the research question. Between the two qualitative data collection time points the feedback intervention had changed and developed significantly and become a Trust wide initiative. A more statistically sophisticated report had been developed in response to the initial qualitative user requests, including monthly detailed case category breakdown, specialty-specific information, deviant case details, enhanced comparative and longitudinal data and institution-wide dissemination. Basic data feedback had been enhanced with broader professional engagement activities including regular presentation of statistical results, consultative interviews (at time point one) by the research team, topic-focused engagement and facilitated peer interaction upon specific specialty areas (e.g. pain management after gynaecological surgery). As mentioned previously, the scope of data collection had been increased to include multiple sites which increased the prominence of the quality monitoring and feedback activities within the broader department and across the trust as a whole.

Anaesthetists had been receiving feedback for a total of 30 months when the time point two interviews took place. Twelve months had occurred between the time point one and time point two interviews.

The interview schedule for this stage of data collection was driven by the findings of the original inductive analysis and the primary research question for this PhD. Example interview questions are displayed in Table 11 below. The full interview schedule is included in Appendix C.



Table 11. Example interview questions

Example interview questions
<ul style="list-style-type: none"><li>• How do you make sense of the data? How do you give them meaning? How do you translate the data into something that is meaningful to you?</li><li>• If you wanted to change your practice would this initiative be enough to support you in doing so? If not, what is missing?</li><li>• What would encourage you to act upon the data that we provide you with in the reports?</li><li>• What does the report show about you as a professional?</li><li>• What could we change about the feedback that would encourage you to change your practice based upon it?</li></ul>

### 2.7.2.3 Analysis

The analysis was deductive in nature and involved coding the raw data from both data collection time points against the key constructs of the individual theories (identified as a result of interpretation of the prior inductive analysis reported in section 2.6.3) using NVivo (version 10). The analyses across the two studies represents a balance between an inductive and deductive approach. The original inductive analysis drove the identification of theoretical constructs and therefore created a new lense through which to view the data more deductively which was the focus of the follow up data collection and combined framework analysis.

Initial outcomes of the framework analysis were reviewed and discussed with clinical input from a Consultant Anaesthetist and a Consultant Intensivist, as well as on-going academic input from the senior social sciences researcher to provide multiple perspectives on the emerging theory. This was of particular importance to ensure that the data were not over fitted to the emergent deductive framework in light of the goals and core interest of the primary analyst.

Table 12 lists the theories that were considered in the analysis and the processes through which it was rationalised that they had the potential to explain the mechanisms of data feedback effectiveness. Please note that the research questions were not designed to be mutually exclusive against each individual theory and there is some overlap due to the integrated nature of the social science theories considered.

Table 12. Theories considered in the analysis

Theory	Key references	Related qualitative codes from time point one analysis	Research questions to be asked of the new dataset (driven by findings of the previous analysis)
Theory of Planned Behaviour	(Ajzen, 1991)	<ul style="list-style-type: none"> <li>• Maintaining the feedback increases workload</li> <li>• Feedback reports useful for revalidation/appraisal</li> <li>• Other members of the team influence quality of recovery</li> <li>• Influence of specific operation on quality of recovery</li> <li>• Effect of patient factors on quality of recovery</li> <li>• Using feedback associated with professionalism</li> </ul>	<ul style="list-style-type: none"> <li>• What do people perceive as the consequences of using feedback? Are those consequences positive or negative?</li> <li>• What are the potential negative or positive consequences of receiving and using performance data?</li> <li>• What are the subjective norms? What do other people think about them using feedback to make improvements? What does the department/organisation think? What do other theatre department professionals think?</li> <li>• Do anaesthetists feel that they have the resources to use feedback for improvement? What are the barriers and facilitators to achieving this?</li> </ul>
Self-Affirmation Theory	(Steele, 1988)	<ul style="list-style-type: none"> <li>• Anaesthetists want to deliver high quality care for their patients</li> <li>• Vision of anaesthetic practice – anaesthesia viewed as a form of art</li> <li>• Using feedback associated with</li> </ul>	<ul style="list-style-type: none"> <li>• Are there any examples of how feedback self-affirms an anaesthetist and emphasises their integrity/worth as an individual?</li> <li>• Are there any examples of the feedback being perceived as threatening (i.e. processes of</li> </ul>

		<p>professionalism</p> <ul style="list-style-type: none"> <li>• Feedback reports provide reassurance to anaesthetists</li> <li>• Anaesthetists care about their feedback reports and want to do well on them</li> <li>• Feedback reports quantify/objectify an anaesthetist's conceptual understanding of their own performance</li> <li>• Feedback reports promote thoughts about practice and potential improvement</li> <li>• People generally think that they are performing better than they actually are</li> </ul>	<p>defensiveness and message rejection)?</p> <ul style="list-style-type: none"> <li>• Are there any links between integrity and message acceptance?</li> </ul>
Cognitive Dissonance Theory	(Festinger, 1957)	<ul style="list-style-type: none"> <li>• Anaesthetists care about their feedback reports and want to do well on them</li> <li>• Feedback reports quantify/objectify an anaesthetist's conceptual understanding of their own performance</li> <li>• Feedback reports promote thoughts about practice and potential improvement</li> <li>• People generally think that they are performing better than they actually are</li> </ul>	<ul style="list-style-type: none"> <li>• Are there any examples of how the feedback has conflicted with prior values, ideas or beliefs (i.e. the existence of dissonance)?</li> <li>• Has this resulted in people altering their cognitions in order to reduce such dissonance?</li> <li>• Can this be linked to the potential rejection of the feedback reports?</li> </ul>

Social Constructivism/Social Cognitive Theory	(Bandura & Cervone, 1986; Vygotsky, 1962)	<ul style="list-style-type: none"> <li>• Anaesthetists need further support translating feedback into improvements</li> <li>• There is currently a high level of transparency in relation to this project in the organisation</li> </ul>	<ul style="list-style-type: none"> <li>• Are there any examples of social interaction around feedback to establish peer norms?</li> <li>• Are there any examples of learning and making changes to practice based on guidance from and modelling of expert peers?</li> </ul>
Goal Setting Theory/Control Theory	(Locke et al., 1968)	<ul style="list-style-type: none"> <li>• Ability to control outcomes of quality indicators</li> <li>• Need combination of normative feedback and individual feedback over time</li> <li>• It would be useful to be able to instantly see own feedback over time</li> <li>• Variation on judgement as to when an improvement is necessary</li> <li>• Feedback reports promote thoughts about practice and potential improvement</li> <li>• Anaesthetists care about their feedback reports and want to do well on them</li> <li>• Having feedback reports increases the motivation of anaesthetists to improve quality of care</li> </ul>	<ul style="list-style-type: none"> <li>• Are there any examples of individuals using a goal to guide and assess behaviour?</li> </ul>
Instrumental	(Skinner,	<ul style="list-style-type: none"> <li>• Using feedback</li> </ul>	<ul style="list-style-type: none"> <li>• Are there any</li> </ul>

Learning/Operant Conditioning/Behaviourism	1948)	associated with professionalism <ul style="list-style-type: none"> <li>• Anaesthetists care about their feedback reports and want to do well on them</li> <li>• People generally think that they are performing better than they actually are</li> <li>• Having feedback reports increases the motivation of anaesthetists to improve quality of care</li> <li>• Feedback reports provide reassurance to anaesthetists</li> </ul>	examples of links between feeling rewarded or punished and whether or not behaviour was affected?
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### 2.7.3 Results

Seventeen additional interviews with consultant anaesthetists were conducted resulting in approximately nine further hours of data.

Six key mechanisms of effect emerged from the analysis. Researcher commentary and example quotations are presented against each of the mechanisms below:

#### **Feedback as a component of planned behaviour:**

The way in which anaesthetists perceived the consequences of using their feedback reports influenced the way in which they engaged with the initiative as a whole. Examples of both positive and negative perceived consequences and their influence on future behaviour were evident in the data. Interviewees who considered themselves to be highly engaged with the initiative and more likely to change their behaviour based upon it tended to focus their attention on positive perceived consequences such as building on their professional ability and improving the experiences of their patients:

*Anaesthetist 1, time point 1: "...It might suddenly bring home to them 'oh a lot of my patients are feeling a bit nauseous afterwards, what am I doing?' It will make them think*

*about it. And I think the other thing is, with these figures you can see your comparisons to all your colleagues and I think that definitely will make people think...I am sure it will because it is a naturally competitive instinct, possibly. And I think it just stops people being complacent about it, because I think that is the biggest thing, especially after you have been in practice for several years, I think people do get complacent."*

**Anaesthetist 16, time point 2:** *"Pain wise, I think it's really useful because I know that's really important, we need to get that right and it's good to know that certain cases you're doing well and the ones where you aren't doing well, that it flags those up so you know that the next time you do that what you can try and improve as well."*

On the other hand interviewees who were concerned about potential negative consequences tended to disengage from the initiative. Perceived negative consequences included making changes based on inaccurate data, data being used punitively for performance management and staff becoming pre-occupied with the data itself rather than providing all round good patient care:

**Anaesthetist 3, time point 1:** *"That would perhaps concern me that people would say, 'Mustn't let any of my patients have any pain, therefore I'll give them all 10mg of IV morphine just after coming off the table.' And we go into recovery and we might be recording a respiratory break but we're not recording tidal volume, we're not recording end tidal Co2. You might actually end up having patients stay longer in recovery. I'm not really sure that's terribly useful."*

**Anaesthetist 10, time point 1:** *"And even, even stuff like, you know, my concerns about whether the post-op nausea and vomiting numbers are accurate is an important component of that, you know, for me to use feedback I have to think that the feedback is valid otherwise there's no point to me using it."*

**Anaesthetist 15, time point 2:** *"Well, if the data turns out to be either inaccurate or just a statistical elaboration or to be due to a phenomenon that is outside the control of the anaesthetist, a case mix being an example, subsequent location of care might be another one if you look at longer term stuff, then, yes, of course, you might do a change with unintended adverse consequences."*

**Anaesthetist 20, time point 2:** *"All data is dangerous isn't it. Data that's not risk-adjusted is dangerous to doctors in this day and age. It would easily be used as a tool to criticise and to remove people from positions and to threaten them. And we see that all the time with the WHO Checklist and this sort of data and feedback and it's very easy to do by Trusts and misaligned Management. I have data concerns, basically."*

Interviewees emphasised the importance of introducing initiatives such as data feedback gradually in order to increase buy in at the individual level through the increase of perceived positive consequences and decrease of perceived negative consequences:

**Anaesthetist 10, time point 1:** *"...the initial introduction of this feedback was done in a very stepwise, gradual, non-threatening way because we knew that that would cause problems otherwise. And I think that was very successful and I think as a consequence that people have now embraced this information a lot more. People have tried to do quality*

*improvement processes by being more confrontational and ended up with absolutely nothing out of it, so I think things are improving.”*

**Anaesthetist 24, time point 2:** *“You have to convince everyone that this data is solid and it’s validated and it’s – yeah, you have to basically get everyone on board. Change doesn’t happen overnight and it’s important to get everyone.”*

There was variation in the data in terms of the degree to which end users felt in control of using their feedback to make changes to practice. Some clinicians demonstrated high self-efficacy (i.e. the belief that they have the necessary skills to achieve a goal) when it came to engaging with the project and improving personal performance:

**Anaesthetist 10, time point 1:** *“I know that I’m able to immediately affect the outcome of these measures, so I can do things to make these measures different.”*

**Anaesthetist 13, time point 2:** *“Not that I’m aware of, no. I mean all the factors involved I can change independently of what other people want me to do. I’m not forced to do anything in particular, if I want to add in something I can.”*

On the other hand, some participants also identified clear barriers to being able to engage with and use the data in an optimal way. Barriers included restrictions on available resources, the influence of other people on their outcomes and limits on the number of changes that can feasibly be made to anaesthetic practice:

**Anaesthetist 4, time point 1:** *“No, I don’t really make any changes because they all get bair huggers, they all get foot warmers, they all get all the post op nausea and vomiting bits...you might be the most knowledgeable, experienced anaesthetist but actually the hospital doesn’t have the drug or the bair huggers are broken, you’ve got inexperienced recovery staff...”*

**Anaesthetist 14, time point 2:** *“...Not to put it onto someone else’s fault but a lot of that is dependent on the surgeon. If it’s a junior surgeon doing the operation on a hernia he can take twice as long, and they’re pulling on stuff, and they don’t infiltrate the local anaesthetic properly; so there are lots of factors that might contribute to it.”*

**Anaesthetist 11, time point 2:** *“...When you have a cold theatre to start with and you have done absolutely everything you can to - you know, you give them warm fluids, you put a Bair Hugger on, you can’t do any more, and yet their temperature when they hit recovery is still below and you’re skewed because of that. And that’s frustrating more than anything.”*

#### **Feedback as a socially-situated cognition:**

Interviewees expressed clear examples of peers becoming experts throughout the life of the project. The most prominent example of this was linked to the fact that the clinical lead for the project was a consultant anaesthetist who also received feedback on his own performance and therefore was

undergoing the same process simultaneously. Clinicians reported engaging with this peer expert to request guidance and support in extracting the most meaning from their personal data:

**Anaesthetist 16, time point 2:** *“Just informally, you can go and chat to him, he, kind of, understands what we do, he’s getting reports himself as well, I presume, and it’s just nice to have that person there who I know who’s approachable. It’s not usually a bit query or anything, it’s like, ‘clinical lead], I just had this thing that I need to do’, or he’s like, ‘No, it doesn’t really mean anything’ or, ‘Yes’.”*

The clinical lead can therefore be viewed as a clear local opinion leader who provided assurance to other clinicians that involvement in the initiative was worthwhile and credible:

**Anaesthetist 18, time point 2:** *“obviously if you have an anaesthetist who does it you would assume that he or she would understand directly how to handle the data and apply the appropriate amount of sensibility about it, let’s put it that way.”*

Secondly, through within specialty group work that was introduced in the latter stages of the intervention, opportunities were created to work with an expert peer to improve performance in a particular anaesthetic specialty. In many cases clinicians reported processes of modelling and scaffolding being used to result in improvements in performance. Expert peers provided them with the appropriate levels of support to promote personal development without taking authority over decision making and action:

**Anaesthetist 12, time point 2:** *“It was really interesting because the person who came out top - it didn’t matter who came out top, but, sort of, you could then see their anaesthetic and change your anaesthetic if it was different.”*

**Anaesthetist 18, time point 2:** *“But, as we’ve seen recently in the gynae pain project, it only helps if you un-blind and say “This person does something really, really well. What is it that you do so well?””*

Even when expert peers were not formally identified as part of the intervention, clinicians took it upon themselves to request support from one another when reviewing their feedback and striving to change their professional practice. Communities of practice were evidenced and knowledge sharing was viewed positively:

**Anaesthetist 2, time point 1:** *“I can talk with them in the full transparency and I always ask for help and even if I have terrible doubts I will not be ashamed to ask what the hell I do wrong! Just check on me please!”*



**Perioperative Service Lead 2, time point 1:** *“I’d probably drop in on them and see what they’re doing and see how my practice differs from theirs, and see what I can learn from it.”*

Interviewees reported positive experiences with peer based learning through social interaction and requests were made for more formal processes to be put in place to encourage and support this in the long term:

**Anaesthetist 5, time point 1:** *“And I would like to see at maybe every audit meeting, or every two audit meetings an update on where things are at and how the general things are. And maybe then give people the opportunity to say, this is what I’ve done. So that would be useful.”*

### **Feedback as a threat to internal consistency:**

Clinicians reported instances of cognitive dissonance when reviewing their performance feedback. This was often associated with discrepancies between what the data was telling them and their prior beliefs about themselves as a healthcare professional:

**Perioperative Service Lead 3, time point 1:** *“We all go through a period of anger, disbelief, this can’t be right...We all think we’re great. Of course we do, it’s part of being a self-confident doctor. And you look at it initially and you think, ‘No, that can’t be right. How can I be down here? Down at the bottom.’”*

**Anaesthetist 23, time point 2:** *“I always look, I look at the results, and I’m always disappointed with the results because I think I work very hard and I’m not happy.”*

The uncomfortable feeling of dissonance was resolved by clinicians in one of two ways. Some chose to reject the data as inaccurate or irrelevant to them whilst others accepted it and attempted to make changes to their practice to ensure that future data improved and was more in line with their conceptualisations:

**Anaesthetist 6, time point 1:** *“I mean I was appalled to find that I am not the best in terms of post-operative analgesia, and I am not the best in post-operative temperature which actually I was thinking about and I thought well that probably reflects more the type of surgery I do, so if you do cardiac, major complex surgery, and major vascular surgery, they are the sort of patients that are more likely to have more complex pain problems or complex temperature problems, and so on.”*

**Perioperative Service Lead 3, time point 1:** *“Yes, I started off quite nauseous. I’m old, I use quite a lot of nitrus oxide, I notice that I was down below half way in my nausea and vomiting, I stopped using it and I got above half way.”*

**Anaesthetist 20, time point 2:** *“But like all things, doctors are prone to self-denial, so if one month I have a terrible score, I shall just blame one of the trainees and clear my mind (Interviewer laughs). That’s not my problem!”*

### **Feedback as reinforcement for practice and learning:**

There were many examples in the data of feedback providing a direct reward to the person using it. Rewards emerged in a number of different formats and at a number of different levels. On a practical level, receiving regular data on performance provided support and resource for CV building and revalidation preparation:

**Anaesthetist 6, time point 1:** *“It is interesting because you can actually position yourself so when you are doing your CV or when you are doing an application, you can actually say ‘well actually I am in the top ten of the anaesthetic department for quality in terms of these things’.”*

In some cases, receiving feedback was viewed as a reward in the sense that it provided emotional reassurance to the recipient that they were performing at the appropriate level and fulfilling their professional identity:

**Perioperative Service Lead 2, time point 1:** *“Yeah, certainly in terms of your own personal performance and you can say: ‘I’m not rubbish because these are my figures’.”*

At the departmental level rewards were demonstrated in the sense that feedback could be used as evidence of collective high performance:

**Anaesthetist 6, time point 1:** *“I think the department can use it to show how good it is, and I think that if we can demonstrate quality anaesthesia, I think that is ideal, and if we can show for example the trainees are giving quality anaesthesia, that reflects our teaching as well.”*

In terms of ongoing interaction with and use of feedback reports to make improvements, individuals also experienced a feeling of reward when changes that they made to their behaviour were evidenced in their next feedback report as an improvement in their data:

**Anaesthetist 5, time point 2:** *““Oh, isn’t this terrible? My patients are not performing very well – that’s quite humiliating.” But in terms of reward, the reward would have to be, oh, actually, last month, I was number 18 – actually, now, I’m number 2.”*

### **Feedback as a motivational tool:**

The feedback reports have provided anaesthetists with the opportunity to set goals for the purpose of individual level improvement based on identification of where they are most needed:

**Anaesthetist 2, time point 1:** *“Because it gives me a benchmark, that I could do better, I could do worse. There is something that I need to learn, there is something that I do right, so it gives me an idea.”*

The importance of being able to test progress against goals was highlighted as being important. Interviewees described the process of making changes and testing them against the feedback reports that they received:

**Anaesthetist 2, time point 1:** *“I think the importance is to have monthly reports, related to the fact that you can see whether you are getting better with what you changed or not. If you still need to change something more or is it enough?”*

**Perioperative Service Lead 3, time point 1:** *“And the other great advantage, the interest to me, not as chief of service but as an individual, is this gives you a fantastically powerful tool in which to say, let us change what we do and we can evaluate the effect of what we have done by looking at this data.”*

Case specific information was introduced following requests from end users for greater detail on reports during the time point one interviews. Reports were developed to include patient information associated with any outliers to support clinicians in recalling case details and identifying why outcomes may have varied. Interviewees found this extremely useful because it enabled them to focus in on the most important areas for goal setting and ensure that they had sufficient information to enact them appropriately:

**Anaesthetist 5, time point 2:** *“I think they’ve become more useful and maybe more meaningful in terms of...For example, you’ll be told, for instance, three of your patients arrived who were cold, and this is the kind of cases they are, so, actually, I think it’s become more personalised, and, actually, I quite like that, it’s made it more relevant to me.”*

**Perioperative Service Lead 1, time point 2:** *“I do read it carefully, page to page, and the thing I zoom in on are the particular patients that – you know the ones where they say like, “You’ve had four patients with nausea and vomiting” I’ll look specifically at those ones and then if there’s something strange about one of them I don’t particular remember, then I’ll look back on my phone and see...”*

Table 13 displays the key mechanisms of data use that emerged from the analysis as being of greatest relevance to the experiences of the anaesthetists alongside the relevant codes to which the data were categorised.

Table 13. Emergent key mechanisms of data use

Mechanism of data use	Example high level codes	Example low level codes
Feedback as a component of planned behaviour	<ul style="list-style-type: none"> <li>• Perceived consequences of the initiative</li> <li>• Subjective norms</li> <li>• Perceived behavioural control and associated behaviours</li> </ul>	<ul style="list-style-type: none"> <li>• Data could be misinterpreted and used punitively for performance management</li> <li>• Changes made based on the data could have negative effects on the patient</li> <li>• Provided with ongoing access to systematically collected data</li> <li>• Reassures individual of their professional skills</li> <li>• Demonstrations of self-efficacy</li> <li>• Resources as a barrier to use</li> <li>• Level of authority as a barrier to use</li> <li>• Workload as a barrier to use</li> <li>• Need for gradual implementation</li> <li>• Stepwise process</li> <li>• Gain buy-in</li> <li>• Non-threatening</li> </ul>
Feedback as a socially-situated cognition	<ul style="list-style-type: none"> <li>• Examples of peer experts</li> <li>• Learning through social interaction</li> </ul>	<ul style="list-style-type: none"> <li>• Project leader becomes peer expert</li> <li>• Highest performer becomes peer expert</li> <li>• Examples of scaffolding</li> <li>• Learning from peers</li> <li>• Requesting support from peers</li> <li>• Sense of openness for learning across peer group</li> <li>• Feedback provides a reason for discussion</li> <li>• Learning through discussion</li> <li>• Need to explore alternative communication channels</li> </ul>

		<ul style="list-style-type: none"> <li>• Need for a formal process for learning through interaction</li> </ul>
Feedback as a threat to internal consistency	<ul style="list-style-type: none"> <li>• Examples of dissonance</li> <li>• Response to dissonance</li> </ul>	<ul style="list-style-type: none"> <li>• Expectation of high performance</li> <li>• Positive views of performance not normally challenged</li> <li>• Having negative feedback contradicts identity as a 'good' doctor</li> <li>• Feedback has an emotional effect</li> <li>• Emotional response to negative feedback</li> <li>• Rejection of a threatening message</li> <li>• Link between a threatening message and behaviour change</li> <li>• Sense of professionalism attached to active reflection on performance</li> </ul>
Feedback as reinforcement for practice and learning	<ul style="list-style-type: none"> <li>• Feedback reports viewed as a reward</li> </ul>	<ul style="list-style-type: none"> <li>• Reward comes through reassurance</li> <li>• Reward comes through data for revalidation/CV purposes</li> <li>• Reward for the department to use as evidence for performance</li> </ul>
Feedback as a motivational tool	<ul style="list-style-type: none"> <li>• Need for a goal to measure performance against</li> <li>• Feedback has led to new goals being identified and set</li> </ul>	<ul style="list-style-type: none"> <li>• Process of making changes and testing them</li> </ul>

#### 2.7.4 Discussion

The theoretically informed analysis identified the presence of a number of relevant theories in the qualitative dataset. It is clear that such pre-existing theories, from the field of social sciences, are highly applicable in accounting for the mechanisms of effect for feedback.

There is a need for feedback to be viewed as an intervention that requires gradual implementation over time. The increase of engagement and impact over time fits with expectations of a complex quality improvement initiative with phased implementation. When designing feedback initiatives researchers should encourage individuals to focus on the positive consequences of using feedback to change behaviour and reduce perceptions of any potential negative consequences. Prior research has demonstrated that the outcome expectancy of recipients influences the effectiveness of performance feedback. (van der Veer et al., 2010) In a sense, the feedback reports encouraged clinicians to consider the effect of their behaviour on consequences to their personal data as well as consequences to the clinical outcomes of the patients that they treat.

The results of the analysis suggest that we should increase perceptions of the feedback reports as easy to use and act upon (i.e. targeting the construct of self-efficacy). This can be achieved by reducing barriers and increasing facilitators. Lack of hospital resources, untrustworthy data and high baseline compliance have each been highlighted as barriers to effective feedback in the literature (De Vos et al., 2009; Ivers et al., 2012).

Individuals should be supported through experiences of dissonance when reviewing feedback to ensure that they resolve inconsistencies through behaviour change rather than message rejection (i.e. behaviour change should become an attractive and obtainable option). This may also interact with ideas around attribution of responsibility/blame which inevitably vary from anaesthetist to anaesthetist (Sapyta et al., 2005). Receiving and acting upon data about one's own individual performance is clearly linked to the concepts of professionalism and excellence. Anaesthetists associate their involvement in the initiative with their professional identity and the need to strive for excellence. The quantification of their performance enabled them to objectively assess their conceptual ideas of excellence and this sometimes contradicted their professional identity and led to behaviour change. The importance of the search for excellence in anaesthesia has been highlighted in the literature (Smith, Glavin, & Greaves, 2011; Smith & Mahajan, 2009). This work has emphasised a need for anaesthetists to be supported by their educators and organisations in achieving a higher level of performance rather than baseline competence. The concept of excellence has also been associated with the ability to seek challenges and learn from them in an on-going cycle of development (Smith et al., 2011).

The emergence of feedback as a motivational tool comments on the interactions between what is 'actual', what is 'ideal' and what is 'possible'. Feedback can be viewed as a 'prompt' for action when there is a discrepancy between these concepts (Carver & Scheier, 1982; Kluger & DeNisi, 1996; Sapyta et al., 2005). There is a clear limit to how much improvement can be made at an individual level (i.e. there are only a set number of actions that can be taken before resource and clinical barriers come into play). However, interviewees generally felt that the individual anaesthetist has a degree of power to use the data in the way that they want to for their own professional development. This finding can be linked to the emerging awareness of the need for active rather than passive feedback and the importance of goal setting (Buetow, 2007; Sapyta et al., 2005). Passive feedback has been defined as the unsolicited provision of information with no stated requirement for action. Active feedback, on the other hand, occurs where the interest of the clinicians has been stimulated and engaged in aspects of practice, through the process of agreeing standards, involvement in continuing education, or consideration of the implications of the information for improving care (Mugford et al., 1991). Facilitative rather than directive feedback, has been shown to enhance the effect of feedback for high achieving groups that are undertaking complex tasks (Archer, 2010). The effectiveness of feedback has been linked to the motivation of recipients and the presence of plans and strategies for improvement (De Vos et al., 2009; van der Veer et al., 2010).

Social interaction around the feedback reports and their use at both the individual and departmental levels should be encouraged. Working as an anaesthetist can be viewed as a relatively solitary professional role. The presence of the feedback reports encouraged camaraderie and a sense of learning community across the department. This was demonstrated through interviewees' support of the identification of expert peers to interact with and learn from through mutual problem solving and improvement conversations. It is further evidenced through the need to request formal processes for discussion and interaction rather than viewing this as something that would occur naturally. A lack of support management to clinical units has been evidenced in the literature as a barrier to effective feedback (De Vos et al., 2009). The identification and promotion of potential peer experts to support and guide others through processes of modelling, scaffolding and cognitive apprenticeship should be considered in the design of future interventions. The clearest example of the presence of a peer expert in this initiative was the clinical lead for the project who was also a consultant anaesthetist receiving feedback reports. The literature has emphasised the importance of appropriate leadership and in particular the need for peer led feedback rather than feedback provided by an external group (Dixon-Woods et al., 2012). The source of feedback and the credibility

that is attributed to it has been associated with its success (Ilgen et al., 1979). In fact, feedback has been shown to change physicians' clinical performance when provided systematically over multiple years by an authoritative, credible source (J. Veloski et al., 2006).

When feedback was viewed as a reward, levels of engagement increased. This could be linked to the fact that anaesthetists do not generally receive regular praise. They are not necessarily recognised and rewarded by their patients as they are considered to be working 'behind the scenes' of clinical care. The initiative may have gone some way in reducing the anonymity of the anaesthetist. The reports shine light on the work that anaesthetists do which simultaneously increases visibility and provides a form of praise and positive reinforcement.

Research study three has a number of limitations which should be acknowledged at this stage of the thesis. As with the previous qualitative study, the sample studied was a relatively small opportunity sample and there are potential social desirability issues. Only consultant anaesthetists were invited to participate in this follow up interview. Additional insight could have been gained by including the perspectives of other professional roles such as the surgical nursing leads. However, the purpose of the second round of data collection was to understand the mechanisms through which feedback was impacting on individual professional behaviour. It can be argued that consultant anaesthetists had the greatest opportunity to change their behaviour based upon their feedback reports whereas reports provided to surgical nursing leads were more representative of broader systemic issues. Some of the consultant anaesthetists were interviewed at both time points and some were only interviewed at one time point. This analysis involved combining qualitative data from two time points that had been collected by different researchers which has further epistemological considerations. These are based on the fact that the principles of qualitative research do not generally fit with the combination of results in search of a positivist 'truth' or explanation of a phenomenon. There is an advantage, however, in having the same researcher conducting the synthesis who conducted all of the original analyses.

Please note that overarching limitations of the PhD and thesis as a whole are explored in section 5.3.

### **2.7.5 Key findings against research question**

In order to extract and compile key findings against the primary research question, these short sections are included consistently throughout the thesis at the end of each research study. They also



contribute to the intermittent work stream syntheses and the overarching synthesis of results in section four. The key characteristics and psychological processes that emerged through this research study are presented in Table 14 below.

**Table 14. Key findings from study three against research question**

<b>How does feedback influence professional behaviour in healthcare?</b>	
<b>Characteristics of effective feedback</b>	<b>Psychological processes through which feedback impacts on professional behaviour</b>
<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback takes place within cohesive and integrated groups of colleagues/communities of practice</li> <li>• Feedback is accompanied with goal setting and action planning</li> </ul>	<ul style="list-style-type: none"> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for their existing performance</li> <li>• Improvement actions displayed by end users are reinforced</li> <li>• The professional identities of end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are actively engaged with feedback</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> </ul>

## 2.8 Research study four: Framework analysis of Hospital Two case study

Figure 6 below provides a breakdown of the individual research studies and how they build up into case studies and work streams. Circles are included to demonstrate the focus of this section and contextualise it within the thesis as a whole.

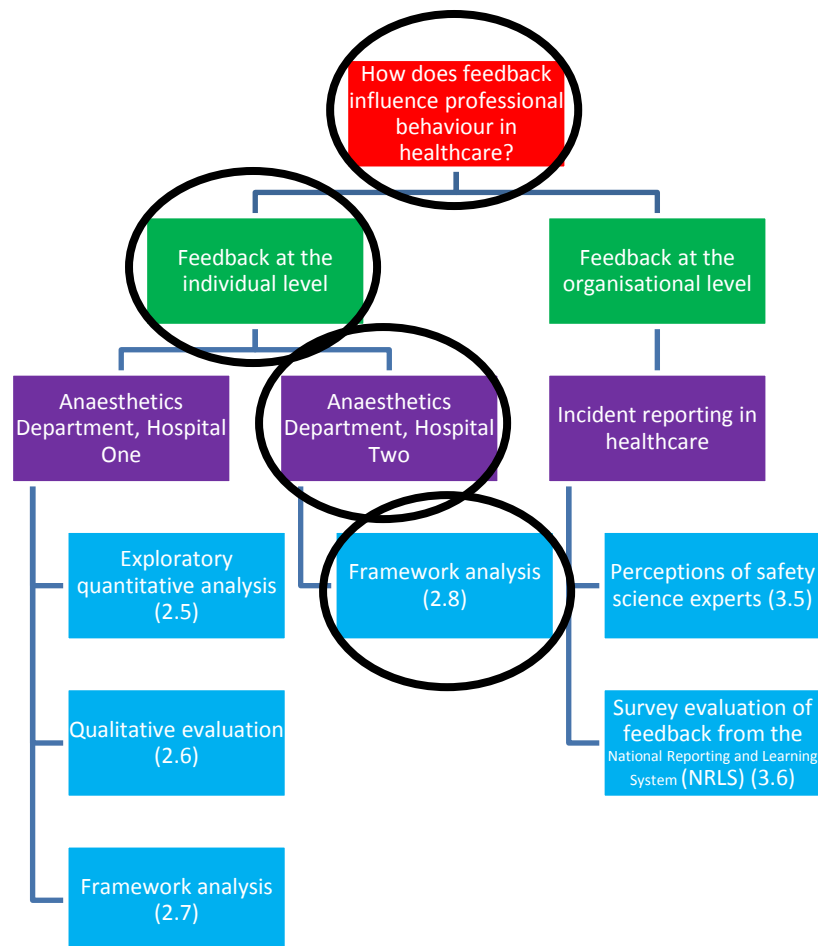


Figure 6. Structure of the thesis

### 2.8.1 Introduction

The previous two qualitative research studies have provided an end user perspective on experiences of a personalised feedback initiative in the anaesthetics department of Hospital One. As a result of ongoing collaboration and dissemination of the findings of the broader project, it was decided that a similar personalised feedback intervention, based around the same theory of change, would be implemented in the anaesthetics department of Hospital Two.

This presented the opportunity for further qualitative data collection around the mechanisms through which feedback results in learning and behaviour change. The key advantage of including this as a further case study was that it would enable the interviewing of anaesthetists before they had received any feedback at all. This had not been possible for the Hospital One case study and therefore clinician expectations of receiving feedback and how it could potentially contribute to their learning had not previously been captured.

A further opportunity emerged through the ability to test out and refine the emergent understanding of the mechanisms through which feedback contributes to learning, that had been identified in the previous case study, in a different context. This would enable enhancement of the developing theory of the mechanisms through which personalised feedback works as an intervention and therefore the updating of prior understanding in accordance with new qualitative data (Dixon-Woods et al., 2011). The two previous cycles of qualitative data collection were centred around one specific context. Conducting further data collection, informed by the emerging theory, allowed for an investigation of the social constructions of feedback and behaviour change in a different environment by different end users who may be experiencing a different truth/reality. In this sense, it offered the opportunity for triangulation which has been proposed as a validity tool for qualitative research (Mays & Pope, 2000).

### **2.8.2 Theory of the intervention**

During 2013, the roll-out of a new electronic patient record system (Surginet™) provided a platform for routine data collection of every patient having an operation at Hospital Two. Based on pilot work at the sister hospital site a new section in the Surginet™ database was developed to permit routine collection of quality indicator data from Theatre Recovery (the ward area where patients recover immediately after their operation). Quality indicator data were collected routinely from October 2013. The three main quality indicators recorded and reported are proportion of patients with a body temperature < 36°C on arrival in theatre recovery, proportion of patients with severe pain in recovery (defined as either “pain score in recovery of 9 or 10 at any time” or “writhing or moaning in pain at any time”) and proportion of patients with severe post-operative nausea and vomiting (defined as “PONV unresponsive to two anti-emetics in recovery”) The Surginet™ database also includes a 4th question aimed at capturing a number of rare but important adverse events, called “medical review”. Nursing staff are asked the question “Was the patient reviewed by a doctor in

Recovery for any of the following problems?” Answering “Yes” leads to a tick-box list of 16 events including: unexpected low oxygen saturation; respiratory depression; respiratory distress; laryngospasm; incomplete reversal of muscle relaxants; persistent bradycardia; persistent hypotension; persistent hypertension; new arrhythmia; cardiac chest pain; ischaemic ECG; excessive sedation; acute confusion; unsatisfactory handover; inadequate post-op prescription; and unplanned admission to Intensive Care Unit, High Dependency Unit or Post Anaesthetic Care Unit. These data are used to report a fourth quality indicator defined as proportion of patients requiring “medical review” in theatre recovery.

During September to November 2014, mock reports were generated to test and refine the steps needed to create individual comparative reports for multiple consultants in a short timeframe. The format of the feedback was developed specifically for the local implementation context; building upon lessons learnt from the previously described study at Hospital One. Feedback began at Hospital Two on 2<sup>nd</sup> December 2014. The first report included 12-months data collected between 1<sup>st</sup> October 2013 and 30<sup>th</sup> November 2014. To allow for a settling in period, data collected during the first two months of the project (October and November 2013) were not included in the feedback reports. Since December 2014, feedback reports have been given at monthly intervals to all consultants in the department. Departmental data have been reviewed at department audit meetings, Clinical Governance Committee meetings and presented to recovery staff.

The feedback initiative at Hospital Two had very similar objectives to the initiative at Hospital One. The primary objective was to stimulate improvement through the feedback of routinely collected quality indicators to consultant anaesthetists, including comparisons with anonymised data from their peers. This feedback was expected to encourage reflective practice and support compliance with best practice guidelines in temperature control, improve appropriate use of analgesics and anti-emetics and, in turn, improve patient-reported outcomes in the post-operative phase. The secondary objective was to develop, embed and evaluate a sustainable continuous data collection and feedback initiative within local anaesthetic services, whilst engaging the broader professional group of anaesthetists in the programme.

## 2.8.3 Method

### 2.8.3.1 Research ethics

The study protocol, participant information sheet and consent form were reviewed and approved by the Trust Research and Development Committee on 13<sup>th</sup> June 2014. Review by a REC was not required as the research was limited to involvement of staff as participants (no involvement of patients/service users as participants).

### 2.8.3.2 Data collection

The mode of data collection for this study was focused, semi-structured interviews (specifically designed to last approximately 30 minutes each). The experiences, perceptions and levels of engagement of consultants were qualitatively explored at two key time points across the broader project life span. Baseline data collection took place in June/July 2014 (approximately four/five months before the intervention was launched) and follow up data collection took place in April 2015 (after anaesthetists had been receiving feedback for approximately five months). Results and experiences from the previous qualitative data collection and analyses (reported in sections 2.6 and 2.7) were used to drive the development of the interview schedules for this research study. Example questions from both time points are included in Table 15 below. The interview schedules and initial results from early interviews were continuously reviewed by the multi-disciplinary research team spanning Hospital One and Hospital Two in order to refine and iterate the interview schedules as the work progressed. The final interview schedules are included in Appendices D and E.

Table 15. Example questions from the interview schedules

Baseline	Follow up
<ul style="list-style-type: none"><li>• How do you feel about the fact that this quality improvement initiative is being introduced at your organisation?</li><li>• What do you expect the consequences to be of introducing a feedback initiative in this department?</li><li>• How do you think it will make you feel to see your data for the first time?</li><li>• How anonymous do you think a</li></ul>	<ul style="list-style-type: none"><li>• What was your initial reaction to seeing your data?</li><li>• Do the reports tell you anything that you didn't know before?</li><li>• How do you translate the data into something that is meaningful to you?</li><li>• Please describe any changes to practice that you have planned or implemented based upon the data</li></ul>

<p>feedback initiative of this type should be ideally?</p> <ul style="list-style-type: none"> <li>• What might help or hinder the effectiveness of this quality improvement initiative?</li> </ul>	<ul style="list-style-type: none"> <li>• Is there any additional information that you think the individual clinician needs to get from these reports in order to learn and make improvements?</li> </ul>
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### 2.8.3.3 Analysis

The analysis was driven by the findings of the previous qualitative analyses included in this PhD (reported in sections 2.6.3 and 2.7.3). A primarily deductive approach was taken to exploring the new data in order to search for any evidence of the mechanisms of effectiveness that had been suggested by the prior work (i.e. the previously developed framework). Table 16 below displays the deductive framework that was applied to the data based on the previous findings. Simultaneously, inductive analysis was also incorporated to allow any novel mechanisms to emerge from the dataset and to support development in understanding the emerging model and how it should be framed going forwards. The overall purpose of this analysis was to test and refine the emerging framework of how personalised feedback contributes to learning, behaviour change and professional development.

Table 16. Deductive framework based on previous findings

Mechanism	Definition
Feedback as a component of planned behaviour	Feedback impacts on professional behaviour by targeting perceived consequences, subjective norms and self-efficacy
Feedback as a socially situated cognition	Feedback impacts on professional behaviour by fostering the development of communities of practice and peer to peer learning
Feedback as a threat to internal consistency	Feedback impacts on professional behaviour by highlighting discrepancies between prior values, ideas or beliefs and evidence of actual practice
Feedback as reinforcement of learning and practice	Feedback impacts on professional behaviour by rewarding or punishing end users for their practice and the improvements that they make to it
Feedback as a motivational tool/feedback as a cycle	Feedback impacts on professional behaviour by directing end users as to where goal setting and ongoing monitoring of trends is required

## 2.8.4 Results

Across the two time points, 45 interviews were conducted with 32 anaesthetists resulting in approximately 19 hours of qualitative data. Thirteen anaesthetists were interviewed at both time points. Table 17 provides an overview of the newly emergent mechanisms of data use with definitions (i.e. mechanisms that had not been previously defined by the Hospital One analysis).

Table 17. Newly emergent key mechanisms of data use

Mechanisms of data use	Definition
Feedback as an interaction with mental models	Feedback impacts on professional behaviour by contributing to end users' mental models of their practice
Feedback as a threat to public perception	Feedback impacts on professional behaviour by increasing trust and reducing scepticism
Feedback as signal/prompt for personal action or reflection	Feedback impacts on professional behaviour by focussing the attention of end users on areas of performance that require reflection
Feedback as signal/prompt that (potentially) needs acting upon externally	Feedback impacts on professional behaviour by focussing the attention of the department on end users that may require further support to improve performance
Socio-cultural impact of feedback	Feedback impacts on professional behaviour by activating a group identity and creating shared goals
Feedback as a resource/feedback as evidence	Feedback impacts on professional behaviour by aligning with the goals/needs of end users and their profession

Each of the mechanisms are discussed below and supported with illustrative quotations.

### Feedback as a reinforcement of learning and practice:

During the time point one interviews, receiving feedback for the first time was expected to provide a reward through reassurance that performance was sufficient. This type of reward was associated with job satisfaction:

*Anaesthetist 10, time point 1: "Simply showing that what you're doing, you're doing right, and you're giving decent outcomes to patients."*

However, once the initiative was in place, it became evident that the level of reward and

reinforcement experienced by the anaesthetists was dependent on their position in the rankings compared with their peers:

*Anaesthetist 5, time point 2: "I get it, and I appear to be not a huge outlier, so that makes me reassured."*

*Anaesthetist 27, time point 2: "I just get my score if I'm in the middle of everybody I'm happy, if I'm better than average I'm even happier"*

Feedback enabled anaesthetists to test out their existing practice including any specific areas or methods that they were unsure about. In this sense it reinforced approaches and behaviours that they may not otherwise have continued with:

*Anaesthetist 29, time point 2: "I don't often use antiemetics routinely yet I have very low post-op nausea and vomiting rates so that has I guess, reinforced that behaviour."*

*Anaesthetist 7, time point 2: "Yes, I suppose historically I used patient warming ... I presumed that I used patient warming less than I should have done, but actually my results from patients being cold are fine. So I think it has helped me to keep doing what I am doing."*

#### **Feedback as an interaction with mental models:**

Anaesthetists were positive about having data to compare to their conceptualisations of performance. In this sense they were keen to have the opportunity to test out their mental models of their own practice in reality:

*Anaesthetist 23, time point 1: "So it will be interesting to see how the data fits the, I suppose, the expectation and the thoughts of people."*

*Anaesthetist 31, time point 1: "You know there are certain parameters I am sure I fall down on, it would be useful for me to know if I am doing that."*

There were a number of examples of feedback interacting with anaesthetists' existing mental models at follow up. In many cases feedback was able to confirm existing mental models of practice:

*Anaesthetist 6, time point 2: "But the rest of it was sort of how I would have imagined, I think, I would've performed."*

Alternatively, in some instances feedback contradicted or added conflicting information to an anaesthetist's existing mental model of practice:



**Anaesthetist 6, time point 2:** *“I thought I would do quite well in things like pain scores because that’s my special field, but I actually scored best on temperature oddly.”*

**Anaesthetist 7, time point 2:** *“Well I do ICU and anaesthesia, so I do only half the amount of anaesthetics that the anaesthetists would do... so I thought I would be in the bottom third for lots of stuff, just because you get better at things the more you do them...So it was actually quite gratifying to find that I was top half for most of the things”*

#### **Feedback as a threat to internal consistency:**

During the time point one interviews, anaesthetists expressed anxiety about receiving feedback for the first time. They had particular concerns about the emotions that could be provoked by receiving negative feedback and how they would deal with them:

**Anaesthetist 11, time point 1:** *“If you don’t do as well you may feel a bit sad about it, so there is that anxiety about finding out your score.”*

**Anaesthetist 26, time point 1:** *“I think I’d be worried in case I performed badly. I think that would make me feel terrible.”*

However, feeling threatened by feedback had the potential to lead to action. Changes to behaviour were often born out of a discrepancy between performance as imagined and performance in reality, as demonstrated by the feedback reports. Interviewees believed that having the ability and opportunity to improve upon feedback made it less emotionally threatening. In this sense it provided a potential resolution to the discrepancy between actual and ideal performance:

**Anaesthetist 11, time point 1:** *“... You’re looking and you see those scores, maybe you’ll sit back at the time and think oh, bugger. At the time you’re very deflated, but later on you’ll probably think you’ll find then, okay, well if I don’t do well, fine, I’ll go ahead and see if I can do it any better.”*

**Anaesthetist 29, time point 2:** *“...It’s changed my practice on a particular patient group that I didn’t use PCAs [Patient Controlled Analgesia] for before but now I’m much more likely to use them because I had one or two where I was a bit surprised that they were getting as much discomfort and so I’ve started using a different form of analgesia for that.”*

#### **Feedback as a motivational tool/feedback as a cycle:**

Individuals were able to set a goal, change behaviour and then measure the outcome against the original goal. This provided them with increased control over the data that they received in future feedback reports:

**Anaesthetist 25, time point 1:** *“...Well if you are not doing so well in a certain area you can maybe target that and see, right what can I change, what in my practice can I ...So over a next set period you then get the same data, extract it and see whether we have improved if we have made any changes.”*

**Anaesthetist 6, time point 2:** *“Well, I think because we have comparisons with ourselves doing the same operations, we’ve got historical data, if I make a change and all of a sudden there is a step down which is consistent then that would be very reassuring.”*

For this reason, multiple requests were made by interviewees at follow up for the frequency of report delivery to be reduced. It was believed that less frequent reports may be more meaningful and engaging in terms of monitoring changes to practice and having greater impact on recipients:

**Anaesthetist 6, time point 2:** *“Well, I think we felt that sometimes if you get them too frequently because they’re cumulative over a year that you don’t detect changes so easily, and also you tend to get a bit complacent about them because you get them every month. So I think every three months might have a bigger impact.”*

**Anaesthetist 22, time point 2:** *“It feels like a monthly report is a bit too frequent because if I make a change in January, I do 700 cases a year but they’re not all tonsils, they’re not all hip replacements so it’s going to take me several months, if not a full year to work out whether that change has done any good or not.”*

#### **Feedback as a threat to public perception:**

The anaesthetists felt strongly that the feedback data should not be openly published. It was thought that publicising data without adequate protection could reduce engagement with the initiative:

**Anaesthetist 31, time point 1:** *“I think it probably should be anonymous, I think everyone should get their own data back people should be allowed to share their data with other people. But to publish a league table I think can be very damaging to a department.”*

**Anaesthetist 7, time point 2:** *“So I would be quite wary. I remember when you came around the first time, the uniform message I think I gave you was this should not be a tool for management to dictate what we do, and I think even within the department, a more wide publication of individual activity without the anonymisation is prone to a lot of error as well...”*

Interviewees felt that staff outside of the anaesthetic environment lacked the necessary skills and experience to interpret the feedback data accurately and meaningfully. Therefore, involving senior members of the organisation in the initiative was expected to make it more threatening to end users and reduce their levels of trust in its purpose and potential:

**Anaesthetist 30, time point 1:** *“...The higher you go up, the less close to the actually coalface they are, the less likely they are to see the reasons for variations. So that could be a pitfall.”*

Anaesthetists emphasised the importance of having a peer leading the project and controlling the dissemination of feedback:

**Anaesthetist 29, time point 1:** *“I think it probably is quite useful that it’s somebody within the department who is not management, who is not from recovery, who is not from the wards...”*

**Anaesthetist 31, time point 1:** *“...If something is imposed from above it’s inevitable, it never works as well...Whereas if it comes from within you sort of feel you have a bit more ownership over it.”*

They therefore demonstrated high perceived trust in and satisfaction with the fellow consultant anaesthetist who was running the local project:

**Anaesthetist 27, time point 1:** *“[project lead]’s running the project and I believe in his integrity to do the right thing.”*

### **Feedback as signal/prompt for personal action or reflection:**

Feedback encouraged anaesthetists to question and reflect upon specific areas of their practice. In this sense it guided them as to where their cognitive attention was most required. For example, being below average or identifying as an outlier of the department prompted reflection and potential action:

**Anaesthetist 18, time point 1:** *“So if I’m below average then I’ve got to do something about it.”*

**Anaesthetist 31, time point 1:** *“but I imagine it would change your practice particularly if you felt that you were outside the bell curve. Because you would probably then do a little informal check of where everyone else was and if you found all my patients are in agony and everyone else’s patients are great, then I think ...I would like to think that I would probably change my practice in that respect.”*

**Anaesthetist 32, time point 2:** *“Yes, it’s not necessarily what I’m doing but it’s the fact that I can see that other people are doing differently or better, and then I can work from that.”*

The anaesthetists used the specific detail provided in the reports on procedure type and case mix to question practice and objectively guide their interpretation of feedback:

**Anaesthetist 27, time point 2:** *“I think I scored – have consistently scored fairly highly for medical and referral required in recovery, but when you look at the cases it’s all very understandable, so that was fine.”*

**Anaesthetist 32, time point 2:** *“...if I see that all my patients after having tonsillectomies are in pain it’s known to be a painful operation so at some point you say “Look, I’m sorry but that’s the way it is”, on that pain score thing you are on the right side and you realise*

*that most of the patients who are in pain had tonsillectomies then you're doing nothing wrong"*

The effects of feedback on professional behaviour were thought to be serial and cumulative. Interviewees believed that data would need to build up over time before it becomes completely meaningful and is best positioned to guide appropriate reflection and changes to practice:

**Anaesthetist 29, time point 1:** *"Perhaps seeing a few months' worth of data and seeing where they score might enable them to sort of understand that, you know maybe that things could be done better..."*

### **Feedback as signal/prompt that (potentially) needs acting upon externally:**

The signals provided by feedback were not viewed as being purely for the anaesthetists themselves to respond to. It was thought that signals may require external attention and action in order to protect the quality and safety experienced by patients. Some interviewees believed that the clinical director of the anaesthetics department should have access to the data to some degree:

**Anaesthetist 3, time point 1:** *"I think undoubtedly the clinical director has to know that, because that's part of good governance."*

**Anaesthetist 31, time point 1:** *"I think it would make sense for somebody in charge of the project or clinical director to be aware of feedback particularly people who are on at one end of the bell curve because if you do have somebody whose feedback is routinely poor about particular aspects then given that we are trying to provide a service then it should be used for service improvement in that respect."*

It was thought to be important that outliers are highlighted and investigated in the most appropriate way to support development and protect patient safety:

**Anaesthetist 12, time point 1:** *"If there was a marked outlier, I don't think you could ignore that. Much the same as you can't ignore high mortality surgeons or hospitals – you know a marked outlier, you'd have to investigate why and that's possibly a role for that"*

**Anaesthetist 12, time point 2:** *"So if you were a specific outlier and your results were quite markedly different to your colleagues yes that's something that should be assessed and you should work towards working out why that's a problem..."*

### **Socio-cultural impact of feedback:**

The interviews revealed processes of behaviour change and improvement at the group as well as individual level. Departmental data was viewed as having potential to highlight areas for group level reflection and improvement efforts:

**Anaesthetist 27, time point 1:** *“There may be particular cohorts of patients that we’ve failed and hopefully this sort of thing will pull that out. Because it’s not just that certain individuals might struggle, I think there’s certain cohorts of patients we might struggle to do the best for.”*

For example, interviewees proposed and discussed the application of selected 'recipes' to improve departmental performance in specific areas:

**Anaesthetist 23, time point 1:** *“Or it might be that, as one of my colleagues pointed out, there is someone who doesn’t routinely give anti-sickness medicines to lots of patients, and it might be that his levels of sickness are the same as everyone else’s, and that might mean that actually we all give far too many anti-sickness medicines..”*

**Anaesthetist 24, time point 2:** *“Not yet but that’s what we would hope to do with the renal transplant patients; so audit our pain scores now according to what we’re doing, see what each other’s recipes are... so ideally we agree a way, we audit our pain scores, we change our way if the pain scores are not good again, and then we audit again would be a plan which we haven’t yet executed, but it’s certainly been discussed.”*

Anaesthetists also recognised the opportunity to compare departmental results with that of other anaesthetics departments. This was thought to have the potential to drive the implementation of departmental improvement projects:

**Anaesthetist 20, time point 1:** *“I think, when you’re looking at very big sort of centres like here with the work that we do, then you’d be able to compare, again, against population kind of data and say, do we have any specific issues here that we need to look at?”*

**Anaesthetist 28, time point 1:** *“And we might find that things are being done in a different way in different hospitals and then we can probably change that to improve things.”*

However, they felt that it was only possible to meaningfully compare with departments that have a similar case mix:

**Anaesthetist 30, time point 1:** *“But you’ve got to be wary what you’re comparing it to. Other data from other hospitals is a different set up, it’s a different hospital, a different case mix, different ways of collecting the data unless it’s the same everywhere...”*

#### **Feedback as a socially situated cognition:**

Anaesthetists felt that learning from their peers was already an established part of current practice even before the implementation of feedback began:

**Anaesthetist 18, time point 1:** *“Yeah, I do it all the time. People come up to me and ask me what I do for this and that and I do the same to other people so we do it all the time I think as a group and as individuals.”*

At baseline, interviewees expected that they would need and want to request general guidance and

support from their colleagues in interpreting and improving upon their feedback:

**Anaesthetist 14, time point 1:** *“No I think it would be – not exactly a coffee room conversation but a corridor conversation, like, “That was my graph, where were you? What feedback did you get? And what do you think we can do about it?” sort of thing”*

More specifically there was a focus on requesting scaffolding from those that are higher performers in certain areas:

**Anaesthetist 15, time point 1:** *“Go find out who’s at the top end of the scale and find out what they’re doing.”*

It was believed that this could be achieved through recipes created by the top performers specifically to guide lower performers:

**Anaesthetist 24, time point 1:** *“Yes, because if you have a best player in the department the obvious thing to do is to say to that person can you make public how you’re so good.”*

**Anaesthetist 24, time point 2:** *“I know that [project lead] sent out an email to everybody saying that “My tonsils seem to be in pain, is there anybody else that can give me a recipe?”*

**Anaesthetist 32, time point 2:** *“And the only thing I happened to talk to somebody about it who, in one of the items I was kind of in the middle and one of my colleagues was doing quite well, but it was a coincidence we were talking about that and so I asked him what he was doing; and so I got some of his ideas, I used them, and they improved my practice a lot.”*

However, interviewees recognised anonymity as a potential barrier to optimal peer learning:

**Anaesthetist 5, time point 1:** *“Well the problem is of course I don’t know who the high performer is, so I need to – there needs to be a way that perhaps one person knows who that is – who everybody is, so you can approach one person and say, “Could you tell me who the good people are so I can go and learn from them?””*

#### **Feedback as a resource/feedback as evidence:**

Feedback was viewed as a resource to draw upon for the purposes of appraisal and revalidation. It enabled anaesthetists to demonstrate their fitness to practice as well as a commitment to reflecting upon one’s practice and developing where possible over time:

**Anaesthetist 30, time point 1:** *“So that’s one of the big things that we struggle with in anaesthetics is that we have no way of looking at our outcomes, both for appraisal and for revalidation. So that would provide us with objective evidence.”*

**Anaesthetist 6, time point 2:** *“It’s quite good for our appraisal; I can go now to my appraiser and say “These are my results” and I think that’s useful for that sort of a process.”*

This may be explained by the association made by anaesthetists between reflecting upon your practice and being a professional person:

**Anaesthetist 11, time point 1:** *“It’s good behaviour and good practice to reflect on your practice, and that’s what the GMC say in Good Medical Guidance, reflect on your practice and try and do better.”*

**Anaesthetist 6, time point 2:** *“And we all have a professional responsibility to our patients to be thinking about where we can improve, and I think this shows that we’re doing it.”*

Feedback was also thought to be useful to provide evidence of the effectiveness of the department as a whole:

**Anaesthetist 11, time point 1:** *“And I suppose in a glib way you could say if you wanted to advertise us, we have the lowest rate of nausea and vomiting in the Northeast, something like this. You could directly do it that way.”*

**Anaesthetist 6, time point 2:** *“And in terms of PR exercise, which is important in the modern health service, I think they’re very good as a display for non-medical staff and patients as well potentially...we can show that we’re measuring our results, which is important for them to know, we’ve instituted certain changes based on those results, and I’m sure it’s reassuring for patients coming into that environment.”*

Finally, feedback was also framed as evidence to support potential requests and to demonstrate areas where departmental resources may be lacking:

**Anaesthetist 30, time point 1:** *“We could go to the orthopaedic department and say, ‘Look, we’ve got a problem, part of it is because of this...We need to change the way things are done’.”*

**Anaesthetist 29, time point 2:** *“But it’s perhaps something that we can use to bid for a data manager or some technical support”*

### **Feedback as a component of planned behaviour:**

At both time points interviewees expressed the expected consequence that performance could improve as a result of the initiative being implemented in their department. This was believed to be due to an increase in people’s motivation to develop and provide better patient care:

**Anaesthetist 29, time point 1:** *“So I think it could be quite useful because it might, and hopefully it will open a few people’s eyes to areas where perhaps they can improve”*

**Anaesthetist 5, time point 1:** *“But it would be probably quite a good thing for the department as well because it sort of encourages people – I mean good feedback is good isn’t it, because it encourages people to do more and to do – usually people striving to be better.”*

**Anaesthetist 32, time point 2:** *“And certainly patients will benefit from it who are having the benefit already”*

However, there were also concerns about performance management occurring unfairly as a result of the initiative. This can be viewed as a negative expected consequence of receiving feedback reports:

**Anaesthetist 1, time point 1:** *“I would worry, and I think this is unnecessarily cynical of me, that it might still end up being a stick to beat us with. Because none of us are perfect and none of us will get it completely right and I would worry that the data is there for the finger to be pointed...”*

Subjective norms were evident in the interview data. Anaesthetists believed that their peers had positive feelings towards the initiative and this influenced their own personal judgements. This was particularly evident during the follow up interviews:

**Anaesthetist 1, time point 1:** *“I think most people think it’s quite a good thing to do, yeah.”*

**Anaesthetist 6, time point 2:** *“And I think most of my colleagues are using it in a positive way to do it as well.”*

**Anaesthetist 27, time point 2:** *“I’ve picked up that people do value the data.”*

Interviewees demonstrated self-efficacy in relation to the quality indicators being used in the initiative. Anaesthetists felt that the measures themselves were generally actionable:

**Anaesthetist 24, time point 1:** *“Those types of things I think are easier to act upon, you know, if you’ve got all your patients coming out sick it’s a very straightforward thing to do to give an anti-emesis and warming is another classic example, pain as well, you know, if you know there’s a whole cohort of patients that are coming out in pain then it’s relatively easily remedied. So I would say those things are particularly useful.”*

**Anaesthetist 12, time point 2:** *“So things like temperature, having hypothermic patients, that’s quite easy to fix and you just deploy more equipment to keep them warm; and that’s quite easy.”*

However, both type of procedure and specific patient factors were put forward as barriers to improving upon feedback successfully:

**Anaesthetist 16, time point 2:** *“Very minor changes, because some of it is just that foot and ankle surgery is painful! There is not a massive quantity that you can do about that. You can give them more analgesia, but it is still ultimately as painful a surgery.”*



**Anaesthetist 4, time point 2:** *“...But also you can reflect and look back and say “Well, actually this patient, for example, 40 milligrams of morphine”, which would knock me dead, “But they were still in pain” so that’s probably as much a patient issue because it’s the same surgery and the anaesthetic that myself and this surgeon have been doing for ten years, so you kind of think “Well, it probably wasn’t my fault it was just one of those things”.”*

Finally anaesthetists felt that the behaviour of their colleague interacted with and impacted on their ability to improve their personal feedback data:

**Anaesthetist 1, time point 2:** *“Things that I would do if it was left to my own control I have to actually liaise with the surgeon so there are some things that I don’t get to do maybe as I would to do because it’s a team approach.”*

Table 18 provides a breakdown of all emergent mechanisms with example qualitative codes from the analysis.

**Table 18. Overview of mechanisms and example related codes**

<b>Theme</b>	<b>Example related codes</b>
Feedback as a reinforcement of learning and practice	<ul style="list-style-type: none"> <li>• Seeing improvements in data based on behaviour change will provide a reward</li> <li>• Reward is dependent on position in the rankings</li> <li>• Feedback provides a reward through reassurance</li> <li>• Feedback as a test of existing practice or methods</li> <li>• Feedback as a reward through job satisfaction</li> <li>• Concerns that feedback will lead to punishment</li> </ul>
Feedback as an interaction with mental models	<ul style="list-style-type: none"> <li>• Feedback may provide further evidence for a problem that an individual already know exists</li> <li>• Feedback contradicts or adds to existing mental model of practice</li> <li>• Feedback confirms existing mental model of practice</li> </ul>
Feedback as a threat to internal consistency	<ul style="list-style-type: none"> <li>• Receiving feedback for the first time may not make an individual feel how they expected</li> <li>• People may feel disheartened if they are unable to improve upon negative feedback scores</li> <li>• People do not expect feedback to contradict their expectations</li> <li>• People assume that they are above average</li> <li>• If feedback doesn’t match with conceptualisation of performance then it may be rejected</li> <li>• If feedback does not match with conceptualisation of performance this could be disheartening</li> <li>• If feedback does not match conceptualisation of performance then it may lead to changes in behaviour</li> <li>• Feeling threatened by feedback could lead to action</li> <li>• Feedback may not match with assessments of performance by other</li> </ul>

	<p>people</p> <ul style="list-style-type: none"> <li>• Being at the bottom of the scale would lead to negative emotion</li> <li>• Anxiety may occur before the feedback has been received</li> <li>• Anonymity will help protect from the threat of feedback</li> </ul>
Feedback as a motivational tool/feedback as a cycle	<ul style="list-style-type: none"> <li>• Scoring below the average may indicate that an individual needs to launch improvement actions</li> <li>• Reports should be produced less frequently in order to maximise the visibility of changes</li> <li>• Longitudinal feedback will allow monitoring of changes in individual performance over time</li> <li>• Individuals should make one change at a time to ensure that they can monitor the effects accurately</li> <li>• Individuals can set a goal, change behaviour and then measure the outcome</li> <li>• Having the ability to improve on feedback makes it less emotionally threatening (i.e. it provides a resolution)</li> <li>• Feedback will prompt changes to behaviour</li> <li>• Feedback can be used to prompt and then test departmental level changes to practice</li> <li>• Expectation that negative feedback should be acted upon</li> <li>• Data needs to be specific and meaningful in order to prompt an improvement action</li> <li>• Benchmarking will support an individual in knowing when an improvement plan is necessary</li> </ul>
Feedback as a threat to public perception	<ul style="list-style-type: none"> <li>• The data should not be openly published</li> <li>• Taking away anonymity could have a negative effect on the departmental morale</li> <li>• Staff outside of the anaesthetic environment will not be able to interpret the data meaningfully</li> <li>• Some people will automatically be afraid of the initiative</li> <li>• Publicising data could reduce engagement</li> <li>• Managers will have a different agenda</li> <li>• Involving senior members of the organisation in the initiative will make it more threatening to end users</li> <li>• Initiative will not be viewed in a threatening way by end users</li> <li>• Initiative should not be used to put additional pressure on people</li> <li>• Initiative should not be used to give power to managers</li> <li>• If data is publicised, people need guidance on how to interpret it meaningfully</li> <li>• Concerns about being accused of poor performance based on feedback</li> <li>• Anonymity could be threatened by breaking down data based on case mix</li> </ul>
Feedback as signal/prompt for personal action or reflection	<ul style="list-style-type: none"> <li>• Use of detail on procedure type to question practice and interpret feedback</li> <li>• Feedback makes people aware if they are outliers</li> <li>• Feedback encourages an individual to question their practice</li> <li>• Feedback does not tell an individual what to do but lets them know their position</li> <li>• Being below average as a signal to take action</li> </ul>
Feedback as signal/prompt	<ul style="list-style-type: none"> <li>• The clinical director should have access to the data</li> <li>• Senior nurses should have full access to the data</li> </ul>

that (potentially) needs acting upon externally	<ul style="list-style-type: none"> <li>• Outliers need to be highlighted and investigated</li> <li>• Interventions may be necessary if people do not improve upon their negative feedback scores</li> <li>• Duty of care to protect patients</li> </ul>
Socio-cultural impact of feedback	<ul style="list-style-type: none"> <li>• Use of a selected 'recipe' to improve departmental performance</li> <li>• Only possible to compare with departments that have a similar case mix</li> <li>• Initiative could lead to the formation of a national dataset</li> <li>• Important to assess teams rather than individuals</li> <li>• Departmental feedback could be useful in assessing any potential negative effects of the initiative</li> <li>• Departmental data will highlight areas for group level improvement</li> <li>• Departmental data should be discussed at audit meetings</li> <li>• Departmental data put individual data into context</li> <li>• Data can be used to track departmental performance longitudinally</li> <li>• Comparison of one department with another can lead to improvement projects being implemented</li> </ul>
Feedback as a socially situated cognition	<ul style="list-style-type: none"> <li>• Use of recipe to guide lower performers</li> <li>• Use of discussion to decide whether or not action needs to be taken by the department</li> <li>• Use of a recipe to refine a protocol or approach</li> <li>• There needs to be a way of accessing high performers</li> <li>• The local culture supports sharing learning</li> <li>• Request for scaffolding from higher performers</li> <li>• Request for guidance from colleagues in improving feedback</li> <li>• Recipes from the highest performers could be distributed anonymously</li> <li>• People will vary in the extent to which they want to discuss their feedback</li> <li>• People tend to discuss their practice with those that think similarly to them</li> <li>• People may speculate with others about people's results</li> <li>• Learning from others is already part of current practice</li> <li>• Important to discuss with people who have a similar case mix to you</li> <li>• Formal presentation of the initiative will promote discussion</li> <li>• Evidence of discussion around feedback and changes to practice</li> <li>• Down to the individual to share with trusted colleagues only</li> <li>• Discussion will help an individual to identify if others are facing similar problems</li> <li>• Discussion of feedback with recovery staff</li> <li>• Discussion of feedback can reduce negative emotion</li> <li>• Discussion of approach to using feedback data</li> <li>• Discussion could take place at appraisal</li> <li>• Better for discussion to bypass anonymity naturally than for it to be removed entirely</li> <li>• Assigned people should be available to discuss feedback with individuals if they want to</li> <li>• Anonymity could prevent peer learning</li> </ul>
Feedback as a resource/feed back as evidence	<ul style="list-style-type: none"> <li>• Useful for appraisal and revalidation</li> <li>• Feedback as a resource that is personal to anaesthetists</li> <li>• Evidence that an individual is not an outlier</li> <li>• Evidence for the effectiveness of the department</li> </ul>

<p>Feedback as a component of planned behaviour</p>	<ul style="list-style-type: none"> <li>• Type of procedure as a barrier to improvement</li> <li>• Time pressure as a barrier to improvement</li> <li>• Perceived consequences determine whether or not management should have access to data</li> <li>• Patient factors as a barrier to improvement</li> <li>• Other people have positive feelings towards the initiative</li> <li>• Lack of variation across department as a barrier to improvement</li> <li>• Lack of new methodologies to try as a barrier to improvement</li> <li>• Lack of control over measures as a barrier to improvement</li> <li>• Impact of colleagues on data as a barrier to improvement</li> <li>• Financial resources as a barrier to improvement</li> <li>• Expected consequence that the initiative will not be cost efficient</li> <li>• Expected consequence that the initiative will distract people from safe care</li> <li>• Expected consequence that recovery nurses will be burnt out</li> <li>• Expected consequence that people will make changes for the wrong reasons</li> <li>• Expected consequence that people will be performance managed as a result of the initiative</li> <li>• Expected consequence that overall performance will improve</li> <li>• Expected consequence that low performers will become alienated</li> <li>• Expected consequence that initiative will provide information that was previously unknown</li> <li>• Expected consequence that behaviour changes could have negative effects on patient care</li> <li>• Evidence of self-efficacy in relation to reviewing and interpreting feedback report</li> <li>• Evidence of self-efficacy in relation to measures</li> <li>• Evidence of a lack of self-efficacy in relation to the initiative</li> <li>• Difficulty identifying trends as a barrier to improvement</li> <li>• Data quality as a barrier to improvement</li> <li>• Comparison of own approach with that of others</li> </ul>
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### 2.8.5 Discussion

This qualitative research study explored anaesthetists' perceptions of a personalised feedback initiative before and after its implementation into the local context of the anaesthetics department at Hospital Two. The purpose of this investigation was to understand expectations and experiences of the processes through which receiving personalised performance feedback impacts (or has the potential to impact) on learning and behaviour change in this group of healthcare professionals. It also provided the opportunity to test and refine the emergent qualitative model from the exploration of the case study feedback intervention at Hospital One. The two sets of findings are further integrated and reflected upon in the case synthesis section below (section 2.9). This specific

discussion section is first included to consolidate the findings from the Hospital Two study in light of the relevant literature.

Use of feedback was regularly associated with professional role and identity. Anaesthetists reported experiencing reinforcement to their levels of job satisfaction when they received positive feedback. Acting upon personalised feedback to drive ongoing developments in clinical practice was viewed as a demonstration of effective professional behaviour and aligns well with the goals of appraisal and revalidation (Moonesinghe & Tomlinson, 2011; Smith et al., 2011; Smith & Greaves, 2010).

The analysis emphasised the value of different types of comparisons. Peer benchmarking and normative comparison had a clear role to play in focussing the attention of end users and prompting reflection and behaviour change based on feedback. The role of feedback in focussing the attention of its end users has been emphasised by Feedback Intervention Theory (Kluger & DeNisi, 1996). The level of reward experienced when receiving feedback was often dependent on an anaesthetist's individual positioning compared with their peers. When people were dissatisfied with their position in the rankings they were motivated to seek the support of those who had achieved a higher status and engage in processes of goal setting. This emphasises the role of situated learning in responding to feedback (Brown et al., 1989).

Being classified as an outlier was viewed as a prompt for action from both the individual and the department. Identifying as an outlier compared with peers encouraged personal reflection and behaviour change. From an external point of view anaesthetists recognised the need for intervention from more senior members of the department if outlying individuals were unable or unwilling to improve their performance over time. In this sense, when individuals are content with their relative position compared with others they may lack the stimulation to improve regardless of whether or not their performance is optimal. This may limit the potential impact of feedback on learning and behaviour change.

Feedback provided the missing link between expected and actual performance (performance as imagined vs performance as done) for this group of anaesthetists. This sometimes resulted in reinforcement of both practice and learning when actual performance met or exceeded an individual's expectations. However, it also revealed discrepancies between expected and actual performance and this was associated with the experience of negative emotions such as disappointment and anxiety. Negative emotion could be resolved, however, by appropriate goal setting and monitoring of actions over time to achieve improvement. These findings echo the key principles of a number of pre-existing models of feedback (Carver & Scheier, 1982; Kluger & DeNisi,

1996; Sapyta et al., 2005).

The use of detail to focus cognitive attention and aid decision making was evident throughout the analysis. Information on procedure type, case mix and patient factors were of particular importance in guiding effective interpretation of feedback. It was thought that such detail would be required in order to successfully develop the potential for cross departmental comparison. Data provided a flag for review rather than a definite judgement on quality of care. This led to processes of both exploration and explanation. Anaesthetists could explain away the data using reasoning associated with case mix for example or instead explore the differences with peers to create learning and change. Again, this supports Feedback Intervention Theory which highlights a change in the locus of attention as the key psychological process through which feedback has its impact on behaviour (Kluger & DeNisi, 1996).

Mixed views were expressed around the levels of anonymity required to support optimal learning from feedback, as demonstrated by the themes concerned with feedback as a threat to public perception and feedback as a prompt that may require external action. Anaesthetists felt strongly that the data should not be open to judgement from members of staff who may lack the necessary skills to appropriately interpret it. There were clear concerns around use of the initiative for the purposes of performance management. Such apprehensions have been echoed in the recent literature around publication of surgical performance data (Rosenbaum, 2015). However, simultaneously interviewees also believed in the importance of being alert to potential threats to patient safety. They additionally recognised anonymity as a barrier to optimal peer interaction and learning. This aligns with the need to understand feedback as a socially situated cognition.

Interviewees were keen to impose new structures to their practice based on the key messages that had been identified from feedback at both individual and departmental levels. The use of successful performance 'recipes' were voiced both in the context of developing departmental protocol and the encouragement of informal modelling and scaffolding between colleagues. This idea aligns well with the principles of positive deviance (Lawton, Taylor, Clay-Williams, & Braithwaite, 2014). The anaesthetists were in favour of tools to stimulate active (as opposed to passive) exploration and learning and hence behaviour change and improvement (Mugford et al., 1991).

Research study four has a number of limitations which should be acknowledged at this stage of the thesis. As with the previous two studies, the sample was a relatively small opportunity sample and there are potential social desirability issues. Some of the consultant anaesthetists were interviewed

at both time points and some were only interviewed at one time point. This analysis involved combining qualitative data from two time points which has further epistemological considerations as discussed previously. However, the same researcher had collected and analysed all data.

Please note that overarching limitations of the PhD and thesis as a whole are explored in section 5.3.

### 2.8.6 Key findings against research question

In order to extract and compile key findings against the primary research question, these short sections are included consistently throughout the thesis at the end of each research study. They also contribute to the intermittent work stream syntheses and the overarching synthesis of results in section 4. The key characteristics and psychological processes that emerged through this research study are presented in Table 19 below.

Table 19. Key findings from study four against research question

<b>How does feedback influence professional behaviour in healthcare?</b>	
<b>Characteristics of effective feedback</b>	<b>Psychological processes through which feedback impacts on professional behaviour</b>
<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is novel and provides an additional resource</li> <li>• Feedback initiative is led by a trusted peer</li> <li>• Feedback is detailed and specific</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer</li> </ul>	<ul style="list-style-type: none"> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for their existing performance</li> <li>• Improvement actions displayed by end users are reinforced</li> <li>• The professional identities of end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> <li>• End users experience schema development</li> </ul>

<p>guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</p> <ul style="list-style-type: none"> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback takes place within cohesive and integrated groups of colleagues/communities of practice</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality improvement and performance management</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is accompanied with goal setting and action planning</li> </ul>	<ul style="list-style-type: none"> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users take on a group identity</li> <li>• End users experience control and ownership over their future performance</li> <li>• End users are actively engaged with feedback</li> <li>• End users form a partnership with feedback providers</li> </ul>
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## 2.9 Case synthesis: Feedback at the individual level

Figure 7 below provides a breakdown of the individual research studies and how they build up into case studies and work streams. Circles are included to demonstrate the focus of this section and contextualise it within the thesis as a whole.

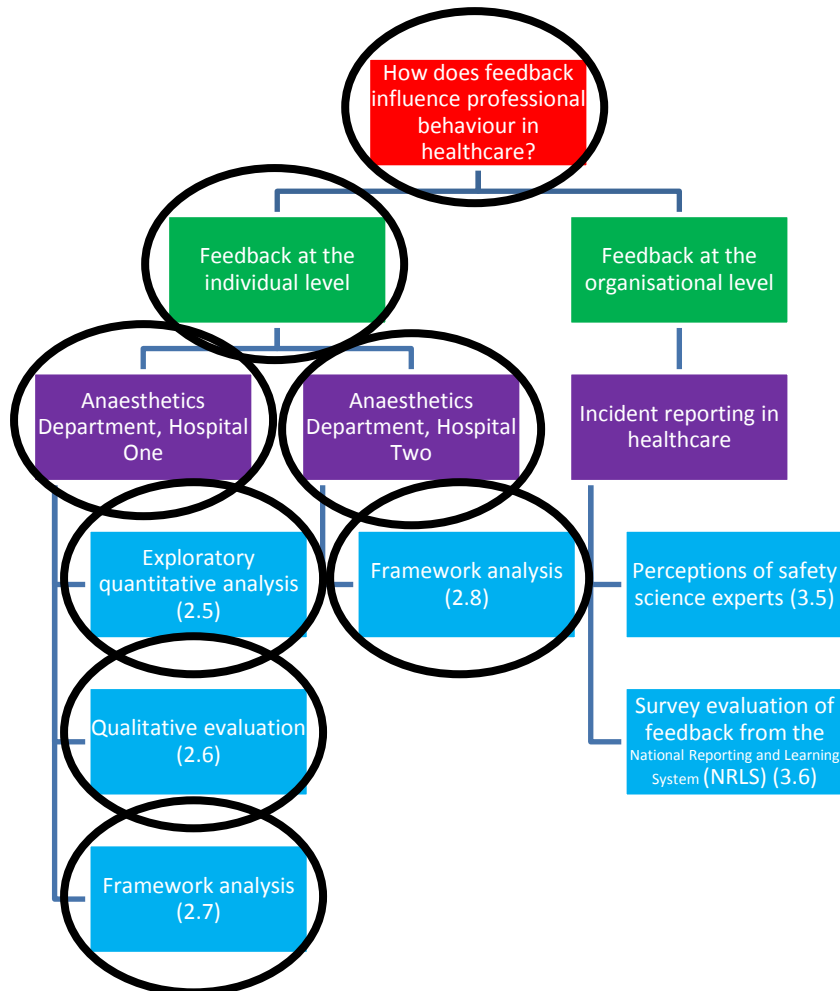


Figure 7. Structure of the thesis

### 2.9.1 Introduction

In order to extract and compile key findings against the primary research question, this model building chapter integrates the findings from the two case studies and demonstrates the development in theory building and conceptualisation of the mechanisms at play.

Four research studies have been presented and discussed thus far in the thesis. These studies represent work stream one of the thesis which looks at the influence of feedback at the individual

level on professional behaviour in healthcare. Figure 8 below demonstrates the various sequential interactions between the research studies.

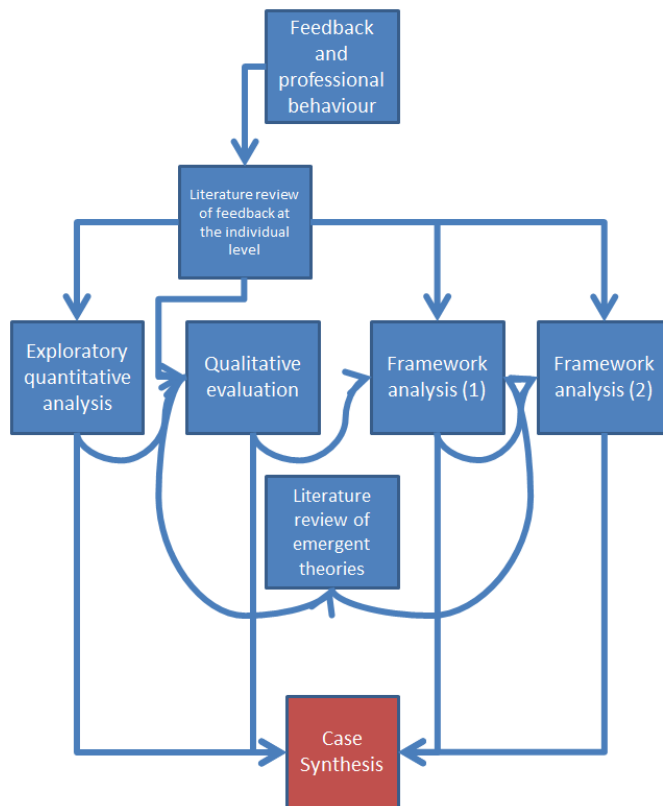


Figure 8. Sequential model for work stream one

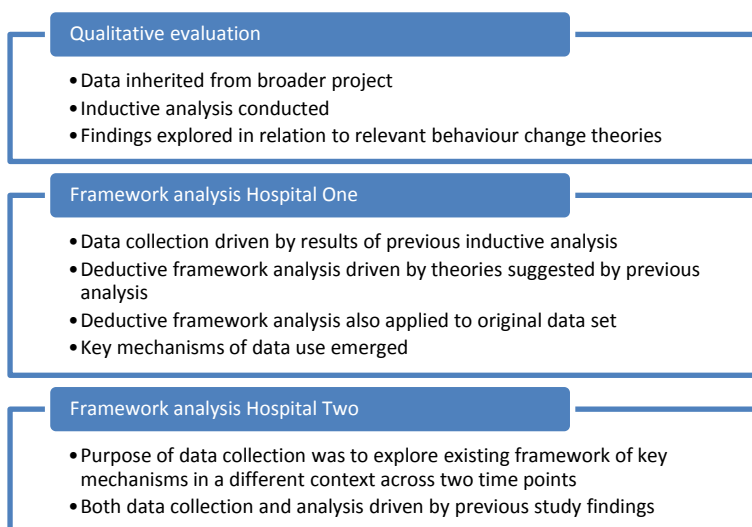
In order to start drawing together key findings against the overarching research aim of the PhD an intermittent synthesis was conducted based on the studies included in work stream one. The purpose of this synthesis was to begin identifying and integrating the characteristics and psychological processes through which feedback impacts on professional behaviour in healthcare.

### 2.9.2 Methodology

Due to the sequential design of the research studies synthesis had taken place to some extent throughout the evolution of the findings thus far (Creswell & Clark, 2007; Creswell et al., 2011). The positivist approach adopted for the regression analysis was based upon the existence of variables and categories to support the research question. However, findings from this study emphasised the need for a socially constructed exploration of stakeholder experiences, values, beliefs and perceptions which would be better achieved using a qualitative approach. Drawing upon some of the core principles of grounded theory, initial analysis of pre-existing data drove the need for further

data collection to engage in cycles of inductive and deductive reasoning and constant comparison of emerging categories. This resulted in an emerging framework of the mechanisms through which personalised feedback influences professional behaviour. The next step was to investigate this emergent framework in light of a new context. Qualitative enquiry is heavily interlinked and dependent upon the context in which it takes place and therefore it was thought to be important to explore the phenomenon of feedback of individual level data and professional behaviour change across multiple contexts.

Inheriting the qualitative data for research study two from a broader project limited the opportunity for iteration in cycles of analysis and data collection. However, the inductive analysis of this data is what drove the collection of the time point two data and a re-analysis of the original data in light of the emerging framework (i.e. the contents of research study three). This then led to data collection at a further site (Hospital Two) and exploration of the same mechanisms of effect (whilst allowing for new mechanisms to occur and the framework to be developed). Figure 9 below demonstrates the various interactions between the qualitative studies in work stream one.



**Figure 9. Interaction between qualitative studies in work stream one**

There is clearly an element of connectedness across the existing studies. However, it was still thought to be of value to engage in merging of the data in line with a more convergent mixed methods design (Creswell & Clark, 2007; Creswell et al., 2011). In this sense, multiple approaches to mixing the data were employed.

For the purposes of this case synthesis, all identified characteristics and psychological processes of the effect of personalised feedback on professional behaviour were extracted from the individual

studies, compared and contrasted with specific attention paid to disconfirming evidence. In this sense, a comparative analysis was employed (Pope, Mays, & Popay, 2007).

### 2.9.3 Results

Table 20 below represents the characteristics and psychological processes identified within each of the individual research studies in work stream one.

Table 20. Key findings from work stream one against research question

<b>How does feedback influence professional behaviour in healthcare?</b>		
<b>Research study title</b>	<b>Characteristics of effective feedback</b>	<b>Psychological processes through which feedback impacts on professional behaviour</b>
Exploratory quantitative analysis	<ul style="list-style-type: none"> <li>• Feedback is based upon relevant and meaningful quality indicators</li> <li>• Feedback comes from a credible source</li> <li>• Feedback is detailed and specific</li> <li>• Feedback is personalised (based on individual level performance)</li> <li>• Feedback takes place within a supportive local context</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focused on the areas that require reflection and action</li> <li>• End users experience a reduction in scepticism/defensiveness</li> </ul>
Qualitative evaluation	<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is novel and provides an additional resource</li> <li>• Feedback is based upon relevant and meaningful quality indicators</li> <li>• Feedback initiative is led by a trusted peer</li> <li>• Feedback is detailed and specific</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way and</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users identify with the purpose of receiving the feedback</li> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• The professional identities of end users are reinforced</li> <li>• End users are aware of positive subjective norms associated with</li> </ul>

	<p>provides sign posting to the end user</p> <ul style="list-style-type: none"> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback is anonymous</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality improvement and performance management</li> <li>• Feedback is aligned with broader policy</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is accompanied with goal setting and action planning</li> </ul>	<p>feedback</p> <ul style="list-style-type: none"> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users are actively engaged with feedback</li> </ul>
<p>Framework analysis Hospital One</p>	<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback takes place within cohesive and integrated</li> </ul>	<ul style="list-style-type: none"> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for their existing performance</li> <li>• Improvement actions displayed by end users are reinforced</li> <li>• The professional identities of end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> </ul>

	<p>groups of colleagues/communities of practice</p> <ul style="list-style-type: none"> <li>• Feedback is accompanied with goal setting and action planning</li> </ul>	<ul style="list-style-type: none"> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are actively engaged with feedback</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> </ul>
<p>Framework analysis Hospital Two</p>	<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is novel and provides an additional resource</li> <li>• Feedback initiative is led by a trusted peer</li> <li>• Feedback is detailed and specific</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback takes place within cohesive and integrated groups of colleagues/communities of practice</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality improvement and performance management</li> </ul>	<ul style="list-style-type: none"> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for their existing performance</li> <li>• Improvement actions displayed by end users are reinforced</li> <li>• The professional identities of end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> <li>• End users experience schema development</li> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users take on a group identity</li> <li>• End users experience control and</li> </ul>

	<ul style="list-style-type: none"> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is accompanied with goal setting and action planning</li> </ul>	<p>ownership over their future performance</p> <ul style="list-style-type: none"> <li>• End users are actively engaged with feedback</li> <li>• End users form a partnership with feedback providers</li> </ul>
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As with the Hospital One qualitative investigation, clear processes of reinforcement, cognitive dissonance, mastery (i.e. setting goals and tracking performance against them over time), social interaction and planned behaviour (based on attitudes, subjective norms and perceived behavioural control) were identified among the Hospital Two anaesthetists. However, the Hospital Two exploration also refined and advanced the emergent understanding of the mechanisms through which feedback impacts upon professional behaviour. A number of additional mechanisms emerged during the Hospital Two analysis and these simultaneously advanced the existing understanding of the Hospital One dataset further.

This work stream demonstrates the importance of the relevance and meaningfulness of feedback in the eyes of its end users which has been emphasised in the literature (Hysong et al., 2006). This interacts with perceptions of purpose. If end users identify with the overarching purpose of receiving and acting upon feedback then they are more likely to perceive the information as important. The regression analysis demonstrated the significance of feedback that is perceived as relevant. End users need to be able to engage with the feedback and classify it as something that is important to them and their local setting. A variety of perceptions of purpose came through in the qualitative analyses. When end users believed that the goals of feedback were to improve patient care and support professional development they were more engaged and demonstrated greater positivity towards participation. This is likely to be due to a synchronisation of goals of the initiative with goals of the individual. The literature also demonstrates a preference for non-punitive feedback that is focussed on quality improvement (Bradley et al., 2004; Hysong et al., 2006; van der Veer et al., 2010).

The qualitative exploration of the Hospital Two initiative suggests that feedback impacts on professional behaviour by fulfilling additional purposes and appealing to the wider needs of its end users. The Hospital One anaesthetists were also keen to use feedback to provide evidence of departmental performance and improvement over time, to request support from senior members of the organisation and to fulfil the requirements of both appraisal and revalidation. Perceptions of novelty are also relevant here. The provision of feedback was regarded as an additional resource for end users which therefore gave it greater meaning and relevance. It served a purpose that had not

previously been attended to. The Theory of Planned Behaviour emphasises the role of perceived consequences in determining whether or not an individual will act upon feedback (Ajzen, 1991). Therefore, the outcome expectancies assigned to feedback initiatives are of great importance.

Feedback works through promoting trust and perceptions of credibility in its end users. Factors that increase trust and perceived credibility include its source and the quality indicators upon which it is based. The Feedback Process Model highlights perceived accuracy (which is thought to be pre-empted by source credibility) as a key process through which feedback impacts on behaviour (Ilgen et al., 1979; Kinicki et al., 2004). The regression analysis, in study one, highlighted perceived credibility as one of the most important factors in determining perceived usefulness of feedback for improving practice. The importance of the perceived credibility of feedback and its source is evident across both case studies. Interviewees emphasised the importance of having a trusted peer leading the initiative. In the Hospital One qualitative analysis concerns about anonymity were identified alongside a drive for achieving an effective balance between quality improvement and performance management. The Hospital Two analysis also suggests that feedback works through increasing trust and reducing scepticism/defensiveness in its end users.

Feedback impacts on professional behaviour by appropriately focussing the attention of its end users (i.e. sign posting and directing them to the areas that require attention and resources). This is often related to the level of detail and specificity that it provides them with. This is directly linked to the level of actionability of the feedback and therefore the likelihood that it will result in behaviour change and learning. The regression analysis emphasised the role of personalised feedback. Receiving feedback based on performance as an individual captures and focuses attention on areas that the individual has some degree of control and ownership over. Qualitative analysis revealed that information that highlights potential discrepancies between ideal and actual performance can act as a prompt for behaviour change. In this sense it increases actionability and provides the recipient with greater direction for improvement. The role of benchmarking and peer group comparisons appears to be of particular importance across both case studies. Effective sign posting has the ability to promote automatic thoughts about potential behaviour change in end users. Simultaneously, such signals can be used by more senior members of staff to ensure the protection of patient safety. Feedback Intervention Theory states that feedback impacts on behaviour by changing the locus of recipients' attention to key discrepancies between goals and performance (Kluger & DeNisi, 1996). The role of goal setting and monitoring has been widely associated with feedback, learning and behaviour change (Carver & Scheier, 1982; Sapyta et al., 2005).



Feedback can act as reinforcement for both current performance and changes to behaviour. Receiving information that confirms abilities or demonstrates improvement over time therefore acts as a reward for end users. This encourages them to continue their engagement with the feedback process and supports further modifications over time. This finding integrates well with behaviourist learning theory (Skinner, 1948).

Feedback impacts on professional behaviour by interacting with the concepts of identity and excellence. Engaging with feedback (or not) has an influence on how individuals feel about themselves as professionals and how they assess their progression towards excellence. The importance of professional role and identity has been emphasised in the Theoretical Domains Framework (Cane et al., 2012; Michie et al., 2005). The Hospital Two analysis suggests that feedback impacts on professional behaviour by contributing to schema development in its end users (Piaget, 1964). This relates to the desire that the Hospital One anaesthetists expressed to test their personal conceptualisations of their own performance (i.e. their mental models) against the feedback reports that they were receiving. Feedback therefore also has the ability to contribute to professional identity through the information that it provides. For example, feedback may inform an individual that they are not realistically performing in the way that complies with internal standards. This may lead to behaviour change. In order to encourage behaviour change it is important to ensure that it is an attractive and obtainable option in comparison to message rejection. Qualitative analysis revealed that this is achieved through perceptions of subjective norms and experiences of self-efficacy which are key components of the Theory of Planned Behaviour (Ajzen, 1991). In relation to self-efficacy, the Behaviour Change Wheel has proposed capability, opportunity and motivation as the key pre-requisites to behaviour change (Michie et al., 2011).

It is evident that feedback impacts on professional behaviour through an interaction with acceptance and support from those around you. Perceived social pressure and social support increases the likelihood that feedback will contribute to learning. Active interaction with peers contributes further support through processes of modelling, scaffolding and cognitive apprenticeship. These processes echo the key principles of social constructivist learning (Bandura & Cervone, 1986). The regression analysis demonstrates the importance of a supportive local context which was also revealed through qualitative analysis emphasising the role of subjective norms as a construct predicting behaviour. The need for feedback to promote active interaction was a prominent finding of the framework analysis. Learning was associated with social interaction and

peer guidance. The Theoretical Domains Framework has emphasised the role of social influences in behaviour change (Cane et al., 2012; Michie et al., 2005) whilst key systematic reviews have highlighted the importance of additional components to support feedback and reduce passivity (Benn et al., 2012; De Vos et al., 2009).

A core difference between the Hospital One and Hospital Two anaesthetists was centred around the group identity and group level behaviour change. Feedback seemed to be more associated with group level changes to practice at Hospital Two compared with Hospital One. From researcher experience of conducting interviews at both sites there seemed to be more of a collective culture for quality improvement within the anaesthetics department at Hospital Two compared with Hospital One. Social interaction that had to be initiated by the project lead at Hospital One tended to occur more naturally at Hospital Two. For example, people were contacting those that had a similar case mix to them and asking for support in improvement processes and for the opportunity to compare data over time. However, the Hospital One anaesthetists did recognise the role of feedback in monitoring departmental performance and any associated improvements over time. In this sense they may have recognised the socio-cultural potential of feedback but felt limited in actioning these processes by the local climate and their existing level of integration with colleagues. This links with the finding from the regression analysis that local departmental climate for quality improvement influences perceived usefulness of existing feedback. The role of group level processes and behaviour change may be dependent on the local culture and existing level of cohesion among group members (Kaplan et al., 2012; Ovreteit et al., 2011).



## **3. WORK STREAM TWO: FEEDBACK AT THE ORGANISATIONAL LEVEL**

### **3.1 Introduction**

Work stream one explored the characteristics and psychological processes through which individual level feedback influences professional behaviour from the perspective of personalised feedback initiatives in anaesthesia. Within part three of the thesis work stream two will be introduced through a literature review of feedback at the organisational level and an overview of the specific research context of incident reporting. Following from this the methods and findings from each of the two individual research studies will be presented and discussed. The section will conclude with a case synthesis which combines insights from both studies and contributes to model building and conceptual development.

### 3.2 Literature review: Feedback at the organisational level

Feedback at the organisational level has generally received less attention in the academic literature compared with feedback at the individual level. However, feedback of operational experience over time is viewed as an important mechanism of organisational learning, resulting in incremental and large-scale modification to care systems and processes (Davies & Nutley, 2000). Effective feedback of this nature supports the development of a 'learning organisation' by encouraging adaptive and responsive behaviours that occur collectively among professionals (Senge & Suzuki, 1994).

Provision of effective organisational level feedback may also contribute to the development of an optimal safety culture within an organisation. One of the key characteristics of a safety culture that has been identified in the literature is being 'informed'. Effective feedback contributes directly to the level of information that an organisation is engaging with (Reason, 1998). Feedback may support organisations in reaching the generative stage of learning in Westrum's model of safety maturity (Parker, Lawrie, & Hudson, 2006; Westrum, 1993; Westrum & Adamski, 1999). Having a generative learning culture involves seeking out information, sharing responsibility and welcoming new ideas (Hudson, 2003).

Effective feedback also has the potential to support the development and sustainability of high reliability organisations (Roberts & Rousseau, 1989). A high reliability organisation is an organisation that has succeeded in avoiding catastrophes in an environment where normal accidents can be expected due to risk factors and complexity (La Porte & Consolini, 1998; LaPorte & Consolini, 1991; Roberts, 1990). High reliability organisations seek out and use information wherever possible (Hudson, 2003). Responding to feedback demonstrates adaptivity to warning signs which is a further characteristic of a high reliability organisation (Cooke & Rohleder, 2006). This may work through encouraging collective heedfulness as organisations respond and adapt to feedback to make positive changes through professional behaviour change. Feedback supports the development of a heedful organisational mind and should be viewed as an ongoing communication process (Weick & Roberts, 1993). A recent systematic review has emphasised the relevance of high reliability organisation research to healthcare organisations (Tolk, Cantu, & Beruvides, 2015).

Theories of organisational learning suggest that in order to be effective feedback should be framed in a way that supports systems rather than individual level thinking (Senge & Suzuki, 1994).

However, recent work has suggested that in order to be effective, feedback at the organisational level must have the ability to transfer key messages and learning to the individual professionals that make up an organisation (Dimick & Hendren, 2014; Glance, Osler, Mukamel, Meredith, & Dick, 2014). Specific issues associated with feedback to professionals based on organisational level data may include the practical issues of access and coordination, human factors around system usability and any competing social or cultural issues (e.g. openness and data disclosure, misuse of data to support specific agendas, lack of resources for quality checking etc.) (Berg, 1999, 2001; Pipino, Lee, & Wang, 2002; Powell, Davies, & Thomson, 2003; Wallace, Spurgeon, Benn, Koutantji, & Vincent, 2009; Wilkinson, Michie, & McCarthy, 2007).

### 3.3 Research context: Incident Reporting Systems

One way of monitoring organisational performance is through information that is offered voluntarily by those working on the frontline of healthcare. Incident reporting systems allow individuals to submit information about individual errors, systemic problems or near misses that they, or relevant others, have experienced. Local incident reporting systems exist within every hospital and healthcare professionals receive training to support them in using them optimally.

Incident reporting data can be collated, analysed and fed back to promote wider learning. The possibility exists to harness the power of such large datasets to learn from experience across many individual units, to analyse what may be relatively infrequent events, to establish commonly agreed national standards and to tune guidance for safer, better quality care (Leape, 2002). The National Reporting and Learning System (NRLS) is the UK's centralised incident reporting system set up in 2003 shortly after the publication of the pivotal report, "An Organisation with a Memory" by the Department of Health (Department of Health, 2000). All trusts are required to upload their locally reported incidents monthly. The goal of centralised incident reporting systems is to share learning from one site to another. By extracting the key messages and learning across a broader dataset it is possible to encourage wider scale learning from individual incidents (rather than confining the learning to the area in which the original incident took place) (Williams & Osborn, 2006).

However, despite its vast potential, feedback from current incident reporting systems is not optimal and requires improvement (Barach & Small, 2000; Leape, 2002). In the UK, policy initiatives focused upon incident reporting have raised questions around how best to feed back and use incident reporting data to support both professional and organisational learning. One of the only systematic reviews to address this issue specifically was conducted by Benn and colleagues by looking at case studies of feedback (Benn et al., 2009). The authors identified five modes and 15 requirements for effective feedback based on a systematic scoping review and accompanying guidance from an expert panel. The review emphasised the wide variation in practice in terms of the mechanisms by which reporting systems link to local action to improve clinical work systems. It demonstrated that there is little evidence of capacity for rapid action in current high level systems and little evaluation of the impact of feedback upon operational quality and safety. In terms of characteristics of effective feedback, the review article emphasised the importance of leadership, credibility and channels for dissemination. However, despite this work, there remains a need to better understand the use of information and action from incident reporting at the organisational level to improve quality and safety through individual level learning.

There are also potential unintended consequences of feeding back organisational level information from incident reporting systems. For example, when individuals become aware of an area of focus for management, they may consciously or unconsciously neglect other aspects of care in attempt to meet and exceed expectations of improvement (Asch, 2004; Rosenbaum, 2015). It is vital that research explores such issues, in their complexity, and that a stronger understanding of these potential barriers is incorporated into the development of new incident reporting systems and procedures.

Understanding how to increase the effectiveness of feedback from incident reporting is an ongoing challenge for healthcare systems globally. Multiple studies have identified ineffective feedback as a barrier to future reporting and general engagement with information systems at the individual level (Anderson, Kodate, Walters, & Dodds, 2013; Barach & Small, 2000; Braithwaite, Westbrook, Travaglia, & Hughes, 2010; Evans et al., 2006; Firth-Cozens, Redfern, & Moss, 2004; Gandhi, Graydon-Baker, Huber, Whitemore, & Gustafson, 2005; Gong, Song, Wu, & Hua, 2015; Holmström et al., 2012; Kaplan & Fastman, 2003; Kingston, Evans, Smith, & Berry, 2004; Macrae, 2015; Pfeiffer, Manser, & Wehner, 2010; Stavropoulou, Doherty, & Tosey, 2015; Thoms, Ellis, Afolabi, & Graham, 2012).

Incident reporting, more generally, has received significant attention in the recent literature. A qualitative study based on the views of international patient safety experts presented five key challenges as an explanation as to why incident reporting has not reached its potential to date (Mitchell, Schuster, Smith, Pronovost, & Wu, 2015). These included inadequate processing of incident reports in terms of analysis and prioritisation and insufficient visible action for frontline staff as a result of their reporting efforts. This is further emphasised by Sujan (Sujan, 2015) who explores the difficulties of breaking down the barriers between the high level processes of incident reporting and the experiences of front line staff. This author goes as far as to suggest that incident reporting should become less centralised and focus more on generating action through local processes on the front line of healthcare. A recent systematic review found that incident reporting has been unsuccessful at enabling double loop learning and therefore its existing impact on safety culture is limited (Stavropoulou et al., 2015).



### 3.4 Work stream aims

The primary research aim for this PhD is to describe and investigate the characteristics and mechanisms by which feedback influences professional behaviour in healthcare. The specific aim of this work stream is to investigate the perceptions and experiences of healthcare professionals using organisational level feedback from incident reporting systems. In doing this, the objective is to understand and enhance the effectiveness of organisational level feedback from incident reporting systems and extract the characteristics and mechanisms by which it influences professional behaviour.

### 3.5 Research study five: Perceptions of safety science experts

Figure 10 below provides a breakdown of the individual research studies and how they build up into case studies and work streams. Circles are included to demonstrate the focus of this section and contextualise it within the thesis as a whole.

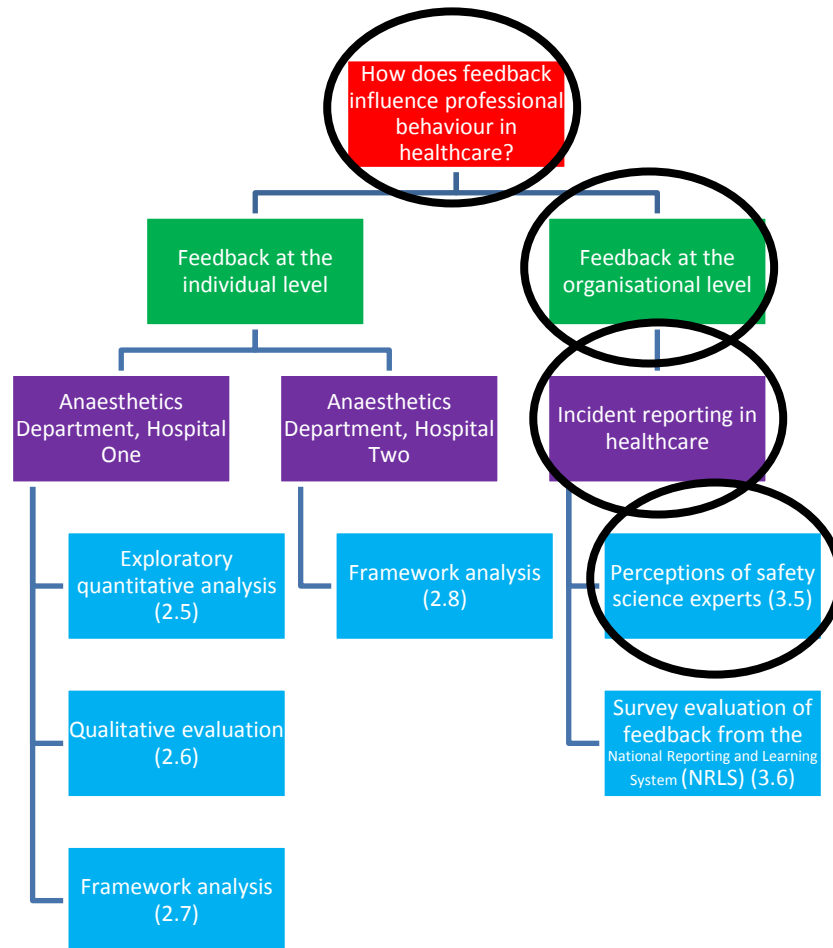


Figure 10. Structure of the thesis

#### 3.5.1 Introduction

As mentioned previously, one of the only systematic reviews to address the issue of how best to feed back and use incident reporting data to support learning was conducted by Benn (primary supervisor of this PhD) and colleagues by looking at case studies of effective feedback (Benn et al., 2009). Within the original study, the research team consulted with a range of subject matter experts to help develop the conceptual focus of the scoping review using a mixed methods approach. The qualitative dataset that was collected as part of this exercise was a rich source of information on

multi-industry perspectives on effective forms of safety feedback for frontline professionals, and hence the decision was made to perform an extended analysis of these data, using a robust qualitative approach, to explore the theme of feedback from incident reporting and professional behaviour change.

## **3.5.2 Methods**

### *3.5.2.1 Research ethics*

The original study was approved by the Thames Valley Multicentre Research Ethics Committee in June 2005 (Ref: 05/MRE12/13).

### *3.5.2.2 Participants*

Sampling for the original study had been driven by qualitative research principles of maximum variation sampling. Potential interviewees were contacted due to their association with a specialist international forum. The forum director facilitated contributions whilst the research team followed up with the individuals, provided information about the project and gained consent according to ethical guidelines. Semi-structured interviews were undertaken with safety science experts across a range of industries, including: civil aviation, maritime, energy, rail, offshore production and healthcare. All interviewees had either professional or academic responsibility for incident reporting systems. Several well-established current and former incident reporting programmes were represented, including: NASA Aviation Safety Reporting System (ASRS), UK NPSA National Reporting and Learning System (NRLS), UK Confidential Human Factors Incident Reporting Programmes (CHIRP) for both general aviation and maritime operations, the Australian Incident Monitoring System (AIMS), the UK Rail Confidential Incident Reporting and Analysis System (CIRAS) and the British Airways Safety Information System (BASIS). A full list of the reporting systems can be found in Table 21. Many of these high risk industries have achieved remarkable levels of safety performance and have progressed further than healthcare in terms of creating and sustaining effective safety information systems (Hudson, 2003; Pham et al., 2010).

**Table 21. Incident reporting systems represented**

<b>Acronym</b>	<b>Title</b>	<b>Domain</b>
ASRS	Aviation Safety Reporting System	US Aviation
PSRS	Patient Safety Reporting System	US Healthcare
NRLS	National Reporting and Learning System	UK Healthcare
CHIRP	Confidential Human Factors Incident Reporting Programme	UK Civil Aviation
CHIRP	Confidential Hazardous Incident Reporting Programme	UK Maritime
BASIS	British Airways Safety Information System	UK Civil Aviation
	Military Incident Reporting System	UK Military Aviation
CAP	Corrective Action Programme	UK Energy
CIRAS	Confidential Incident Reporting and Analysis System	UK Rail
AIMS	Australian Incident Monitoring System	AUS Healthcare
PPMS	Personal Professional Monitoring System	AUS Healthcare

### **3.5.2.3 Data Collection**

Interviews had previously been conducted by the primary supervisor of this PhD programme of research. Interviews explored perceptions of existing safety management and information processing/incident reporting systems with a specific focus upon feedback of safety-critical information. The specific mechanisms used to feed back information into operations to improve safety were investigated alongside associated barriers and facilitating factors. Table 22 provides a simplified overview of the topic areas with example questions covered whilst the full interview schedule is included in Appendix F. The interview schedule was developed and refined throughout the process of data collection based on recommendations and advice from interviewees. However, the interviews were purposely very flexible in terms of topic coverage, as dictated by the respondents' specific subject matter expertise.

Table 22. Simplified overview of interview topic areas with example questions covered

Topic	Example Questions
Relevance and representation	<ul style="list-style-type: none"> <li>• Please could you outline your role relevant to safety management and/or incident reporting systems in particular?</li> <li>• Please could you describe the primary industry/sector in which you currently work and any other work domains/industrial sectors in which you have had experience relevant to safety management.</li> </ul>
Description of safety management and information processing/incident reporting Systems	<ul style="list-style-type: none"> <li>• Can you describe the process by which safety issues within operations are detected, analysed and [information fed back to improve safety?] (What happens to an issue as it is reported and passes through the information system?).               <ul style="list-style-type: none"> <li>- How are data collected and analysed, and what is the output from this process?</li> <li>- How are recommendations/issues prioritised – what is the risk analysis process?</li> </ul> </li> <li>• How is the effectiveness of changes made in operations evaluated? How do you know that they've worked?</li> </ul>
Focus upon feedback of safety-critical information	<ul style="list-style-type: none"> <li>• Is feedback provided to individual reporters on the progress of their issues?</li> <li>• On what level of organisational systems is information fed back/targeted?</li> <li>• What types of changes are implemented as a result of operation of the system?</li> <li>• What formal channels/means of communication already exist/are in place for feeding back information to the operational level?</li> </ul>
Barriers and facilitating factors for effective feedback processes	<ul style="list-style-type: none"> <li>• How important is senior management support for incident reporting and feedback?</li> <li>• What cultural factors influence the success of safety information feedback processes?</li> <li>• What technological/IT factors influence the success of these systems?</li> </ul>
Specific questions for dedicated incident reporting programs	<ul style="list-style-type: none"> <li>• What information processing takes place within the database? Can it be queried?</li> <li>• What is the output from the database? What metrics are tracked/reported periodically?</li> <li>• What type of analysis of stored information takes place – qualitative or quantitative? What's the difference between the two?</li> </ul>

### 3.5.2.4 Analysis

The original interviews had been thematically analysed, for the scoping review, from the interview audio, with only partial transcription. For the purposes of this analysis the recordings were

professionally transcribed in order to support analysis using more robust methods in NVivo software (version 10). The analysis comprised both inductive and deductive reasoning. Interview recordings were read and re-read until the data were familiar. The inductive approach was informed by some of the principles of grounded theory (Strauss & Corbin, 1990). For example, data fragments were open-coded into units of meaning, units of meaning were then coded and grouped into broader themes and sub-themes through a process of axial coding and constant comparison. The over-arching research questions were also used deductively to structure the analysis with support from the previously established modes and requirements for effective feedback that had been identified in the original scoping review article (Benn et al., 2009). The purpose of including this parallel deductive approach was to embrace the opportunity to expand and elaborate upon the original identified themes in light of the more specific research questions, advanced approach to analysis and different qualitative investigator (representing different views, experiences and expectations of the data). In parallel, the inductive approach ensured that new theory was able to emerge from the analysis and that it was not in any way restricted by circular reasoning. At an intermediary stage of analysis, the emergent qualitative template was defined and populated with example coding categories and interview quotations. This was reviewed and refined with input from a broader research team of social scientists with particular attention paid to searching for disconfirming evidence. Throughout the process of analysis, iterations of the qualitative template were developed until no new categories of meaning were derived and theoretical saturation had been reached.

### **3.5.3 Results**

Seventeen interviews lasting between 45 and 90 minutes each were analysed. This provided approximately 17 hours of data. Interviewees reported a range of perceptions and experiences of effective feedback from incident reporting. Eight concepts for effective feedback emerged from the dataset. Data are presented below with each quotation accompanied by respondent code and area of safety science expertise. An overview of the structure and definition of the themes which form the output from the qualitative analysis process is provided within Table 23. Table 23 also includes example practical applications of the concepts in the form of industrial case studies to demonstrate how these concepts can be translated into practice. All included practical applications were derived directly from the transcripts themselves (i.e. they were examples put forward by the participants).

Table 23. Overview of structure and definition of themes alongside practical applications

Themes	Sub-themes	Definition of theme	Practical applications
Effective feedback has visible sponsorship from executive members of staff	<p>Senior members of staff have the right level of authority/power to take action based on incident reports</p> <p>Senior members of staff have the profile/visibility that is needed to set an example to others</p>	Senior members of managerial staff take an active and visible role in all stages of the feedback system and its underlying mechanisms/processes.	<p>Memos or safety bulletins circulated by senior members of staff</p> <p>Leadership walk rounds</p> <p>Senior member of staff is 'the face' of a local safety campaign</p> <p>Senior member(s) of staff present at the 'roll out' of a new safety initiative</p> <p>Management responses to feedback are published and disseminated</p>
Effective feedback preserves anonymity without compromising learning	<p>Gives the reporter an active involvement in the decision making process</p> <p>Supports a system rather than individual approach</p> <p>Avoids the need for anonymity</p> <p>Blame culture decreases future reporting/engagement with the system</p>	Feedback processes gain the trust of reporters without preventing full access to necessary information related to the incident under investigation. There is a trade-off to be made between 'identifiability' and specificity of learning and this must be completed successfully.	<p>Reporters' consent is gained for anything that is intended to be published</p> <p>Education about reporting</p>
Effective feedback rewards reporters for their efforts	<p>Reinforces reporting</p> <p>Morale/relationship with the organisation</p>	Reporters are satisfied with the outcomes of their incident investigations and are encouraged to engage in the process again in the future.	<p>Individualised feedback is sent directly to all reporters</p> <p>All reporters are followed up by telephone</p> <p>Written material (i.e. journals) summarising the outcomes of all investigations is circulated</p>
Effective feedback	Allows for the best use of resources with	Prioritisation is a key step in the feedback system to	Ranking process determines the course of

supports prioritisation of resources for improvement	<p>greatest effect</p> <p>Enables identification of where a rapid response is necessary</p> <p>Develops a stronger understanding of long term risk</p>	ensure that the most appropriate incidents are investigated and acted upon first (with consideration of current resource availability).	<p>action for the incident (e.g. does an incident get passed on to the board for discussion or not)</p> <p>Screening process</p> <p>Agreed triggers for action</p> <p>Monitoring of repeat events</p> <p>Risk assessment to support future planning</p>
Effective feedback involves and engages frontline staff in the safety improvement process	<p>Frontline staff can provide valuable input into solutions and actions</p> <p>Develop shared understanding of purpose of reporting systems</p> <p>Develop shared responsibility for making an organisation safe (i.e. delivery of the purpose)</p>	Feedback processes consider the subject matter knowledge and expertise of frontline staff and ensure that staff members understand the role that they should be playing in the information system in order to ensure high quality care for their patients.	<p>Operational staff are consulted during the investigation process</p> <p>Seminars to target and support specific areas of improvement</p> <p>The purpose of the reporting system is published and disseminated to increase understanding</p>
Effective feedback is tailored and specific to its audience(s)	<p>People will remain interested if they receive information that is relevant/meaningful to them</p> <p>Supports the satisfaction of multiple stakeholders simultaneously</p>	Feedback is appropriately tailored to the people that are receiving it to encourage a positive reception. It is delivered using multiple practical modes of dissemination.	<p>System can respond to personal requests/requirements for specific data</p> <p>Just in time briefs</p> <p>Directed reading</p> <p>Hard copy and electronic copy of feedback material</p>
Effective feedback occurs at multiple points in the alerting and response process	<p>Supports timely feedback (keeps people updated and stops them from feeling abandoned)</p> <p>Allows for general awareness of a problem to be raised</p>	Feedback is given to relevant stakeholders at multiple time points to maintain interest and engagement at different stages of the investigation process. This results in an ongoing dialogue.	<p>Specific staff members are responsible for sending out direct feedback after an event has occurred</p> <p>Department writes back to individual to explain how their incident has been classified and what the next steps are.</p>



			<p>Further feedback then follows at a later date</p> <p>People are reminded about existing policies and guidance whilst further investigation is underway</p>
<p>Effective feedback allows for further communication with relevant stakeholders</p>	<p>Allows for further communication with the reporter to request further contextual information</p> <p>Holds people accountable to following up specific actions</p> <p>Allows reporter to feedback on the way that their incident was dealt with (i.e. a form of double loop learning)</p>	<p>The feedback loop is ongoing and allows both reporter and investigator to request further information/support at any stage. This results in an ongoing dialogue.</p>	<p>Systematic telephone follow up</p> <p>Action tracker</p> <p>Action review board</p>

**Characteristic 1: Effective feedback has visible sponsorship from executive members of staff**

Executive members of an organisation were thought to have the profile and visibility that is needed to set an example to others in terms of prioritising and valuing the safety improvement process. This could be at the level of strategic priority setting or visible support of local quality and safety projects. This was suggested to be particularly important at the early stages of change (during “rollout”) when frontline staff are forming opinions on new projects and deciding whether or not they want to participate. Senior members of staff have the ability to champion a safety related project and increase its visibility against competing demands (i.e. productivity pressures):

**Respondent 7, UK Healthcare and Nuclear Power:** *“And it needs senior engagement. You know. So the Chief Exec made that happen by, you know, when he’s having his Board meetings, you know, rather than safety being an any other business item, safety was the first.”*

**Respondent 11, UK Chemical Offshore and Process:** *“You do need the senior people to stay with it and I think it’s reasonable, you’ve got to understand their situation, they can’t turn up to everything, but they show their face periodically, they do participate and when it comes to the rollout it is important that they reappear and they very clearly champion these things.”*

**Respondent 9, UK Mining:** *“So I think management’s most difficult task is to keep safety visible, you know, to regard it as more important than the production of the day.”*

Executive members of staff were also thought to have the right level of authority to ensure that corrective action is taken based on incident reports. Their involvement was perceived to support the transition from information into local improvement. When senior support was not present the feedback process remained passive:

**Respondent 10, UK Rail:** *"... Some organisations did not appoint someone senior enough and with enough authority to actually get appropriate responses out of the organisation. So we would give a report to someone and really they were just the safety administrator, and they would then push this report onto various heads of engineering or operations and they would just get curt replies, and they didn't have the authority internally to exert some pressure to get a sensible response."*

### **Characteristic 2: Effective feedback preserves anonymity without compromising learning**

It was thought to be important to give the reporter(s) an active involvement, and degree of power, in the decision making process surrounding feedback and action. This involved discussions around the potential need for anonymity and ultimate ownership of the reported information:

**Respondent 1, Australian and UK Healthcare:** *"And we say, "Are you happy for us to group your data and analyse it?" and they always say, "Yes, that's fine. As long as you don't identify me, that's not a problem.""*

A system rather than an individual focussed approach was thought to be desirable in order to effectively tackle problems that had been raised through the reporting system. However, further education may be required in order to achieve this:

**Respondent 10, UK Rail:** *"So we have to try to encourage and educate them, really, into a systemic way of thinking. Because if you've got a report that concerns inappropriate or long roster periods that are making people drowsy, tired, that potentially has an impact on safety, and you don't really need to know where it happened and when it happened and who was involved – all you need to do is look at your system for designing rosters, and how that system is managed, and how that system potentially can be shortcut-ed or violated, and what the pressures are for doing that. You don't need to go to any specific place – you just have to have a systems view of your organisation."*

Having a systems approach was believed to take the focus away from that of a blame culture which had the potential to decrease engagement with and trust in the system. Interviewees felt that there was a need to change the way that people conceptualise incident reporting in order to effectively improve safety culture and ultimately influence professional behaviour change:

**Respondent 4, UK Healthcare:** *"So to make it clear that this was a reporting and learning system is partly a cultural – well, it's a message about the nature of the reporting and what it's for and an attempt to kind of engage people in this sort of thinking. Reporting is not only about, you know, reporting people who are negligent or deficient or something, but it's a process of thinking and learning."*

**Respondent 16, UK Civil Aviation:** *“Their problem was, which I think is the health service problem, is they had a blame culture. And when you have blame culture people, A, are reluctant to report and, B, when they report they’ll make sure somebody else is to blame (laughs).”*

### **Characteristic 3: Effective feedback rewards reporters for their efforts**

It was thought to be absolutely essential that feedback reinforces the process of reporting by making end-users aware of the positive and influential outcomes of incident investigation and professional behaviour change. However, this procedure was not considered to be the norm:

**Respondent 7, UK Healthcare and Nuclear Power:** *“I think it has to reinforce reporting, I think it has to reinforce that by reporting something positive occurs out of the process or some analysis has occurred or something has been done with the data, because I don’t think many people see that at the moment.”*

Feedback was also viewed as an emotional reward through its ability to boost the morale of its end users and improve their relationship with the information system. This may take place when people feel that their working life has improved as a result of reporting and therefore they experience a feeling of satisfaction and optimism. This results in increased respect for the process of incident reporting and a sense of empowerment that it is possible to achieve change:

**Respondent 7, UK Healthcare and Nuclear Power:** *“And that to me is what’s successful; people at the sharp end need to see quite quickly that what they put in they started getting something out locally and they start seeing change locally quickly that really sort of improves their working lives.”*

**Respondent 13, UK Maritime:** *“Really it’s about the way that they perceive the process, the way that they then value the process more and then you know, word gets round which is great.”*

A lack of communication about the outcomes of reporting, on the other hand, has the potential to result in disconnect and disengagement. Interviewees were concerned that reporters had been disheartened by having to report into a “black hole”. Even if developments are progressing behind the scenes it is vital to ensure that clear information is provided:

**Respondent 8, US Healthcare:** *“Because I think that people’s general feeling, I’m sure you’ve heard, is that these things just go into a black hole and you never heard anything back again, you don’t even get a thank you for submitting it.”*

**Respondent 5, UK Healthcare, Maritime, Civil Aviation, Rail, Chemical Offshore and Process and Nuclear Power:** *“You disseminate it, because clearly reporters will not continue to respond if they’re reporting into a black hole.”*

**Respondent 11, UK Chemical Offshore and Process:** *“Now, that was a classic exchange between two groups of people who clearly didn’t understand each other’s mind-sets. The company was resourcing this reasonably well, they were actually acting on the actions, none of that was visible to the employees.”*

#### **Characteristic 4: Effective feedback supports prioritisation of resources for improvement**

The safety science experts believed that engaging in a process of prioritisation as a matter of routine allowed for the best use of resources with greatest effect. In most cases, it was thought to be impossible to follow up all incidents thoroughly and therefore it is essential that there is a procedure to support systematic and objective decision making:

**Respondent 15, UK Nuclear Power:** *“... And you can see that you’ve got a scale of investigation and ability to prioritise and to focus your resource because you can’t chase every hare, and you have to make sure you chase the important ones. So there’s a process of prioritisation which is what it’s all about.”*

A number of different approaches to/methods of prioritisation were identified by the interviewees. These included the prioritisation of repeat events, events that are simpler to deal with and events that have the potential to cause harm for the greatest number of people:

**Respondent 15, UK Nuclear Power:** *“And if it’s a repeat event, we give it a more heavy weight treatment. If this is the second or third time something has happened or something similar has happened then we hit it harder, because what we want to understand in that case is why what we did in response to the earlier event hasn’t succeeded.”*

**Respondent 3, US Healthcare:** *“... As the simpler issues get dealt with, then you start getting into the thornier problems that are more difficult to deal with.”*

**Respondent 17, UK Healthcare, Military Aviation and Rail:** *“So I think the general agreement around the table would be, it would not be sensible to concentrate fully on the ultra-severe cases because their numbers are relatively small, and you probably would want to use, and I know I would certainly want to use, information that suggested thousands of people were being slightly harmed or moderately harmed by a procedure that wasn’t right, or a drug administration that has gone wrong. So there’s a balance to strike there.”*

Prioritisation was thought to enable investigators to identify where a rapid response is necessary. Interviewees shared experiences of rankings and categories that they had used to determine when to launch an immediate response. Such rankings had been determined by various factors such as risk rating and required resources:

**Respondent 12, UK Civil Aviation:** *“The analysts would be fairly well trained engineers or pilots with a lot of experience who would look at the incident and then assign a risk level to it, which was initially and that’s changed now since I left, it was A, B, C, D or E with A at the top and E at the bottom. And each of those basically an A would be straight to the Board and to the Civil Aviation Authority and they had to get something done about it immediately, B was pretty hot after that, C was fairly significant but depending on how much resources we had available you would deal with it, Ds and Es would be sort of lesser.”*

**Respondent 16, UK Civil Aviation:** *“And for that meeting probably recommendations on action would be presented to the chief executive because they’re not experts in it, but you might say, “Look, we can do a short term fix, but in the long term we need to spend money”*

*And there would be a consideration and perhaps the chief executive would say, "Okay, yes, because of the size of the money I need to take it to the board." It goes to the board then."*

Prioritisation was also believed to support the development of a stronger understanding of long term risk which can aid future planning and strategy. Interviewees thought that current feedback data has the potential to predict and support future approaches to both prioritisation and action:

**Respondent 10, UK Rail:** *"Yeah. We classified them and also applied a risk assessment process to it, so we would then highlight, in an executive report for management, those incidents or near misses and associated causal factors that had the highest likelihood and consequence rating. So then that was fed back to the industry and said, okay, we think, based on the CIRAS data, that this is a high-risk area that you need to pay particular attention to."*

**Respondent 17, UK Healthcare, Military Aviation and Rail:** *"I think that probably varies from place to place and system to system. Most of the systems that we have round the table would not ignore a lot of smaller incidents because I think there's a general feeling that this could be the next set of accidents, you know, coming from, and you need to know that information so that you can actually put stuff into place that will address it."*

#### **Characteristic 5: Effective feedback involves and engages frontline staff in the safety improvement process**

Frontline staff were thought to be able to provide valuable input into solutions and actions based on their clinical expertise and perspective:

**Respondent 2, US Healthcare and Civil Aviation:** *"Their expertise is what I want, because these are doctors, nurses and pharmacists, and they need to put their perspective in the coding, I want to see that there..."*

In some cases this involvement included frontline staff seeking out and implementing their own improvement actions based on the feedback that they had received from the incident reporting system. In this sense feedback prompted individualised plans for improvement that were led by end users:

**Respondent 1, Australian and UK Healthcare:** *"And they don't need to do anything with that. I mean, we encourage them to share it with their supervisors of training, and we go through it with them, and they usually come to us and say, "Look, I've got a glitch on my" - I don't know - "IV cannulae. Could I have more IVs to put in please?" And then we'll say, "Okay, we can give you lists with them on," and then they'll go and do more IV cannulae."*

Interviewees expressed a need for a shared frontline understanding of the ultimate purpose/goals of reporting systems if feedback is to reach its potential. It should not be assumed that people have a strong enough understanding of how the system works in order to engage with it optimally:

**Respondent 4, UK Healthcare:** *"I'd say one kind of challenge or barrier, whatever, which is implicit, I think, in a lot of what we've been saying, is understanding what reporting can give*

*you and what it can't, and what it's useful for. I just don't think that's really been thought through."*

**Respondent 17, UK Healthcare, Military Aviation and Rail:** *"It's certainly true of healthcare they don't really realise what's expected of them. For instance, there is not just a misunderstanding but a lack of understanding about near miss situations particularly..."*

This in itself may support the development of a shared responsibility for making an organisation safer based on feedback from incident reporting. The safety science experts emphasised that people need to be educated in order to know how to use feedback effectively and have the confidence to do so:

**Respondent 9, UK Mining:** *"So if they're educated properly then the feedback becomes critically important because if they're educated well then if you tell them what the basic cause is they've probably got a solution. But they'll only put the solution to place if they believe they're in control of their environment, and a lot of workers don't believe they're in control of their environment, even quite well paid workers, even professionals."*

#### **Characteristic 6: Effective feedback is tailored and specific to its audience(s)**

People were only thought to be interested in and engaged with feedback that is directly relevant and meaningful to them and their role(s). They are unlikely to seek out any additional information unless it serves a particular purpose for them as an individual:

**Respondent 12, UK Civil Aviation:** *"I think the pilots, like everybody else who goes to work and comes home and is tired, they don't tend to do an awful lot of hunting round unless they've got some special agenda that they want to pursue, maybe their own personal incident or something that they've got a bee in their bonnet about."*

This was also associated with whether or not they go on to act upon the information that the feedback has provided them with:

**Respondent 7, UK Healthcare and Nuclear Power:** *"And this is almost where it comes back to the ownership; if it's meaningful for you you'll do something about it, but if it's not I wonder how much actually it gets done. I'm not always convinced but that's a personal perceptive. You know. You know, so it's about, you know, doing something with that component."*

Therefore incident reporting systems require the capacity to deliver targeted information. The experts believed that feedback should be angled in order to make it relevant to as broad an audience as possible:

**Respondent 7, UK Healthcare and Nuclear Power:** *"So I think, you know, it's about trying to make the sort of the feedback meaningful to different people in a variety of different contexts and perspectives even if you haven't been involved in that type of incident."*

One interviewee felt that the ultimate goal would be for end users to have automatic access to the most relevant information at the most appropriate time:

**Respondent 15, UK Nuclear Power:** *“What we’ve been seeking and striving to get to, is when somebody goes out to do a particular job on a power station, on Thursday of this week, that he has available to him all of the accumulated knowledge about things that have gone wrong with that type of activity in the past...”*

In order to achieve this it was thought that investigators and managers required a more developed understanding of the day to day working lives of people on the frontline. If successful, this change could go some way in narrowing the gap between management and frontline perspectives:

**Respondent 11, UK Chemical Offshore and Process:** *“You have to spend time in the tea shack and the shop floor because you’ve got to understand what their agenda is and how they see this. Otherwise you just become part of the shared management problem as they might see it. You’re not a positive influence.”*

Interviewees believed that feedback systems should also have the capacity to respond to specific information requests from individuals. In this sense, the end user should have the opportunity to request and define the tailored feedback that will be most useful to them personally:

**Respondent 6, Australian Healthcare:** *“If people are interested in something, they can look in our database. And we found, wow, we’ve got a bunch of these. When they said, “Have you got anything on violence and aggression?” We said, “Well, we can give you a breakdown of 15,000, if you want?” So it’s pretty powerful data.”*

The use of different modes of communication to deliver the feedback in multiple formats was framed as allowing the system to have greater reach. It was emphasised that different channels and levels of specificity allow messages to be effectively distributed to different types of recipient:

**Respondent 7, UK Healthcare and Nuclear Power:** *“I think it’s about not putting all your eggs in one basket and thinking, “Well we’re just going to do it this way,” I think you’ve got to be very versatile in, you know, making sure feedback gets back to the relevant people.”*

**Respondent 6, Australian Healthcare:** *“Yes. Well, they’ve got to be completely versatile, from real simple, standard reports for executives and so on, through to very detailed, could tell me how many kids in paediatric intensive care units have had cerebral haemorrhages from adrenaline infusions, you know?”*

It was expressed that this approach supports the delivery of information to multiple stakeholders simultaneously despite them having different perspectives and fulfilling different roles. Different people require the same feedback of information but for different purposes:

**Respondent 3, US Healthcare:** *“... Depending on what fields are filled in, there might be other managers that the report goes to. So for example, if the report is about a drug given on a patient floor, the report goes to the nurse manager on that floor, but because it’s a drug, it might also go to the pharmacy manager. So the patient safety manager gets it, plus*

*those other managers and there's a fairly free flow of information and discussion to flesh out the issues that they think are interesting."*

#### **Characteristic 7: Effective feedback occurs at multiple points in the alerting and response process**

Timely feedback was presented as a way to keep people updated with the investigation process and prevent them from feeling abandoned by the system. This was thought to be particularly relevant when step by step decision making is taking place behind the scenes. People will assume that no action has been taken if they do not receive any information. If it is not possible to feedback with action then it is essential that systems feedback with information:

**Respondent 8, US Healthcare:** *"I wonder if sometimes it wouldn't be useful just to give feedback on, "This is our understanding of where the vulnerabilities are and it may not..." You know, even before we have a ready solution, because, I mean, some of these things will take a longer time, some of them may not be able to be resolved."*

**Respondent 17, UK Healthcare, Military Aviation and Rail:** *"Sometimes people need interim feedback as well, because some of these things take a long time for the system to implement changes, you need to make sure that the reporter is kept on board and knows what's happening, that it just doesn't work for a long haul and he gets left in the dark about things because he thinks nothing's happening."*

**Respondent 16, UK Civil Aviation:** *"It might say, "We've done a risk analysis on it and we are going to put it in the database," or, "This will be raised at the next monthly meeting." And then if it's important enough, however months later when something has been done, they would get another letter saying, "This was part of five reports which gave the same thing and we've taken the following action.""*

As well as reassuring the reporter, it was believed that this process allows investigators to raise general awareness of the problem at an early stage of investigation. Initial key messages can be disseminated passively before definite action takes course. This may be as simple as reminding end users to refer to existing guidelines and policy whilst further investigation takes place. Small interventions such as these may prevent additional incidents from occurring in the interim period:

**Respondent 17, UK Healthcare, Military Aviation and Rail:** *"And also, an issue should not be ignored just because no obvious known solution exists. It's all very easy to put something in the too difficult basket, and we can't solve that, but what we're saying is that you can actually raise awareness by talking about the issue through the feedback system."*

**Respondent 15, UK Nuclear Power:** *"...So we put something round our internal systems that said while we are still investigating the detail of what this is all about, it's quite clear this guy was not clipped on at the point at which he fell off. So we have, in the company, a clear safety code of practice at working at heights, part of which says while you are working not in the designated area or complete working platform, while you are building it, while you are extending it, you will be clipped on. This went round all of our sites saying you want to take an opportunity now to just review your arrangements for ensuring that people who are working whether their own staff or whether they are contractors doing work at heights how*



*you satisfy yourself that, actually, while they are doing those kind of jobs they do clip themselves on, because you can't watch them all the time."*

### **Characteristic 8: Effective feedback allows for further communication with relevant stakeholders**

The investigator may need to engage in further communication with the reporter to request contextual information to support optimal analysis and interpretation. A full understanding of the origins of the report was believed to be essential and this also provides an opportunity for any subjectivity to be removed. A systematic follow up process was framed as serving a dual purpose as it simultaneously acknowledges the efforts of the reporter:

**Respondent 10, UK Rail:** *"That's one of the reasons we keep the information. The initial reason was, first of all, once we take the initial report, we may then need to clarify something with the reporter, so we need to contact them again. And also we need to establish that it's a bona fide report, so we need to identify the individual, who they work for, etc., rather than just accepting anonymous reports."*

**Respondent 12, UK Civil Aviation:** *"We tried to get them to call them back as much as possible, (a) just to pat them on the back and say thanks, but also to actually make sure that they understood what the incident was all about."*

The experts viewed this process as guiding the quality and usefulness of feedback that it is possible to provide to end users. Without further contact with the reporter the depth of information is likely to be restricted and there is a lack of opportunity for validating that it is accurate:

**Respondent 3, US Healthcare:** *"And if you don't have the ability to go back to the reporter to get more information, then you've so hamstrung your analysts that you've undermined the learning ability of the reporting system. So I think anonymous systems don't make any sense."*

**Respondent 2, US Healthcare and Civil Aviation:** *"...but we try to get more information from them that is in a way substantiated or validated because that will help us take it out further beyond this report to maybe an alerting...about an issue, but then we have to be very solid on that before we do that."*

It was thought that an ongoing dialogue between relevant parties also helps to monitor progress and hold people accountable for following up specific actions as a result of feedback. This may be best approached in a structured and systematic way:

**Respondent 15, UK Nuclear Power:** *"The corrective actions all get allocated to an individual, they are all personalised, they are all timed, so they have a completion date, and they are monitored; they are all in one big database."*

**Respondent 14, UK Civil Aviation:** *"If you had received a negative or a zero response, you write to the chief executive if you think it's worthwhile and you say, you know, "On such and such a date I wrote to so and so and regretfully haven't received a response. We feel it's*

*important. The advisory board thinks it's important. Perhaps you could, you know, arrange for a response to be given”.*

Importantly, it also allows the reporter to feedback to the investigator(s) on the way that their incident was dealt with. This represents a form of double loop learning and removes the assumption that the feedback process ends when action takes place and information is delivered. The interviewees encouraged end-users to reflect upon whether or not the feedback that they have received meets their expectations of the safety monitoring system:

**Respondent 14, UK Civil Aviation:** *“And we invite them to do that and we say, “Come back to us if you’ve got any other problems or similar problems or if the problem’s not solved.”*

### **3.5.4 Discussion**

Feedback from incident reporting systems must be conceptualised and designed in the most effective way in order to promote learning and professional behaviour change at the individual level. Learning and behaviour change at the individual professional level can result in broader collective organisational learning and the development of an enhanced safety culture and a high reliability organisation. This in-depth qualitative analysis identified a number of concepts for effective feedback from incident reporting systems as perceived by a variety of safety science experts from different domains. These concepts explicitly suggest that feedback should be visibly supported, anonymous, timely and specific in order to impact on professional behaviour and have the desired effects. They also advocate the role of feedback in rewarding the efforts of incident reporters, engaging clinical staff members in the safety improvement process and effectively prioritising local action.

The results suggest that information in itself can be a prompt for behaviour change if it is appropriately specified and targeted. There is a need for feedback to effectively capture the attention of end users. Efforts to tailor feedback to specific audiences are evident in the literature (Ahluwalia & Marriott, 2005; Wilf-Miron, Lewenhoff, Benyamini, & Aviram, 2003) with particular emphasis on employing multiple modes of feedback to satisfy a variety of needs (Nakajima, Kurata, & Takeda, 2005; Takeda et al., 2003). This is often seen in the case of feedback on severe incidents or safety threats (Westfall et al., 2004). Initial rapid responses to feedback are often followed up with further information once an investigation has been completed (Joshi, Anderson, & Marwaha, 2001; Silver, 1999). It has been recommended that feedback represents different levels of analyses (i.e. provides information on both active and latent contributory factors) (Mahajan, 2010). The

current work has suggested that feedback must occur at regular time points in order to satisfy the end user and disseminate knowledge appropriately.

Feedback should recognise and reinforce processes of reporting and of professional behaviour change. Positive deviance may come into play here if those who respond well to feedback and demonstrate improvement can have a broader influence on those who have less initial faith in the worth of the system (Lawton et al, 2014; Marsh, Schroeder, Dearden, Sternin, & Sternin, 2004). This has the potential to result in self-perpetuation. The importance of feedback as a mechanism of reinforcement of the reporter has also been emphasised in the literature. There is evidence of existing feedback highlighting and rewarding the positive actions of staff whilst contributing to the development of an effective learning organisation (Amoore & Ingram, 2002; Nakajima et al., 2005; Takeda et al., 2003; Tighe, Woloshynowych, Brown, Wears, & Vincent, 2006). This has been shown to occur through a variety of forums including notes, teaching sessions, email correspondence, bulletin board postings, newsletters, seminars, education campaigns and meetings (Amoore & Ingram, 2002; Gandhi et al., 2005; Holzmueller et al., 2005; Joshi et al., 2001; Lubomski et al., 2004; Nakajima et al., 2005; Piotrowski, Saint, & Hinshaw, 2002; Takeda et al., 2003; Tighe et al., 2006; Wu, Pronovost, & Morlock, 2002).

The feedback process must provide protection for its end-users and avoid any associations with punishment. The system should create and support an ongoing dialogue between reporters and investigators in the form of a continuous partnership. A sense of team work, mutual understanding and shared responsibility should be attached to the information system. Processes of double loop learning frame feedback as a validation of the lasting success of the information system and its outputs. In this sense end users should have the opportunity to contest and retaliate against the system if they perceive it to be sub-optimal. A further finding of this analysis was the importance of ongoing communication between those reporting incidents and those investigating them. There are existing incident reporting systems that actively encourage a two-way flow of information between reporters and investigators through reminders and commentary (Beasley, Escoto, & Karsh, 2004). Double loop learning is encouraged through monitoring of the effectiveness of corrective measures and review of the safety improvement process as a whole (Oulton, 1981; Piotrowski et al., 2002). Follow up interviews and a telephone hotline are used to gain further contextual information from the reporter and clarify ambiguous details (Westfall et al., 2004; Wilf-Miron et al., 2003). Ongoing communication is also employed to increase accountability for implementing agreed action plans (Gandhi et al., 2005). The interviewees in this study proposed a number of advantages associated with a cyclical feedback loop. These included the ability to monitor the implementation of

recommended actions and their effectiveness and sustainability according to end users. Feedback should ultimately be systematic in its processes.

Feedback should be openly supported by senior members of the organisation in order to highlight its importance and relevance. Ward rounds (led by members of a Clinical Risk Management Committee) to ensure that safety improvements have been implemented are one way in which the role of support for incident reporting systems from senior members of staff has successfully been demonstrated (Nakajima et al., 2005).

The safety science experts in this study emphasised the need for feedback to prioritise based on the available resources for improvement. Processes of prioritisation are evident in a number of established reporting systems. Such processes are based on above average incident rates in certain areas as well as categorisation of individual incidents by severity (Oulton, 1981; Peshek & Cubera, 2004; Schneider & Hartwig, 1994; Tighe et al., 2006). Incidents classified as being of high importance are awarded appropriate levels of action. For example, they may be escalated for review by specific staff members (Tighe et al., 2006). Frontline clinical staff are involved in the process of rapid response to ensure clinically relevant safety improvements (Poniatowski, Stanley, & Youngberg, 2005). A recent qualitative study of key challenges to the effectiveness of incident reporting systems emphasised lack of prioritisation as an ongoing issue (Mitchell et al., 2015).

A key theme from the present analysis centred around the importance of engaging clinicians with the purpose and potential of incident reporting systems through the feedback that they receive and the involvement opportunities that they are given in the investigation process. Lack of medical engagement with incident reporting systems has received attention in the literature (Mitchell et al., 2015; Waring, 2005). This recent qualitative study emphasised a lack of medical leadership that is associated with the origins of incident reporting as well as fears surrounding data ownership and anonymity. Lessons drawn from the experiences of the NRLS suggest that local users of feedback should be involved in its design and development (Williams & Osborn, 2006).

In order to guide researchers, developers and policy makers this study sought to qualitatively analyse the views and perceptions of a range of safety science experts on how to develop and implement effective feedback from incident reporting systems to promote professional behaviour change and its associated effects (i.e. development of an improved safety culture and high reliability organisation). A range of factors were identified including the need to provide feedback at multiple time points during the process of investigation, the importance of allowing for ongoing

communication between the investigator and the reporter and the ultimate value of employing multiple modes and channels for delivering tailored feedback in a targeted way.

This analysis demonstrates that feedback is action as well as information; it's not just the act of giving information, but the process of changing the system that gave rise to the original safety issue, in some way. In this sense, "feedback" is really the "learning process" – not just human learning and awareness, but system change and quality improvement. Feedback is active communication and dialogue with the reporter, not just passive dissemination of information. Future feedback systems should be conceptualised as networks for information sharing, which are stimulated by and include intelligence from incident reporting, but which are more about facilitating discussion of safety issues and solutions and which bring reporters into contact with peers with diverse experiences and safety experts. Therefore, feedback should resolve around a push and pull model (not just push). Feedback is multi-modal and should not be confined to incident data. It should include contextual information, broader advice/evidence, rich narratives of how things go wrong, and sharing of solutions that have been found to be effective, as well as data on incidence. Feedback is a tool for engagement of staff in patient safety and a tool for professional behaviour change. The reporting loop is a continuous cycle and feedback perpetuates this cycle ensuring that the system continues to receive high quality information to detect future threats. These evidence based conceptualisations of feedback should form fundamental components of the incident reporting systems that are developed and implemented into healthcare systems in the future.

Research study five has a number of limitations which should be acknowledged at this stage of the thesis. The sample of safety science expert interviewees was based on their association with a specific international forum and therefore it is possible that opportunities for additional input could have been missed. However, due to the highly specialised nature of the forum it could be argued that it was the most appropriate way to recruit participants for this study. All of the safety science experts were also given the opportunity to recommend additional people to contribute to the study. This work was an extended version of a previously conducted analysis. However, the former work was heavily focussed on a systematic scoping review and the interview transcripts had not yet been the subject of a rigorous qualitative investigation. It is acknowledged that the data was originally collected in 2005 and significant developments in the field of incident reporting have occurred since then. However, due to the lack of advancement (as demonstrated by recent publications) and ongoing need for an improved understanding of how to develop optimal incident reporting systems it was thought to be justified to re-visit the data accordingly.

Please note that overarching limitations of the PhD and thesis as a whole are explored in section 5.3.

### 3.5.5 Key findings against research question

In order to extract and compile key findings against the primary research question, these short sections are included consistently throughout the thesis at the end of each research study. They also contribute to the intermittent work stream syntheses and the overarching synthesis of results in section 4. The key characteristics and psychological processes that emerged through this research study are presented in Table 24 below.

Table 24. Key findings from study five against research question

<b>How does feedback influence professional behaviour in healthcare?</b>	
<b>Characteristics of effective feedback</b>	<b>Psychological processes through which feedback impacts on professional behaviour</b>
<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is detailed and specific</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback takes place within cohesive and integrated groups of colleagues/communities of practice</li> <li>• Feedback is anonymous</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality improvement and performance management</li> <li>• Feedback is aligned with broader policy</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is delivered in a</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users identify with the purpose of receiving the feedback</li> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for their existing performance</li> <li>• Improvement actions displayed by end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users take on a group identity</li> <li>• End users experience control and ownership over their future performance</li> <li>• End users form a partnership with feedback providers</li> <li>• End users are actively engaged with feedback</li> </ul>

<p>timely fashion</p> <ul style="list-style-type: none"><li>• Feedback is accompanied with goal setting and action planning</li><li>• Feedback is supported by senior members of staff</li></ul>	
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### 3.6 Research study six: Survey evaluation of feedback from the NRLS

Figure 11 below provides a breakdown of the individual research studies and how they build up into case studies and work streams. Circles are included to demonstrate the focus of this section and contextualise it within the thesis as a whole.

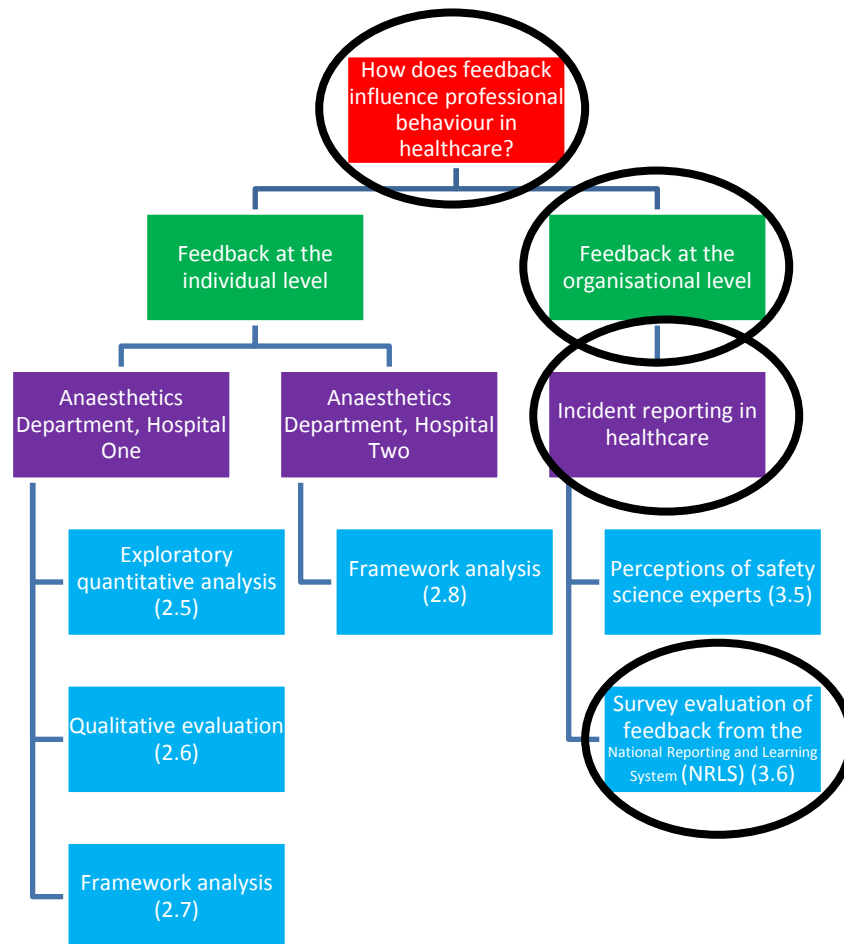


Figure 101. Structure of the thesis

#### 3.6.1 Introduction

The previous qualitative analysis revealed a number of characteristics and conceptualisations of effective feedback from incident reporting systems based on the perceptions of safety science experts internal and external to the healthcare domain. These characteristics and the psychological processes that they promote have the ability to influence professional behaviour across an organisation and in turn contribute to the development of a more effective safety culture and high reliability organisation as well as quality improvement itself. This research study aimed to use those



qualitative findings to drive an informed quantitative investigation of current use of feedback from the NRLS, therefore indicating a movement back to positivist principles. The previous qualitative work suggests that organisational level feedback can influence professional behaviour if it employs a number of characteristics. The core mechanism for receipt of organisational level feedback from incident reporting in the UK healthcare system is via the NRLS. It was therefore viewed to be important to understand whether this system is supportive of professional behaviour change (i.e. does it reach the right people and does it provide information to the organisation in a design/format that is supportive of individual level professional behaviour change?).

This study therefore aimed to evaluate the effectiveness of feedback from the NRLS by exploring its current use within organisations by various stakeholders and the degree to which it supports the necessary processes for professional behaviour change. The evaluation was also designed to offer participants an opportunity to put forward information concerning what they would like to change about the feedback system in order for it to better meet their professional needs and that of others. This is important for the research question because it may be indicative of the design characteristics that are expected to support professional learning based on incident reporting data.

### **3.6.3 Methods**

#### ***3.6.3.1 Research ethics***

This study was part of a broader NRLS development programme initiative to evaluate new service improvements for disseminating NRLS data. Under research ethics guidance survey research involving staff members does not require formal ethics approval. Approval from NHS England was sought to conduct the evaluation through the NRLS development programme steering group.

#### ***3.6.3.2 Design***

A cross-sectional survey design was used with data collected at a single time-point.

#### ***3.6.3.3 Survey measure***

The survey measure was designed with reference to the existing literature around feedback from incident reporting and what makes it effective (reported in section 3.3) as well as the findings from

the previous qualitative research study (reported in section 3.5.3). In this sense, the survey operationalises concepts from the qualitative work as a form of theoretical validation. The survey comprises sections on the value of NRLS data, local data quality, local interpretation and sense making, benchmarking and understanding variation, communicating and raising awareness and acting on risks to patient safety. Table 25 below demonstrates some examples of the links between the qualitative findings and the survey items. A full copy of the survey can be found in Appendix G.

**Table 25. Links between prior qualitative findings and individual survey items**

<b>Qualitative theme</b>	<b>Related survey item(s)</b>
Effective feedback has visible sponsorship from executive members of staff	<ul style="list-style-type: none"> <li>• Which groups use/should be using NRLS data and the NRLS data feedback system</li> </ul>
Effective feedback preserves anonymity without compromising learning	<ul style="list-style-type: none"> <li>• The NRLS data feedback system helps us to understand how our approach to reporting compares to that of other organisations</li> <li>• The NRLS data feedback system allows us to understand the strength of our reporting culture compared to others</li> <li>• The NRLS data feedback system allows us to compare our data with that of other organisations in a meaningful way</li> </ul>
Effective feedback rewards reporters for their efforts	<ul style="list-style-type: none"> <li>• The NRLS data feedback system has resulted in improvements in how we collect data locally</li> <li>• The NRLS data feedback system helps us to find and correct data quality issues</li> <li>• The NRLS data feedback system provides useful ways of analysing and interpreting incident data in order to identify learning opportunities</li> <li>• How useful is the NRLS data feedback system for continuously improving patient safety?</li> </ul>
Effective feedback supports prioritisation of resources for improvement	<ul style="list-style-type: none"> <li>• The NRLS data feedback system helps us to prioritise patient safety issues that require local corrective action</li> </ul>
Effective feedback involves and engages frontline staff in the safety improvement process	<ul style="list-style-type: none"> <li>• Which groups use/should be using NRLS data and the NRLS data feedback system</li> </ul>
Effective feedback is tailored and specific to its audience(s)	<ul style="list-style-type: none"> <li>• NRLS data is integrated with our local risk management processes</li> <li>• The local priorities suggested by NRLS data reflect valid patient safety concerns at our organisation</li> <li>• The NRLS data feedback system supports me in cascading learning to other levels of our organisation</li> <li>• The NRLS data feedback system is supportive of adapting NRLS data for the needs of specific stakeholders in our organisation</li> <li>• Does the NRLS data feedback system support you</li> </ul>

	<p>in disseminating key learning to relevant others?</p> <ul style="list-style-type: none"> <li>• Is the NRLS data feedback system currently adaptable to different people with different purposes in your organisation?</li> </ul>
Effective feedback occurs at multiple points in the alerting and response process	<ul style="list-style-type: none"> <li>• NRLS data provides us with timely information</li> <li>• The NRLS data feedback system helps us to respond rapidly to patient safety issues</li> </ul>
Effective feedback allows for further communication with relevant stakeholders	<ul style="list-style-type: none"> <li>• NRLS data are integrated with our local risk management processes</li> </ul>

The four ordinal items included in the survey are measured using six categories (never/annually/six-monthly/quarterly/monthly/more frequently than monthly). The seven sets of scale items are measured on an eight point Likert scale ranging from one (strongly disagree) to eight (strongly agree). A number of free text items are also included to allow respondents to elaborate on their quantitative ratings and responses. Questions were included to explore both perceptions of both NRLS data (defined as “the data that is compiled through combining your locally reported data with that of other organisations nationally under the NRLS taxonomy”) and the NRLS data feedback system (defined as “the means by which NHS organisations currently receive NRLS data in the form of monthly, quarterly and six monthly reports. Please note that this term does not refer to safety alerts/guidance etc.”). Perceptions of the NRLS data feedback system were expected to be influenced by underlying perceptions of NRLS data. Therefore it was felt to be important to capture and understand this information.

In designing and developing the survey a cognitive walkthrough process was conducted during which a local risk manager reviewed all potential survey items and discussed their value from an operational perspective and as a user of NRLS feedback. This process was invaluable in refining the survey and ensuring that the selected questions were meaningful to the target participants.

#### ***3.6.3.4 Data collection***

The survey was circulated by the reporting leads of the NRLS operational team on the 1<sup>st</sup> May 2014. It was sent to all individuals in England and Wales that have an NRLS login. An NRLS login means that a person has permission to upload incidents to the NRLS. However, recipients of the communication from the NRLS team were also asked to share the survey link with any other members of their organisation who use NRLS data. This means that a broader range of individuals are likely to have received the invitation to participate in the survey. The survey was closed on the 30<sup>th</sup> July 2014.

### 3.6.3.5 Analysis

Descriptive statistics were employed to analyse the quantitative data. A simple thematic approach to qualitative analysis was employed as free text responses were generally short and specific (i.e. did not provide rich data as per the previous qualitative studies). All free text responses were grouped and categorised in relation to the key research questions.

### 3.6.4 Results

The survey had a total of 320 individual respondents although not all participants completed all questions. 49% of possible organisations were represented in the sample (196 out of a possible 399 organisations completed the survey). The total number of possible organisations was calculated by the operational reporting leads at the NRLS based upon organisations that have an NRLS login to upload incidents. Table 26 below shows the breakdown by organisation type. It was not possible to calculate a response rate at the individual level because (due to the sampling strategy employed) there is no way of accurately knowing how many people received the invite to participate.

Table 26. Breakdown of respondents by organisation type

Organisation type	% (n)
Acute teaching	11.2% (22)
Acute specialist	7.1% (14)
Acute large	13.3% (26)
Acute medium	14.8% (29)
Acute small	10.2% (20)
Ambulance	4.1% (8)
Mental health	18.9% (37)
Welsh Local Health Boards (LHBs)	1.5% (3)
CCG	5.1% (10)
Local area team	5.1% (10)
NHS community organisation	4.1% (8)
Social enterprise	4.1% (8)
Other	0.5% (1)

79% of respondents classified themselves as 'risk managers/governance/organisational quality assurance'. The remainder of the sample consisted of 'senior organisational managers/strategic level board', 'clinical service leads and service managers', 'doctors', 'pharmacists', 'nurses' 'allied health professionals' or 'other hospital staff'.

### 3.6.4.1 Quantitative results

Respondents were asked which staff groups currently use NRLS data and the NRLS data feedback system in their organisations. The results demonstrate that currently clinical members of staff are not using either the NRLS data feedback system or the data that it presents. 59% of respondents reported that doctors never use NRLS data in their organisation, 57% of respondents reported that nurses never used the data and 41% reported that pharmacists never used the data. Furthermore, 75% of respondents indicated that both doctor and nursing groups never used the current NRLS data feedback system (monthly/quarterly reports). Risk managers, however, were thought to be using the data at least monthly by 56% of respondents and the feedback system at least monthly by 40% of respondents. Table 27 below demonstrates results for NRLS data and Table 28 demonstrates results for the NRLS data feedback system. The red figures indicate the category that was selected by the highest percentage of respondents.

**Table 27. Perceptions of current use of NRLS data by staff group**

	Never	Annually	Six-Monthly	Quarterly	Monthly	More frequently than monthly
Senior organisational managers/strategic level board	8.7% (17)	8.7% (17)	<b>44.1% (86)</b>	20.5% (40)	13.8% (27)	4.1% (8)
Risk managers/governance/organisational quality assurance	0.9% (2)	1.9% (4)	24.5% (52)	17% (36)	25.9% (55)	<b>29.7% (63)</b>
Clinical service leads and service managers	<b>36.0% (63)</b>	4.0% (7)	26.3% (46)	12.6% (22)	13.7% (24)	7.4% (13)
Doctors	<b>59.2% (93)</b>	5.7% (9)	13.4% (21)	9.6% (15)	7.0% (11)	5.1% (8)
Pharmacists	<b>41.6% (67)</b>	3.7% (6)	21.1% (34)	12.4% (20)	12.4% (20)	8.7% (14)
Nurses	<b>57.4% (89)</b>	3.9% (6)	12.3% (19)	10.3% (16)	9.0% (14)	7.1% (11)
Allied health professionals (health professions distinct from medicine, pharmacy and nursing)	<b>60.4% (93)</b>	2.6% (4)	11.0% (17)	10.4% (16)	8.4% (13)	7.1% (11)
Other hospital staff	<b>63.6% (91)</b>	3.5% (5)	10.5% (15)	7.7% (11)	9.1% (13)	5.6% (8)

Table 28. Perceptions of current use of the NRLS data feedback system by staff group

	Never	Annually	Six-Monthly	Quarterly	Monthly	More frequently than monthly
Senior organisational managers/strategic level board	<b>35.5% (55)</b>	4.5% (7)	34.2% (53)	14.2% (22)	8.4% (13)	3.2% (5)
Risk managers/governance/or organisational quality assurance	8.9% (17)	1.6% (3)	<b>32.5% (62)</b>	17.3% (33)	17.3% (33)	22.5% (43)
Clinical service leads and service managers	<b>57.8% (78)</b>	3.0% (4)	19.3% (26)	8.9% (12)	7.4% (10)	3.7% (5)
Doctors	<b>75.4% (95)</b>	3.2% (4)	10.3% (13)	4.0% (5)	5.6% (7)	1.6% (2)
Pharmacists	<b>64.8% (83)</b>	1.6% (2)	13.3% (17)	10.2% (13)	6.3% (8)	3.9% (5)
Nurses	<b>75.2% (94)</b>	2.4% (3)	9.6% (12)	4.8% (6)	4.8% (6)	3.2% (4)
Allied health professionals (health professions distinct from medicine, pharmacy and nursing)	<b>74.6% (91)</b>	1.6% (2)	10.7% (13)	4.9% (6)	5.7% (7)	2.5% (3)
Other hospital staff	<b>74.4% (90)</b>	0.8% (1)	11.6% (14)	4.1% (5)	5.8% (7)	3.3% (4)

Perceptions of the local validity of NRLS data varied across respondents. Respondents generally reported that NRLS data is well-integrated within their local risk management systems, but 33% strongly disagreed that the current system provided them with timely information (M=2.91). The data in Table 29 below represents perceptions of NRLS data. Note that higher mean scores indicate greater levels of agreement with the statement.

Table 29. Perceptions of NRLS data

Item	Mean	SD	Median	Range
The local priorities suggested by NRLS data reflect valid patient safety concerns at our organisation	4.87	1.815	5	7
NRLS data is integrated with our local risk management processes	5.52	2.064	6	7
NRLS data provides us with timely information	2.91	2.080	2	7
<b>Scale score: Your perceptions of NRLS data</b>	<b>4.41</b>	<b>1.583</b>	<b>N/A</b>	<b>N/A</b>

For the NRLS data feedback system, the items with the highest mean scores were associated with understanding strength of reporting culture compared to others (M=5.64) and understanding how approach to reporting compares to that of other organisations (M=5.29). The items with the lowest mean scores were associated with responding rapidly to patient safety issues (M=3.39) and being provided with the level of detail and specificity that is needed to support local improvement initiatives (M=3.40). The data in Table 30 below represents perceptions of the NRLS data feedback system. Note that higher mean scores indicate greater levels of agreement with the statement.

**Table 30. Perceptions of the NRLS data feedback system**

Item	Mean	SD	Median	Range
The NRLS data feedback system helps us to understand how our approach to reporting compares to that of other organisations	5.29	2.031	6	7
The NRLS data feedback system helps us to find and correct data quality issues	4.59	2.067	5	7
The NRLS data feedback system has resulted in improvements in how we collect data locally	4.66	2.136	5	7
<b><i>Scale score: Your perceptions of the extent to which the NRLS data feedback system supports local data quality</i></b>	<b>4.85</b>	<b>1.824</b>	<b>N/A</b>	<b>N/A</b>
The NRLS data feedback system provides useful ways of analysing and interpreting incident data in order to identify learning opportunities	4.29	1.975	4	7
The NRLS data feedback system helps us to prioritise patient safety issues that require local corrective action	4.03	1.884	4	7
<b><i>Your perceptions of the extent to which the NRLS data feedback system supports local interpretation and sense making</i></b>	<b>4.16</b>	<b>1.877</b>	<b>N/A</b>	<b>N/A</b>
The NRLS data feedback system allows us to understand the strength of our reporting culture compared to others	5.64	1.923	6	7
The NRLS data feedback system allows us to compare our data with that of other organisations in a meaningful way	4.82	2.047	5	7
<b><i>Your perceptions of the extent to which the NRLS data feedback system supports benchmarking and understanding variation</i></b>	<b>5.23</b>	<b>1.868</b>	<b>N/A</b>	<b>N/A</b>
The NRLS data feedback system supports me in cascading learning to other levels of our organisation	4.32	1.915	4	7
The NRLS data feedback system is supportive of adapting NRLS data for the needs of specific stakeholders in our organisation	3.68	1.753	4	7
<b><i>Your perceptions of the extent to which the NRLS data feedback system supports communicating and raising awareness</i></b>	<b>4.00</b>	<b>1.737</b>	<b>N/A</b>	<b>N/A</b>
The NRLS data feedback system helps us to respond rapidly to patient safety issues	3.39	1.887	3	7
The NRLS data feedback system provides us with the level of detail and specificity that we need to support local improvement initiatives	3.41	1.761	3	7
<b><i>Your perceptions of the extent to which the NRLS data feedback system supports local action to address risks to patient safety</i></b>	<b>3.39</b>	<b>1.764</b>	<b>N/A</b>	<b>N/A</b>

### 3.6.4.2 Qualitative results

Respondents were asked to explain their reasons for using the NRLS data feedback system. Qualitative analysis of free text responses revealed that the main reason for using the NRLS data feedback system was for the purposes of benchmarking:

**Respondent 132:** *“In my role with Patient Safety it is useful to compare our information with other organisations”*

**Respondent 264:** *“To gather information on our levels of reporting and compare against other organisations”*

**Respondent 165:** *“Enables good benchmarking against other organisations within our cluster”*

This included benchmarking for assurance, benchmarking to increase awareness of current position and benchmarking to identify any issues of concern:

**Respondent 314:** *“To confirm to us that we are strong reporters and what we are reporting and how it compares with others in our cluster”*

**Respondent 219:** *“Improved awareness of incidents and comparison with other providers and time periods”*

**Respondent 182:** *“As a benchmark against other organisations...An independent review of patient safety data that may reveal issues of concern”*

Respondents were asked to describe how the NRLS data feedback system supports them in their specific role. They were also asked how useful the NRLS data feedback system was for disseminating key learning to relevant others, adapting information for different purposes and continuously improving patient safety. Many respondents expressed that the current feedback system is unable to support them in their professional role:

**Respondent 31:** *“In the present guise not very helpful”*

**Respondent 63:** *“At the moment it doesn't”*

**Respondent 319:** *“It SHOULD support me in my role to feed back to GP practices and work with them to increase their reporting but it does not do that at present”*

This was for a number of reasons but primarily a lack of detail and a lack of timeliness:

**Respondent 3:** *“Useful to review but not enough detail at local level. Massive organisation for which I only work in one region. Don't want whole organisation's data, I want my own hospitals”*

**Respondent 182:** *“It does not because the delay in feedback is too long so it is always historical data”*



The way in which the feedback system was perceived to be most useful for end users was for benchmarking purposes. In particular, respondents felt that it supported them in using benchmarking as an incentive for improvement and as evidence to include in local reports:

**Respondent 281:** *"I can use it to drive for increased reporting and to assist in focusing on areas where we are outliers against other similar trusts"*

**Respondent 38:** *"I can use the data for comparisons to demonstrate our performance to Managers etc. within the Trust"*

**Respondent 234:** *"It helps to support the training I deliver and in the production of reports for benchmarking"*

However, peer organisations were not always thought to be comparable:

**Respondent 107:** *"It has information for each trust, this is identifiable to each organisation, but is not easily comparable for a number of reasons"*

**Respondent 301:** *"It is difficult because the trust is not only mental health and has regional services so we are not comparing the same when looking at other trusts"*

The system was also thought to be useful for identifying variation in the quality of local data. For example, the system highlights areas of potential concern with regards to data quality and enabled organisations to work on increasing data quality over time:

**Respondent 237:** *"Highlights reporting inconsistencies and areas for improvement, for example we need to review falls as we don't know if have fewer falls than our peer average or if we don't report them well"*

**Respondent 293:** *"We circulate feedback from the NRLS across the organisation and use it in incident reporting training to focus on improving the quality of our data"*

The system was not perceived to be helpful in disseminating key learning to other members of the organisation or adaptable to different people with different purposes. Reasons for this were again associated with a lack of detail and timeliness:

**Respondent 317:** *"NRLS data is not currently adaptable to different people; it only provides organisational level data"*

**Respondent 65:** *"The report is very high level and does not support specific learning across the teams"*

**Respondent 170:** *"No. There is insufficient information in the overall reports we are able to access"*

**Respondent 192:** *"No, the information provided is outdated and for the most part of too high a level to disseminate learning to relevant others"*

Instead respondents preferred to extract more detailed and timely data from the local system:

**Respondent 108:** *“No - the NRLS system is produced too far in arrears to be useful. We use own database to produce timely & current incident reports”*

**Respondent 107:** *“No, we use our internal data and always have that is current and live, not related to activity that happened a significant time ago, and relates to patients who may no longer be in our healthcare system”*

Overall, the feedback system was thought to be too out of date and unstandardised to have any influence on the continuous improvement of patient safety:

**Respondent 310:** *“Not useful as the data is out of date and not standardised across the NHS/our cluster”*

**Respondent 201:** *“Not particularly: The subjects are too vague and there is no guarantee that any other Trust is reporting the same data in the same way”*

Respondents were asked what could be changed about the NRLS data feedback system that would enable them to use it more effectively to make improvements to patient care. Inevitably, qualitative analysis of free text responses revealed that the main change that respondents requested was an improvement in the feedback system’s degree of timeliness:

**Respondent 190:** *“Reports need to be produced in a more timely fashion. Publishing data 6 months after the cut-off date is not helpful.”*

**Respondent 193:** *“Data comparison more timely so that you can use the information to influence change now rather than basing on information that is already old”*

**Respondent 174:** *“I think feedback could be done in a more timely manner, as unfortunately by the time the data is released it’s out of date”*

They believed that this could be achieved through providing live access to data or at the very least access to data that reflects the previous quarter:

**Respondent 264:** *“Needs to be more responsive we need to get the data and it needs to reflect the previous quarter any older is too late”*

**Respondent 287:** *“More regular data and looking back at last quarters instead of the quarter before”*

Respondents also expressed interest in making the feedback reports more detailed and specific as well as more frequent:

**Respondent 192:** *“Provided quicker and more frequently to allow for relevant trend analysis and support the dissemination of lessons learned in order for an effective response”*

**Respondent 230:** *“Feedback could be more regular in terms of the data...Themes and recommendations from other organisations would be good, without necessarily always*

*having to be mandated through alerts with deadlines, etc. - just general themes and observations”*

Respondents believed that coding of incidents across local and national systems needs to become more specific, defined and synchronised in order to increase the credibility of the data. Increased standardisation across systems was perceived as being essential:

**Respondent 222:** *“The coding hierarchy needs review if it is to be truly helpful - the categories are often broad and are not mutually exclusive”*

**Respondent 133:** *“Improved reliability across organisational cluster definitions. Improved reliability between NRLS incident classifications and the adoption of a common dataset. Both of the above explicitly prohibit reliable between-organisation comparative analysis”*

**Respondent 80:** *“Clearer definitions of incident types would ensure more consistency of data across the different organisations and therefore make comparison more meaningful/effective”*

### **3.6.5 Discussion**

This study aimed to evaluate the effectiveness of feedback from the NRLS in order to better understand the impact of organisational level data on individual professional behaviour and the implications of this for organisational learning and overall safety culture.

The survey data show that respondents currently use the NRLS data feedback system for the purposes of benchmarking for assurance, benchmarking to increase awareness of current position and benchmarking to identify any issues of concern. This was one of the only areas in which the feedback system generally meets respondents’ needs. Effective benchmarking may go some way in focussing the attention of end users which is a key component of existing models of feedback and behaviour change (Kluger & DeNisi, 1996).

Simultaneously, current feedback from the NRLS also enables end users to monitor the quality of the data that their institution is putting into the reporting system compared with others. This type of behaviour change is associated with the enhancement of local safety culture as people become more aware of reporting practices elsewhere. However, in terms of actually supporting local action to address risks to patient safety on the frontline, the feedback system was perceived to be greatly lacking.

Results suggest that considerable opportunity exists for feedback to target clinical members of staff in particular. Qualitative studies have emphasised lack of medical engagement as a key reason why current incident reporting systems have not reached their potential to date (Mitchell et al., 2015; Waring, 2005). It may be possible to tailor feedback to specific groups to increase its relevance and meaning to them in particular and therefore increase overall perceptions of usefulness and actionability. Frontline staff should be more involved in the design and development of feedback from the NRLS in order to ensure that it meets their needs (Williams & Osborn, 2006).

Recent work has suggested that organisational level feedback is not sufficient if it does not percolate through to those that need to act upon it (Dimick & Hendren, 2014; Glance et al., 2014). Participants in the current study expressed that the NRLS feedback system lacks sufficient detail and therefore does not enable the direct recipients of the feedback to further adapt and disseminate the information that they receive in order to simultaneously fulfil the needs of other members of the organisation. Risk managers can generally be considered as the gatekeepers of the feedback received from centralised reporting systems in the UK. Feedback systems should ensure that risk managers are supported in their roles to tailor and target information for specific groups and individuals. They should provide increased support for analysis of the data that local organisations are provided with. It may be the case that data needs to be broken down further at the point of feedback in order to support further dissemination throughout the organisation. Ultimately, a new system should provide further support in translating raw data into usable information for different user groups.

Both quantitative and qualitative results from the survey demonstrate that end users would like to see an improvement in the feedback system's degree of timeliness. They are also interested in feedback that is delivered to them more frequently. The pivotal role of timeliness in enhancing the effects of feedback has been emphasised by Hysong et al's concept of actionable feedback (Hysong et al., 2006). Feedback systems should provide timely and frequent information to their end users.

There is a lack of standardisation across local and national systems. There should be a focus on achieving greater standardisation across local and national systems. Increased standardisation across systems is viewed as essential. Individual staff members may be more inclined to engage with their local, rather than national, system if they perceive discrepancies (Sujan, 2015).

Current feedback generally meets organisational level benchmarking needs and enables monitoring of data quality by healthcare providers. It is therefore more likely to influence safety culture rather

than effectively support local improvement initiatives and rapid response to patient safety issues. This is due to a lack of detail and timeliness to ensure sufficient relevance and specificity for information to be adapted and disseminated throughout the organisation. This may go some way in explaining the perceived lack of engagement with clinical staff members on the ground. Risk managers, and others in similar roles, are unable to fulfil their role as gatekeepers without further support from the organisational level feedback system.

Research study six has a number of limitations which should be acknowledged at this stage of the thesis. The organisational response rate for the survey was relatively low and therefore the findings may not entirely represent the views of end users of NRLS feedback. It was not possible to calculate a response rate at the individual level as there was no way of knowing how many people received the invite to participate. This survey was not statistically validated although its development was heavily influenced by the prior literature and the qualitative findings of research study five and has therefore been theoretically informed.

Please note that overarching limitations of the PhD and thesis as a whole are explored in section 5.3.

### 3.6.6 Key findings against research question

In order to extract and compile key findings against the primary research question, these short sections are included consistently throughout the thesis at the end of each research study. They also contribute to the intermittent work stream syntheses and the overarching synthesis of results in section 4. The key characteristics and psychological processes that emerged through this research study are presented in Table 31 below.

Table 31. Key findings from study six against research question

<b>How does feedback influence professional behaviour in healthcare?</b>	
<b>Characteristics of effective feedback</b>	<b>Psychological processes through which feedback impacts on professional behaviour</b>
<ul style="list-style-type: none"> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is detailed and specific</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> </ul>

<ul style="list-style-type: none"><li>• Feedback contains peer group comparisons</li><li>• Feedback is tailored/targeted to its audience</li><li>• Feedback is delivered in a timely fashion</li></ul>	
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### 3.7 Case synthesis: Feedback at the organisational level

Figure 12 below provides a breakdown of the individual research studies and how they build up into case studies and work streams. Circles are included to demonstrate the focus of this section and contextualise it within the thesis as a whole.

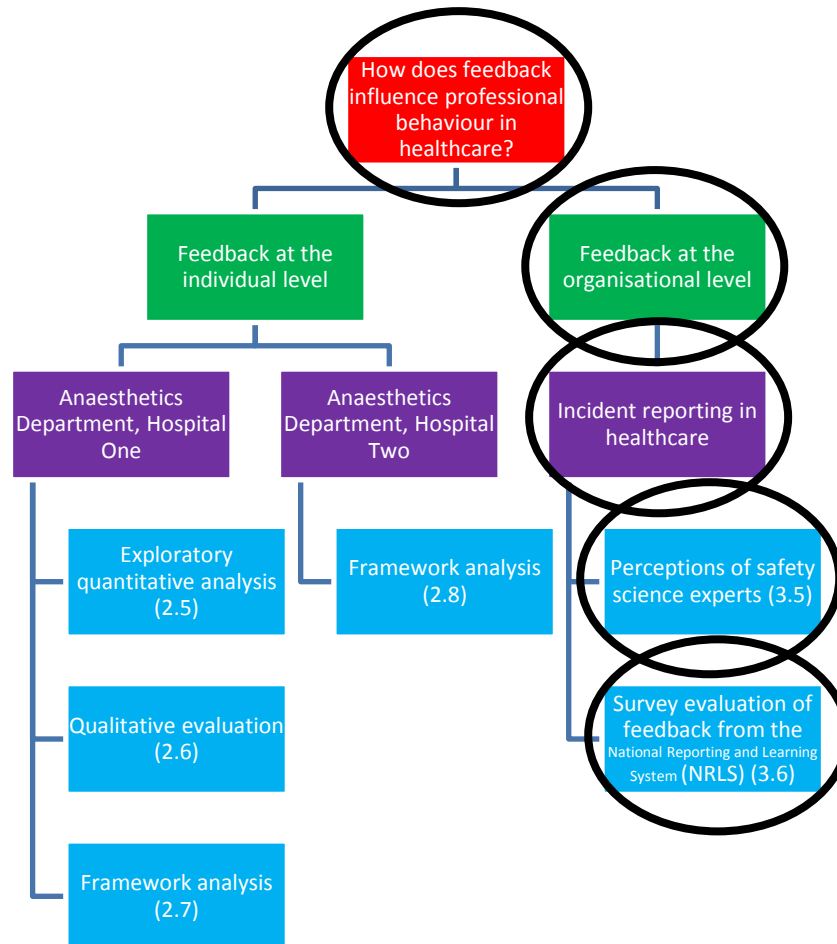


Figure 12. Structure of the thesis

#### 3.7.1 Introduction

Two research studies have been presented in work stream two of the thesis looking at the influence of organisational level feedback on professional behaviour change in the context of incident reporting systems. Figure 13 below demonstrates the various sequential interactions between the two research studies.

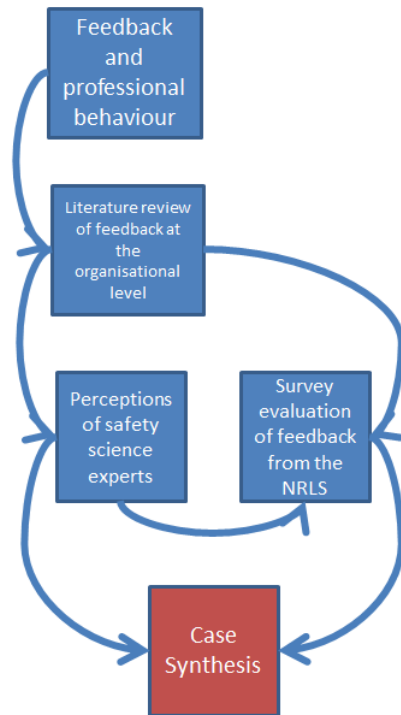


Figure 13. Sequential model for work stream two

As per the previous case synthesis it was thought to be appropriate to integrate the findings from the work stream at this stage. This model building chapter will therefore reflect upon the emerging findings from the two research studies within work stream two. The identified characteristics and psychological processes through which feedback impacts on professional behaviour have been compared and contrasted across the studies in order to identify themes and patterns in the data. This supports the development of an evidence based understanding of the processes through which receiving feedback influences learning and behaviour change in healthcare professionals.

### 3.7.2 Methodology

There was a sequential link between the two studies in this work stream. The qualitative characteristics identified in the first study contributed to the design of the survey measure used in the second study. In this sense there has already been some level of integration between the two. However, it was still thought to be important to conduct a more systematic merge of the two datasets (Creswell & Clark, 2007; Creswell et al., 2011).



For the purposes of this case synthesis, all identified characteristics and psychological processes of the effect of organisational level feedback on professional behaviour were extracted from the two individual studies, compared and contrasted with specific attention paid to disconfirming evidence. In this sense, a comparative analysis was employed (Pope et al., 2007).

### 3.7.3 Results of synthesis

Table 32 below represents the characteristics and psychological processes identified within each of the individual research studies in work stream two.

Table 32. Key findings from work stream two against research question

<b>How does feedback influence professional behaviour in healthcare?</b>		
<b>Research study title</b>	<b>Characteristics of effective feedback</b>	<b>Psychological processes through which feedback impacts on professional behaviour</b>
Perceptions of safety science experts	<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is detailed and specific</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback takes place within cohesive and integrated groups of colleagues/communities of practice</li> <li>• Feedback is anonymous</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users identify with the purpose of receiving the feedback</li> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for their existing performance</li> <li>• Improvement actions displayed by end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> </ul>

	<p>improvement and performance management</p> <ul style="list-style-type: none"> <li>• Feedback is aligned with broader policy</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is delivered in a timely fashion</li> <li>• Feedback is accompanied with goal setting and action planning</li> <li>• Feedback is supported by senior members of staff</li> </ul>	<ul style="list-style-type: none"> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users take on a group identity</li> <li>• End users experience control and ownership over their future performance</li> <li>• End users form a partnership with feedback providers</li> <li>• End users are actively engaged with feedback</li> </ul>
Survey evaluation	<ul style="list-style-type: none"> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is detailed and specific</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is delivered in a timely fashion</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> </ul>

Both studies suggest that feedback impacts behaviour through the focussing of attention which echoes the core principle of Feedback Intervention Theory (Kluger & DeNisi, 1996). Memory, attention and decision processes have been emphasised as key components of behaviour change in the Theoretical Domains Framework (Cane et al., 2012; Michie et al., 2005). The importance of tailoring feedback to its specific audience demonstrates the interaction between specificity and behaviour change. Providing end users with information that is of high relevance to them personally reduces the need for them to engage in endless prioritisation and decision making. Hysong's concept of actionable feedback emphasises the role of relevance (Hysong et al., 2006).

The presentation of feedback can also have a role to play in focussing the attention of end users. Efficient benchmarking can direct end users' attention to potential problem areas or areas that may require further thought and reflection. Direct end users of feedback at the organisational level may also need to adapt and disseminate it further to highlight areas of importance for indirect end users (Dimick & Hendren, 2014; Glance et al., 2014).

Processes of mastery, progression and commitment were evident in both studies. The importance of goal identification, setting and tracking has been emphasised in the literature around feedback and behaviour change (Carver & Scheier, 1982; Kluger & DeNisi, 1996; Sapyta et al., 2005). Timely feedback enables regular monitoring of performance that can be directly linked with instances of behaviour (Bradley et al., 2004; Hysong et al., 2006; Shute, 2008; van der Veer et al., 2010). This gives end users greater control and ownership over their future performance and was shown to increase engagement with the feedback initiatives under study in this work stream. This links with the need for partnership between feedback providers and feedback receivers. Encouraging end users to participate in the design, functioning and evaluation of an information system and the feedback that it provides has a positive effect on their level of engagement and trust.



## 4. RESEARCH SYNTHESIS AND DEVELOPMENT OF AN INTEGRATIVE MODEL

### 4.1 Introduction

Figure 14 below provides a breakdown of the individual research studies and how they build up into case studies and work streams. Circles are included to demonstrate the focus of this section and contextualise it within the thesis as a whole.

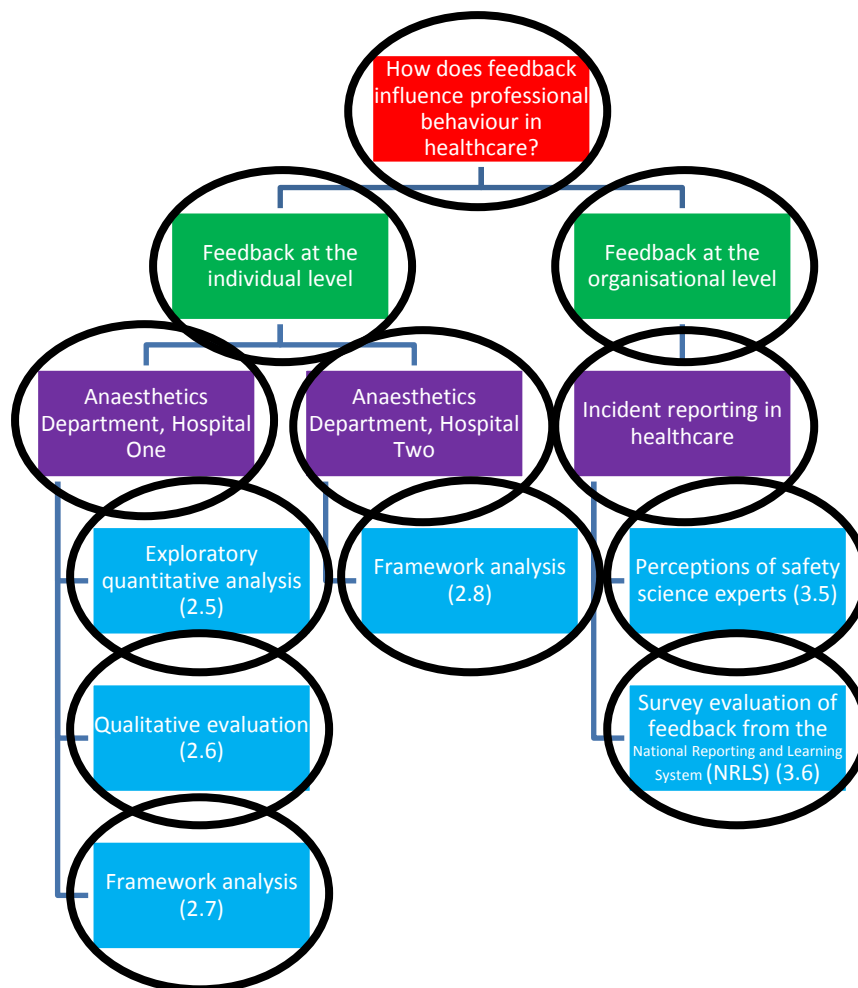


Figure 114. Structure of the thesis

Two work streams reviewing feedback from different perspectives have been presented in the previous chapters of this thesis. One is centred on personalised feedback interventions in anaesthesia and the second centres around organisational level feedback from incident reporting systems. These work streams explore feedback from two very different perspectives. The first

focuses upon continuous, personalised feedback designed to encourage individual and group level improvement plans and subsequent behaviour change. The second draws on a process of providing generalised feedback to relevant individuals about error or sub-optimal outcome that may or may not be directly linked to their specific actions or performance but yet has the potential to inform their future professional practice as well as overall organisational performance and safety culture. Despite the clear differences, the characteristics and mechanisms through which they each function can contribute to a more informed and united understanding of how feedback results in learning and action. The ultimate aim of feedback is to change professional behaviour and therefore the two work streams are comparable. The core difference is whether an initiative is trying to change behaviour based on personal level information or organisational level information.

The purpose of this section of the thesis is to integrate and synthesise the findings to produce a model of the influence of feedback on professional behaviour in healthcare. There is a need for a fully integrated model due to the various limitations of prior conceptual work in this area. There have been recent calls for a stronger, theoretically informed understanding of how feedback impacts on behaviour in healthcare specifically (Ivers et al., 2014). The value of a model based upon this empirical work is that it will draw upon a range of disciplines and perspectives (including applications at different levels of the health care system), rather than specifically focussing in on one viewpoint such as informatics or psychological learning theory. It will also build upon prior work by not only specifying the psychological processes and mechanisms through which feedback impacts on professional behaviour but also presenting the design characteristics of feedback that can deliver them from a practical perspective. The work included in this PhD is based upon empirical mixed methods research studies which have been designed specifically to respond to this research question. Ultimately, the revised model will be derived from the direct views and experiences of end users of feedback. All research studies included in this thesis offer an end user perspective on what makes feedback effective for learning and improving practice. It can be argued that the direct experiences and perceptions of end users offer the greatest insight into the mechanisms through which feedback contributes to learning and impacts on professional behaviour. Therefore, this approach should provide valuable guidance for the design of future initiatives. An overview of the six research studies included in the synthesis is provided in Table 33 below whilst Figure 15 provides a reminder of the sequential interactions between them.

Table 33. Overview of individual research studies that form the PhD programme of research

Study	Design	Participants	Analysis	Key findings
Evaluation of baseline feedback from quality indicators in anaesthesia (work stream one)	Quantitative survey	89 consultant anaesthetists from two acute healthcare organisations	Multiple regression	The relevance of quality indicators to the specific service area and the perceived credibility of feedback as coming from a trusted source are the most important characteristics in predicting the perceived usefulness of feedback.
Evaluation of a complex quality monitoring and feedback initiative anaesthesia (work stream one)	Qualitative semi-structured interviews	21 interviews with consultant anaesthetists, perioperative service leads and surgical nursing leads at Hospital One	Qualitative analysis informed by some of the principles of grounded theory	The selection of quality indicators and the format in which feedback is presented are vital in supporting the processes through which it impacts on behaviour change at the individual and departmental levels.
Empirically informed critical appraisal of theory (work stream one)	Qualitative semi-structured interviews	17 interviews with consultant anaesthetists at Hospital One	Qualitative framework analysis	Social science theory can be incorporated post-hoc to better understand the mechanisms through which feedback has its effects and contribute to the development of a theory of change.
Exploration of mechanisms of effect in a new context (work stream one)	Qualitative semi-structured interviews	45 interviews with 32 consultant anaesthetists across two time points at Hospital Two	Qualitative framework analysis	Similar mechanisms of effect are noted when a feedback intervention based on similar principles is implemented in a new context. This further contributes to the emergent theory of change.

Qualitative lessons from safety-critical industries (work stream two)	Qualitative semi-structured interviews	17 safety science experts from various industries including healthcare	Qualitative analysis informed by some of the principles of grounded theory combined with deductive reasoning	A number of characteristics support the impact of organisational level feedback on professional behaviour change across safety science industries.
Evaluation of feedback from the National Reporting and Learning System (NRLS) (work stream two)	Quantitative survey with some free text items included	320 respondents representing 49% of healthcare organisations in the UK	Descriptive statistics applied to quantitative data and simple thematic analysis applied to free text responses	Current feedback from the NRLS does not optimally support its direct end users in disseminating key lessons to professionals on the ground and supporting behaviour change.

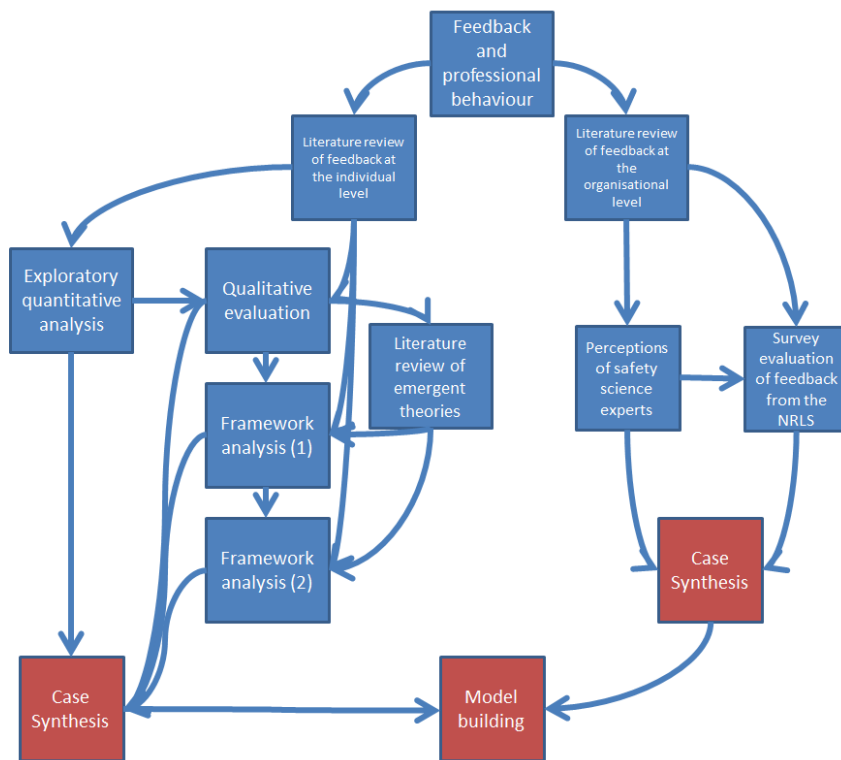


Figure 15. Sequential interactions between individual research studies



## 4.2 Methodological approach to synthesis

Both sequential and concurrent syntheses have occurred throughout the thesis up until this point. Sequential relationships between the individual studies within each work stream represent the ways in which quantitative design and findings have influenced qualitative design and findings and vice versa (Creswell et al., 2011). For example, in work stream one the variables identified as having a relationship with perceived usefulness of feedback were used to drive and interpret a more exploratory qualitative investigation of the perceptions of end users. In work stream two, on the other hand, a broad qualitative exploration was adopted to identify conceptualisations of effective feedback that could be transformed into a quantitative survey measure to assess the effectiveness of an existing feedback system. The three qualitative studies in work stream one have also influenced one another sequentially through cycles of analysis and data collection using a constant comparative approach.

The concurrent syntheses at the end of each work stream, on the other hand, involved the integration and juxtaposition of findings from individual research studies to provide a coherent answer to the overarching research question. These were achieved by comparing and contrasting the findings of individual studies within each work stream in relation to its specific aims and objectives.

There were a number of opportunities for conducting a final synthesis of the research findings as a whole in order to collate the relevant information necessary to respond to the overarching research question. The first option was to collate the two existing case syntheses of the individual work streams. The core disadvantage of taking this approach was that it would prevent any additional similarities between the work streams from being identified and attended to. The work stream syntheses identified patterns within rather than across work streams and therefore were not able to identify any similarities between individual findings in work stream one and individual findings in work stream two. This was thought to be important to provide a thorough response to the research question and it was therefore decided that a full, integrated synthesis of all study findings would be undertaken at this stage of the thesis.

A thematic synthesis of the characteristics and psychological processes that were identified within each individual research study was conducted. This was achieved by extracting all characteristics and

psychological processes from each study and comparing and contrasting them to identify themes, patterns and discrepancies in relation to the research question. The existing individual work stream syntheses were also reviewed and incorporated to emphasise recurrent key messages coming through in the data.

### 4.3 Development of an integrative model: A comparative analysis

Throughout the thesis, the key findings from each of the individual research studies were used to drive the extraction of characteristics and psychological processes through which feedback impacts on professional behaviour. In some cases characteristics and psychological processes could be directly extracted from the research study findings whilst in others these were conceptually inferred via interpretation and discussion of the results. Tables have been included at the end of each research study to present these findings as a response to the overarching research question. At this stage, those tables were integrated into a broader matrix to support a comparative analysis across all studies. Table 34 below represents a matrix of the research studies and their contribution to an understanding of the characteristics and psychological processes that influence professional behaviour in healthcare.

**Table 34. Matrix of characteristics and psychological processes across research studies**

<b>Research study title</b>	<b>Characteristics of effective feedback</b>	<b>Psychological processes through which feedback impacts on professional behaviour</b>
Exploratory quantitative analysis (work stream one)	<ul style="list-style-type: none"> <li>• Feedback is based upon relevant and meaningful quality indicators</li> <li>• Feedback comes from a credible source</li> <li>• Feedback is detailed and specific</li> <li>• Feedback is personalised (based on individual level performance)</li> <li>• Feedback takes place within a supportive local context</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users experience a reduction in scepticism/defensiveness</li> </ul>
Qualitative evaluation (work stream one)	<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is novel and provides an additional resource</li> <li>• Feedback is based upon relevant and meaningful quality indicators</li> <li>• Feedback initiative is led</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users identify with the purpose of receiving the feedback</li> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> </ul>

	<ul style="list-style-type: none"> <li>• by a trusted peer</li> <li>• Feedback is detailed and specific</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback is anonymous</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality improvement and performance management</li> <li>• Feedback is aligned with broader policy</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is accompanied with goal setting and action planning</li> </ul>	<ul style="list-style-type: none"> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• The professional identities of end users are reinforced</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users are actively engaged with feedback</li> </ul>
<p>Framework analysis Hospital One (work stream one)</p>	<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way</li> </ul>	<ul style="list-style-type: none"> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for</li> </ul>

	<p>and provides sign posting to the end user</p> <ul style="list-style-type: none"> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback takes place within cohesive and integrated groups of colleagues/communities of practice</li> <li>• Feedback is accompanied with goal setting and action planning</li> </ul>	<p>their existing performance</p> <ul style="list-style-type: none"> <li>• Improvement actions displayed by end users are reinforced</li> <li>• The professional identities of end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are actively engaged with feedback</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> </ul>
<p>Framework analysis Hospital Two (work stream one)</p>	<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is novel and provides an additional resource</li> <li>• Feedback initiative is led by a trusted peer</li> <li>• Feedback is detailed and specific</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active</li> </ul>	<ul style="list-style-type: none"> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for their existing performance</li> <li>• Improvement actions displayed by end users are reinforced</li> <li>• The professional identities of end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> </ul>

	<p>interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</p> <ul style="list-style-type: none"> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback takes place within cohesive and integrated groups of colleagues/communities of practice</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality improvement and performance management</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is accompanied with goal setting and action planning</li> </ul>	<ul style="list-style-type: none"> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> <li>• End users experience schema development</li> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users take on a group identity</li> <li>• End users experience control and ownership over their future performance</li> <li>• End users are actively engaged with feedback</li> <li>• End users form a partnership with feedback providers</li> </ul>
<p>Perceptions of safety science experts (work stream two)</p>	<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is detailed and specific</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</li> <li>• Feedback takes place within a supportive local</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users identify with the purpose of receiving the feedback</li> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for their existing performance</li> </ul>

	<p>context</p> <ul style="list-style-type: none"> <li>• Feedback takes place within cohesive and integrated groups of colleagues/communities of practice</li> <li>• Feedback is anonymous</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality improvement and performance management</li> <li>• Feedback is aligned with broader policy</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is delivered in a timely fashion</li> <li>• Feedback is accompanied with goal setting and action planning</li> <li>• Feedback is supported by senior members of staff</li> </ul>	<ul style="list-style-type: none"> <li>• Improvement actions displayed by end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users take on a group identity</li> <li>• End users experience control and ownership over their future performance</li> <li>• End users form a partnership with feedback providers</li> <li>• End users are actively engaged with feedback</li> </ul>
<p>Survey evaluation (work stream two)</p>	<ul style="list-style-type: none"> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is detailed and specific</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is delivered in a timely fashion</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> </ul>

In order to more effectively compare and contrast across individual studies and work streams, Tables 35 and 36 were compiled to highlight the patterns through which different characteristics and psychological processes occurred across the findings. This provides a form of weighting analysis to determine which are the most commonly implicated factors across the studies and work streams. However, a causality driven approach was not desired for this synthesis and hence the most frequently occurring characteristics and psychological processes were not automatically assumed to be the most important areas (Dixon-Woods et al., 2004; Catherine Pope et al., 2007).

**Table 35. Comparative analysis of characteristics**

<b>Characteristic</b>	<b>Study one</b>	<b>Study two</b>	<b>Study three</b>	<b>Study four</b>	<b>Study five</b>	<b>Study six</b>
Purpose of feedback is evident to end users		X	X	X	X	
Goals of the end user are synchronised with goals of the feedback		X	X	X	X	X
Feedback is novel and provides an additional resource		X		X		
Feedback is based upon relevant and meaningful quality indicators	X	X				
Feedback comes from a credible source	X					
Feedback initiative is led by a trusted peer		X		X		
Feedback is detailed and specific	X	X		X	X	X
Feedback is personalised (based on individual level performance)	X					
Feedback highlights discrepancies between ideal and actual performance		X	X	X		
Feedback is presented in a clear and direct way and provides sign posting to the end user		X	X	X		X
Feedback contains peer group comparisons		X	X	X		X
Feedback is supported with active interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and		X	X	X	X	



experiences						
Feedback takes place within a supportive local context	X	X	X	X	X	
Feedback takes place within cohesive and integrated groups of colleagues/communities of practice			X	X	X	
Feedback is anonymous		X			X	
Feedback provides protection for its end users		X		X	X	
Feedback draws an effective balance between quality improvement and performance management		X		X	X	
Feedback is aligned with broader policy		X			X	
Feedback is tailored/targeted to its audience		X		X	X	X
Feedback is delivered in a timely fashion					X	X
Feedback is accompanied with goal setting and action planning		X	X	X	X	
Feedback is supported by senior members of staff					X	

Table 36. Comparative analysis of psychological processes

Psychological process	Study one	Study two	Study three	Study four	Study five	Study six
End users perceive the feedback as relevant and meaningful to them and their local setting	X	X			X	X
End users identify with the purpose of receiving the feedback		X			X	
End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive		X	X	X	X	
End users believe that the feedback is credible	X	X		X		X
The attention of end users is focussed on the areas that require reflection and action	X	X	X	X	X	X
End users believe that the feedback is actionable		X	X	X	X	X
End users are rewarded for their existing performance			X	X	X	
Improvement actions displayed by			X	X	X	

end users are reinforced						
The professional identities of end users are reinforced		X	X	X		
End users experience an increase in self-efficacy associated with feedback			X	X	X	
End users are aware of positive subjective norms associated with feedback		X	X	X	X	
End users engage in modelling, scaffolding and cognitive apprenticeship		X	X	X	X	
End users experience cognitive dissonance		X	X	X		
End users track performance over time against a specified goal (mastery/progression/commitment)		X	X	X	X	X
End users are committed to improving upon feedback over time and regularly monitor their performance			X	X	X	
End users experience schema development				X		
End users experience a reduction in scepticism/defensiveness	X	X		X	X	
End users take on a group identity				X	X	
End users experience control and ownership over their future performance				X	X	
End users form a partnership with feedback providers				X	X	
End users are actively engaged with feedback		X	X	X	X	

The findings from both work streams emphasise the process of end user involvement in design and interpretation of innovative feedback as key to optimal engagement and learning. End users should be given the opportunity to contribute to the development and decision making surrounding feedback systems. Learning is likely to be increased when end users are able to build trust in the feedback system and develop an adequate understanding of its purpose and potential consequences through shared ownership. Processes of learning through reward and reinforcement are also evident throughout. This can occur through reinforcement of behaviour or emotional reward linked to increased morale, motivation and engagement. Consistent processes of learning from feedback through specificity and targeted information appear to be effective. In this sense learning takes place through the ability to focus both attention and resources. This has clear links with the need for goal setting and monitoring of improvement over time. Strong processes of social interaction exist across

the research studies. Learning from feedback clearly takes place through the development of communities of practice formed through active communication and dialogue rather than passive dissemination of information. Networks for information sharing involve facilitated discussion with peers that have diverse knowledge and experiences. The social component of feedback is also supported through processes of support, guidance and approval from senior members of staff. Learning from feedback occurs through cumulative, serial and continuous processes over time.

The role of senior leadership is controversial across the two work streams. When dealing with personal level data professionals place more value on peer led feedback and want to reduce the input and involvement of more senior members of staff. For organisational level data, however, the interest of senior staff members sends out the message that feedback is important and worth acting upon. The difference here may be explained by the level of threat associated with managerial level staff accessing data that reflects personal performance, compared with the performance of the whole organisation. This is in some ways contradictory to the original viewpoints expressed at the start of the thesis that organisational level data is more often associated with regulation and judgement. This may be reflective of the recent introduction of revalidation based on professional level data.

The interaction between professional identity and engagement with feedback also varies across the two work streams. Acting upon individual level data was more readily associated with being 'a professional' and striving for excellence than responding to organisational level data. However, this may be interrelated to the fact that the purpose of incident reporting and its associated processes are not always fully understood by professionals on the ground and therefore they may not find it easy to identify with. Feedback in itself provides an opportunity to emphasise to staff the importance of incident reporting and the opportunities for improvement that are associated with it. In this sense it can contribute to a more developed safety culture and closer alignment between incident reporting and professional identity.

Cumulative and serial processes are present across the model. In the case of individual level data, end users experience a reduction in scepticism as time goes by and no negative consequences of engaging with feedback are experienced. This may be accompanied with benefit finding as end users identify the ways in which feedback can save them time, resources and effort (i.e. through providing them with individual level data for the purposes of appraisal and revalidation). The cumulative effects of organisational level data are more associated with the development of safety culture. As frontline professionals experience the effects of positive changes implemented on the basis of

incident reporting they begin to devote more time and effort to reporting their experiences and therefore contribute more to the system.

#### 4.4 Development of an integrative model: A thematic synthesis

The comparative analysis presented a variety of characteristics and psychological processes that had occurred within and across the research studies. A compiled list of the characteristics and psychological processes is included in Table 37 below.

**Table 37. Characteristics and psychological processes extracted from the research studies**

Characteristics	Psychological processes
<ul style="list-style-type: none"> <li>• Purpose of feedback is evident to end users</li> <li>• Goals of the end user are synchronised with goals of the feedback</li> <li>• Feedback is novel and provides an additional resource</li> <li>• Feedback is based upon relevant and meaningful quality indicators</li> <li>• Feedback comes from a credible source</li> <li>• Feedback initiative is led by a trusted peer</li> <li>• Feedback is detailed and specific</li> <li>• Feedback is personalised (based on individual level performance)</li> <li>• Feedback highlights discrepancies between ideal and actual performance</li> <li>• Feedback is presented in a clear and direct way and provides sign posting to the end user</li> <li>• Feedback contains peer group comparisons</li> <li>• Feedback is supported with active interaction/social support/social interaction/peer guidance/dialogue/facilitated discussion with peers that have diverse knowledge and experiences</li> <li>• Feedback takes place within a supportive local context</li> <li>• Feedback takes place within cohesive and integrated groups of colleagues/communities of practice</li> <li>• Feedback is anonymous</li> <li>• Feedback provides protection for its end users</li> <li>• Feedback draws an effective balance between quality improvement and performance management</li> </ul>	<ul style="list-style-type: none"> <li>• End users perceive the feedback as relevant and meaningful to them and their local setting</li> <li>• End users identify with the purpose of receiving the feedback</li> <li>• End users believe that the consequences/outcomes of them using the feedback to learn and change behaviour will be positive</li> <li>• End users believe that the feedback is credible</li> <li>• The attention of end users is focussed on the areas that require reflection and action</li> <li>• End users believe that the feedback is actionable</li> <li>• End users are rewarded for their existing performance</li> <li>• Improvement actions displayed by end users are reinforced</li> <li>• The professional identities of end users are reinforced</li> <li>• End users experience an increase in self-efficacy associated with feedback</li> <li>• End users are aware of positive subjective norms associated with feedback</li> <li>• End users engage in modelling, scaffolding and cognitive apprenticeship</li> <li>• End users experience cognitive dissonance</li> <li>• End users track performance over time against a specified goal (mastery/progression/commitment)</li> <li>• End users are committed to improving upon feedback over time and regularly monitor their performance</li> <li>• End users experience schema development</li> <li>• End users experience a reduction in scepticism/defensiveness</li> <li>• End users take on a group identity</li> <li>• End users experience control and</li> </ul>

<ul style="list-style-type: none"> <li>• Feedback is aligned with broader policy</li> <li>• Feedback is tailored/targeted to its audience</li> <li>• Feedback is delivered in a timely fashion</li> <li>• Feedback is accompanied with goal setting and action planning</li> <li>• Feedback is supported by senior members of staff</li> </ul>	<p>ownership over their future performance</p> <ul style="list-style-type: none"> <li>• End users form a partnership with feedback providers</li> <li>• End users are actively engaged with feedback</li> </ul>
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As a validity check for the ways in which the characteristics and psychological processes were being defined a selection of examples were reviewed in relation to raw data from across the studies/work streams. Table 38 returns to the raw data to explore and define the ways in which example characteristics and psychological processes can be represented across the two work streams.

**Table 38. Empirical review of characteristics and psychological processes**

<b>Characteristic/psychological process</b>	<b>Example data across research studies</b>
Goals of the end user are synchronised with goals of the feedback	<p>“No, it’s brilliant; and I think feedback is very important for us to improve and look back on our practice and to change things that aren’t working properly.” (Research study two)</p> <p>“I’d say one kind of challenge or barrier, whatever, which is implicit, I think, in a lot of what we’ve been saying, is understanding what reporting can give you and what it can’t, and what it’s useful for. I just don’t think that’s really been thought through.” (Research study five)</p> <p>“Now, that was a classic exchange between two groups of people who clearly didn’t understand each other’s mind-sets. The company was resourcing this reasonably well, they were actually acting on the actions, none of that was visible to the employees who thought they were in a completely open loop system and were very fed up with it.” (Research study five)</p> <p>“It SHOULD support me in my role to feed back to GP practices and work</p>

	with them to increase their reporting but it does not do that at present” (Research study six)
Feedback comes from a credible source	<p>The final regression model demonstrated that with the effects of all other factors held constant the perceived credibility of the data as coming from a trustworthy, unbiased source was a significant predictor of perceived local usefulness (<math>\beta=0.55</math>, <math>p=0.01</math>). (Research study one)</p> <p>“You do need the senior people to stay with it and I think it’s reasonable, you’ve got to understand their situation, they can’t turn up to everything, but they show their face periodically, they do participate and when it comes to the rollout it is important that they reappear and they very clearly champion these things.” (Research study five)</p>
Feedback draws an effective balance between quality improvement and performance management	<p>“I think you have to have a crackable code if somebody can make the case that patient safety may be at risk if it’s uncrackable.” (Research study two)</p> <p>“So we have to try to encourage and educate them, really, into a systemic way of thinking. Because if you’ve got a report that concerns inappropriate or long roster periods that are making people drowsy, tired, that potentially has an impact on safety, and you don’t really need to know where it happened and when it happened and who was involved – all you need to do is look at your system for designing rosters, and how that system is managed, and how that system potentially can be shortcut-ed or violated, and what the pressures are for doing that. You don’t need to go to any specific place – you just have to have a systems view of your organisation.” (Research study five)</p>
End users identify with the purpose of receiving the feedback	“I think it is very important because you really don’t know, you walk away, you don’t know whether the patient is vomiting after half an hour, and is back in theatre, nobody really tells you so I discover sometimes after that my

	<p>patient actually was sick because I don't see him being sick once I wake him up and I walk away." (Research study two)</p> <p>"I'd say one kind of challenge or barrier, whatever, which is implicit, I think, in a lot of what we've been saying, is understanding what reporting can give you and what it can't, and what it's useful for. I just don't think that's really been thought through." (Research study five)</p>
<p>End users experience a reduction in scepticism/defensiveness</p>	<p>"So I think that could be a problem. And it will just be helped by, as I said, sensitive and gradual discussion of datasets over a period of time really, which is what I would expect from [project lead]." (Research study four)</p> <p>"And we say, "Are you happy for us to group your data and analyse it?" and they always say, "Yes, that's fine. As long as you don't identify me, that's not a problem."" (Research study five)</p>
<p>The attention of end users is focussed on the areas that require reflection and action</p>	<p>The scope of local quality monitoring explained a further significant 11.2% of the variance in local usefulness of data feedback (<math>p=0.006</math>). In this model, both comprehensiveness of feedback received (<math>\beta=0.45</math>, <math>p=0.02</math>) and provision of feedback at the level of the individual clinician (<math>\beta=1.19</math>, <math>p=0.049</math>), as opposed to department level feedback, were significant predictors of local usefulness, once prior factors had been controlled for. (Research study one)</p> <p>"Because if you do 99 things well and 1 thing bad, you kind of can't remember the bad thing and you think, "Oh, maybe it didn't happen", whereas if you had the information on that and you went, "Okay, so that day I didn't do that". That, you'd learn from it." (Research study two)</p> <p>"Because it gives me a benchmark, that I could do better, I could do worse. There is something that I need to learn, there is something that I do right, so it</p>



	<p>gives me an idea.” (Research study two)</p> <p>“But looking at particularly the reviews and the severe pain, looking at how many have occurred in each month and seeing the sorts of cases that they’ve been , then that’s been useful to just keep a check on those particular areas.” (Research study four )</p> <p>“It enables me to bench mark against other similar Trusts and to understand areas where action are needed for improvement to occur” (Research study six)</p>
<p>End users engage in modelling, scaffolding and cognitive apprenticeship</p>	<p>“I’d probably drop in on them and see what they’re doing and see how my practice differs from theirs, and see what I can learn from it.” (Research study three)</p> <p>“I think I would discuss it with my colleagues and perhaps also some – depending – I don’t know, it depends how it gets broken down to, if it depends on certain specialities or certain operations or certain you know patients. I probably would then seek advice from my colleagues if I have a comparison, if other people are better than that and I would see what they do, to try and learn from them how to improve my own skills, to learn from them you know” (Research study four)</p> <p>“Their expertise is what I want, because these are doctors, nurses and pharmacists, and they need to put their perspective in the coding, I want to see that there...” (Research study five)</p> <p>“We circulate feedback from the NRLS across the organisation and use it in incident reporting training to focus on improving the quality of our data” (Research study six)</p>

The next step was to review and conceptualise each of the characteristics and psychological processes whilst considering how they related to one another and the broader research question. In this sense the goal was to steer away from the data and move towards a more abstract understanding of the findings that can be applied and generalised more broadly. All characteristics and psychological processes were reviewed and coded drawing upon principles of qualitative analysis. It was thought to be important to adequately represent the ways in which the themes occurred within and across work streams. It was believed that themes should not be excluded from the model if they occurred in one work stream only. For example, it is not about the quantity of occurrences that a theme has across a number of research studies but instead more important to understand the relationships between the different themes in the different contexts and why they may have emerged in this way but not others (Dixon-Woods et al., 2004; Pope et al., 2007). This in itself comments on the ways in which feedback impacts on professional behaviour and is therefore of great relevance to the research question.

A number of cross cutting themes and categories emerged through the review process and the characteristics and psychological processes were grouped and reframed accordingly. Various iterations were enacted in order to constantly compare membership to different groups and ensure mutual exclusivity as far as possible. The integrated feedback and behaviour (iFAB) model is presented in Figure 16 below. Definitions of the key components of the model are provided in Table 39 below.

**Table 39. Key components of the iFAB Model accompanied with definitions**

<b>Component from model</b>	<b>Definition</b>
<b><i>Desired output</i></b>	The ultimate goal of the model which occurs via multiple intermediary effects
Professional behaviour change	Modifications to the ways in which healthcare professionals act and perform
<b><i>Intermediary effects</i></b>	The mediators through which psychological processes at the individual level result in the desired output of the model
Learning	The accumulation of additional knowledge and information
Culture	The shared attitudes, beliefs and actions that exist across a large group of individuals
<b><i>Psychological processes</i></b>	The impact of characteristics and pre-conditions of feedback on the individual recipient's internal processing
<b><i>Characteristics/pre-conditions of feedback</i></b>	The properties of the feedback initiative and the existing contextual conditions that surround it
Format	The ways in which feedback is organised and presented to the recipient
Additional/accompanying components	Factors that are <i>not</i> part of the feedback itself

	but <i>are</i> part of the broader initiative (i.e. not just pre-existing context)
Delivery	The approach that is taken to transfer feedback to recipients
Purpose	The goals that the feedback initiative sets out to achieve
Content	The material that is fed back to recipients
Source	The root of the feedback (i.e. where it comes from)
Context	The pre-existing local environment that is not directly associated with the initiative but may interact with it

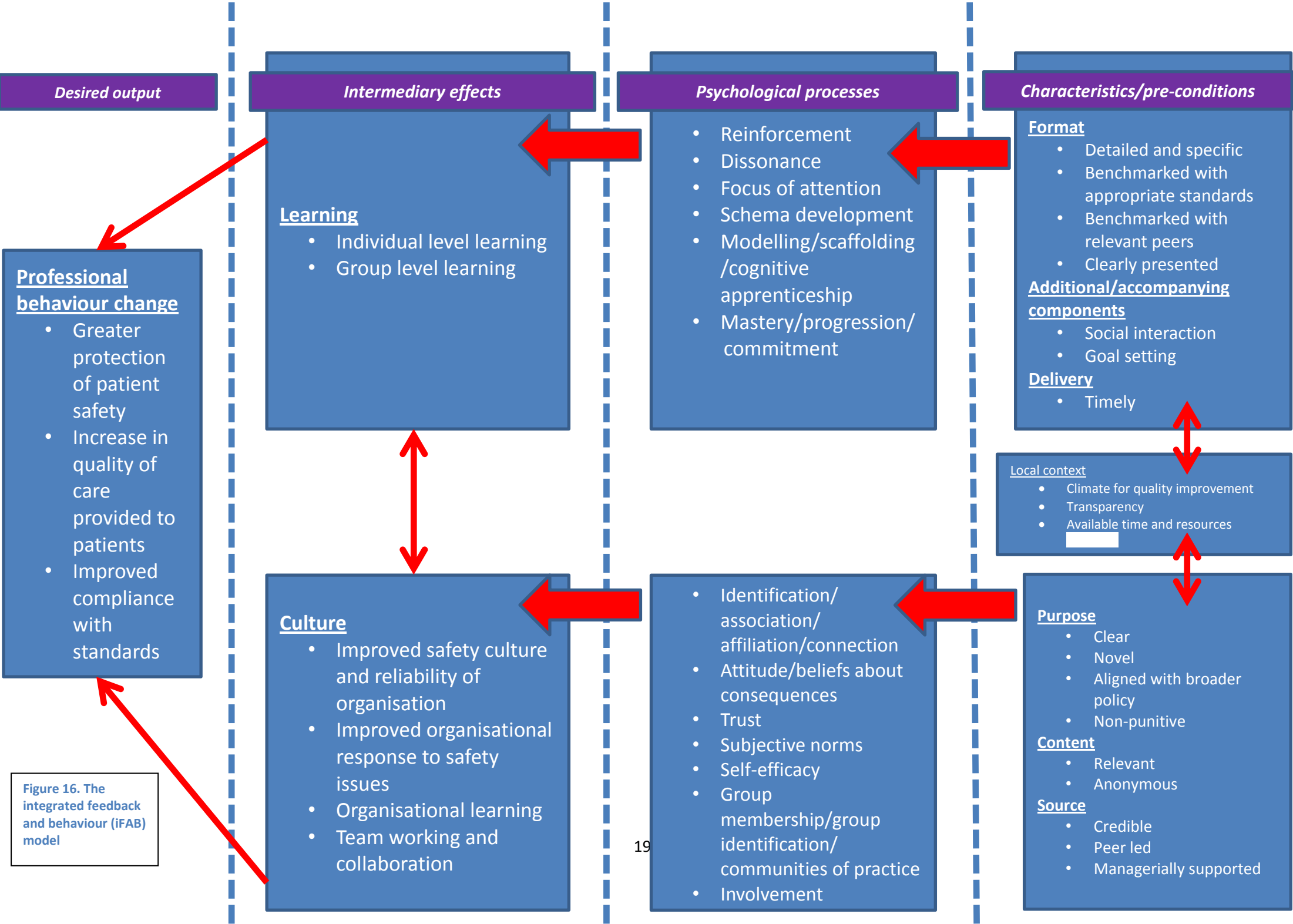


Figure 16. The integrated feedback and behaviour (IFAB) model



## 5. DISCUSSION, LIMITATIONS, IMPLICATIONS AND CONCLUSIONS

### 5.1 Introduction

This thesis set out to identify the characteristics and mechanisms through which feedback influences professional behaviour in healthcare. This has been achieved by using a mixed methods approach to evaluate case study feedback interventions across two work streams from the perspectives of their end users. The key characteristics and psychological processes through which feedback impacts on professional behaviour have been extracted from each of the individual evaluations and combined using multiple approaches to synthesis to form an integrated model of feedback and behaviour.

Individual discussion sections have been included at the end of each research study and cohere in the case syntheses at the end of each work stream. The research synthesis and model building included in the previous section represents the interpretive component of this thesis and explores the implications of the results for understanding the phenomenon of interest and moving the field forwards. This final section of the thesis is devoted to discussing the Integrated Feedback and Behaviour (iFAB) model in context of the broader literature whilst reviewing and acknowledging the limitations of the PhD. Finally, key recommendations for future research studies and implications of the current work for policy and practice will be drawn together. The section will close with a short summary of key conclusions against the overarching research question.

## 5.2 The iFAB model in context

The iFAB model demonstrates the mechanisms through which feedback can impact on professional behaviour and therefore have a positive influence on quality and safety in healthcare. Mechanisms therefore represent the movements across the model from the design characteristics and pre-conditions of feedback to the desired output of professional behaviour change. The model breaks professional behaviour into two core intermediary effects. These are learning and culture. It then demonstrates the core psychological processes that can promote these effects and the characteristics or pre-conditions that support or prompt those processes. The model emphasises the interaction between learning at the individual and group level and culture change and development. Learning that takes place among individuals and groups will penetrate into the local culture whilst the local culture itself will influence the degree to which individuals and groups can engage confidently in the learning experience. In this sense there is a reciprocal relationship between the two.

It is of course acknowledged that other external factors, as well as the characteristics of feedback and the local context, will influence an individual's psychological processes and therefore impact on learning and culture change. However, the role of the iFAB model is specifically to provide a conceptual understanding of the mechanisms through which feedback can impact on individual level professional behaviour. Practically, this model has the ability to support the design of future feedback initiatives in terms of which characteristics and pre-conditions require targeting in order to produce the desired outcomes.

In the case of the anaesthetists, aspects of format and additional components that were introduced to support the feedback initiative were effective at prompting psychological processes such as focus of attention and modelling/scaffolding/cognitive apprenticeship. These processes promote learning at the individual and small group level which leads to professional behaviour change. Alternatively, the safety science experts discussed the importance of an improved understanding of the purpose of incident reporting among front line workers in promoting processes of trust and identification. These processes interact more heavily with local culture which is supportive of professional behaviour change. It is important to note that the model is not meant to imply exclusivity for each of the causal pathways. It is not the case that feedback at the individual level will only promote behaviour change through learning. Equally, feedback at the organisational level is not constrained to impacting on behaviour via culture change. Source credibility and relevance of content were valued very highly by

the anaesthetists whilst timely delivery of feedback to support learning was of great importance to the end users of the NRLS.

The proposed model is complemented and strengthened by the existing prior literature. Both the characteristics/pre-conditions and psychological processes included in the model overlap with previous understanding of the relationship between feedback and behaviour change from a variety of disciplines. The psychological processes, in particular, also link well with more general psychological theories and knowledge around behaviour change. For example, the processes of reinforcement, schema development, modelling/scaffolding/cognitive apprenticeship and mastery, progression and commitment align well with broader psychological learning theory (Bandura & Cervone, 1986; Piaget, 1964; Skinner, 1948). In the iFAB model these psychological processes lead to learning as an intermediary outcome to professional behaviour change. They are prompted by characteristics such as social interaction and goal setting which should be incorporated into feedback interventions as additional components.

Many of the characteristics and psychological processes included in the model are complimented by existing behaviour change theory and the taxonomies that have been developed to consolidate it. The majority of the constructs from the Theoretical Domains Framework (Cane et al., 2012; Michie et al., 2005) are represented as psychological processes in the iFAB model. For example, the theoretical construct 'memory, attention and decision processes' relates to focus of attention as a psychological process in the model that leads to learning as an intermediary outcome to professional behaviour change. Secondly, the theoretical construct 'emotion' interlinks with the model's psychological process of dissonance as a pre-cursor to learning. The three prerequisites for behaviour ('capability', 'opportunity' and 'motivation'), as defined by the Behaviour Change Wheel (Michie et al., 2011), relate to psychological processes in the model such as self-efficacy. Modelling, as an intervention function from the wheel can be connected to the model through its inclusion as a psychological process leading to learning.

The integrated model also embodies the key components of existing feedback theory. Perceived accuracy of feedback, as a psychological process in the Feedback Process Model (Ilgen et al., 1979; Kinicki et al., 2004) links with the process of trust in the iFAB model. In both models, these processes are pre-empted by source credibility as a characteristic of feedback. Focus of attention, dissonance and mastery, progression and commitment are included as psychological processes that lead to learning as an intermediary outcome to professional behaviour change. Goal setting is also a



required additional component in the model to support feedback in promoting this process. These processes form Control Theory (Carver & Scheier, 1982), Feedback Intervention Theory (Kluger & DeNisi, 1996) and Contextual Feedback Intervention Theory (Sapyta et al., 2005). In terms of the more recently developed Model of Actionable Feedback (Hysong et al., 2006), timeliness of delivery, non-punitive nature of purpose and relevance and anonymity of content are all included as necessary characteristics to promote both learning and culture change as intermediary outcomes to professional behaviour change in the iFAB model.

The characteristics included in the integrated model are further supported by a number of studies and systematic reviews that have been devoted to investigating what makes effective feedback in various contexts. In particular the credibility of the source of feedback, the timeliness of its delivery and the support provided for goal setting and long term monitoring feature heavily in both the literature and the model (Bradley et al., 2004; De Vos et al., 2009; Ivers et al., 2012; Jamtvedt et al., 2006; Mugford et al., 1991; van der Veer et al., 2010; Veloski et al., 2006).

The previously understood requirements for effective feedback from incident reporting (Benn et al., 2009) link to a number of both characteristics and psychological processes in the presented model. For example, 'empowering front-line staff to take responsibility for improving safety in local work systems' is related to the psychological processes of group membership/group identification/communities of practice and involvement in the model which promote culture change and development as an intermediary outcome to professional behaviour change. A further example is the requirement for feedback to 'preserve confidentiality and foster trust between reporters and policy developers' which is clearly aligned with the psychological process of trust. The requirements for 'direct feedback to reporters and key issue stakeholders' and 'visible improvements to local work systems' are relevant to the psychological process of reinforcement in this model also. In terms of characteristics or pre-conditions, relevance of content and purpose, anonymity and non-punitive approach, credibility of source and the existence of managerial support clearly support the requirements for effective feedback.

Table 40 below provides an extended overview of the key connections between the iFAB model and the broader literature. A table was thought to be a useful way to further present the specific key constructs and how they interrelate in a clear and concise way.

Table 40. The iFAB model in context of the broader literature

Prior model or literature source	Key components	Relationship with the iFAB model
Learning Theory (behaviourism, cognitivism, social constructivism)(Bandura & Cervone, 1986; Piaget, 1964; Skinner, 1948)	<ul style="list-style-type: none"> <li>• Reward/punishment</li> <li>• Mental models</li> <li>• Social interaction</li> </ul>	Reinforcement, schema development and modelling/scaffolding/cognitive apprenticeship are all represented as psychological processes that lead to learning as an intermediary outcome to professional behaviour change. Social interaction is also a required additional component in the model to support feedback in promoting these processes.
Theory of Planned Behaviour (Ajzen, 1991)	<ul style="list-style-type: none"> <li>• Attitudes (expected consequences)</li> <li>• Subjective norms</li> <li>• Perceived behavioural control/self-efficacy</li> </ul>	Attitudes and beliefs about consequences, subjective norms and self-efficacy are all represented as psychological processes that support culture development as an intermediary outcome to professional behaviour change.
Goal setting theory (Locke et al., 1968)	<ul style="list-style-type: none"> <li>• Action plans motivate and guide a person towards a goal</li> </ul>	Mastery, progression and commitment is included as a psychological process that leads to learning as an intermediary outcome to professional behaviour change. Goal setting is also a required additional component in the model to support feedback in promoting this process.
Theoretical domains framework (Cane et al., 2012; Michie et al., 2005)	<ul style="list-style-type: none"> <li>• Knowledge</li> <li>• Skills</li> <li>• Social/Professional Role and Identity</li> <li>• Beliefs about Capabilities</li> <li>• Optimism</li> <li>• Beliefs about Consequences</li> <li>• Reinforcement</li> <li>• Intentions</li> <li>• Goals</li> <li>• Memory, Attention and Decision Processes</li> <li>• Environmental Context and Resources</li> <li>• Social influences</li> <li>• Emotion</li> <li>• Behavioural regulation</li> </ul>	The majority of the theoretical constructs from the framework are represented in the model as psychological processes. For example, the theoretical construct ‘memory, attention and decision processes’ relates to focus of attention as a psychological process in the model that leads to learning as an intermediary outcome to professional behaviour change. Secondly, the theoretical construct ‘emotion’ interlinks with the model’s psychological process of dissonance as a pre-cursor to learning.
Behaviour	<ul style="list-style-type: none"> <li>• Capability</li> </ul>	The prerequisites for behaviour, defined as

change wheel (Michie et al., 2011)	<ul style="list-style-type: none"> <li>• Opportunity</li> <li>• Motivation</li> <li>• Restrictions</li> <li>• Education</li> <li>• Persuasion</li> <li>• Incentivisation</li> <li>• Coercion</li> <li>• Training</li> <li>• Enablement</li> <li>• Modelling</li> <li>• Environmental restructuring</li> </ul>	capability, opportunity and motivation, relate to psychological processes in the model such as self-efficacy. Modelling, as an intervention function from the behaviour change wheel can be connected to the revised model through its inclusion as a psychological process leading to learning.
Feedback Process Model (Ilgen et al., 1979; Kinicki et al., 2004)	<ul style="list-style-type: none"> <li>• Perceived accuracy of feedback</li> <li>• Desire to respond to feedback</li> <li>• Intended response to feedback</li> </ul>	Perceived accuracy of feedback, as a psychological process in the Feedback Process Model links with the process of trust. In both models, these processes are pre-empted by source credibility as a characteristic of feedback.
Control Theory (Carver & Scheier, 1982)	<ul style="list-style-type: none"> <li>• Identification of discrepancies between current behaviour (as indicated by feedback) and a pre-existing goal or standard</li> </ul>	Mastery, progression and commitment is included as a psychological process that leads to learning as an intermediary outcome to professional behaviour change. Goal setting is also a required additional component in the model to support feedback in promoting this process.
Feedback Intervention Theory (Kluger & DeNisi, 1996)	<ul style="list-style-type: none"> <li>• Comparison of feedback with hierarchically organised goals or standards in order to identify any gaps between the two</li> <li>• Change in the locus of attention as a result of this</li> </ul>	Both focus of attention and mastery, progression and commitment are included as psychological processes that lead to learning as an intermediary outcome to professional behaviour change. Goal setting is also a required additional component in the model to support feedback in promoting this process.
Contextual Feedback Intervention Theory (Sapyta et al., 2005)	<ul style="list-style-type: none"> <li>• Identification of discrepancies between current behaviour (as indicated by feedback) and a pre-existing goal or standard that the individual is highly committed to</li> <li>• Experience of cognitive dissonance</li> </ul>	Both dissonance and mastery, progression and commitment are included as psychological processes that lead to learning as an intermediary outcome to professional behaviour change. Goal setting is also a required additional component in the model to support feedback in promoting this process.
Model of actionable	<ul style="list-style-type: none"> <li>• Timely</li> <li>• Individualised</li> </ul>	Timeliness of delivery, non-punitive nature of purpose and relevance and anonymity of

feedback (Hysong et al., 2006)	<ul style="list-style-type: none"> <li>• Non-punitive</li> <li>• Customisable</li> </ul>	content are all included as necessary characteristics to promote both learning and culture change as intermediary outcomes to professional behaviour change.
Systematic review of reviews of the characteristics of effective feedback. Reported in (Benn et al., 2012)	<ul style="list-style-type: none"> <li>• Linked to a quality improvement plan</li> <li>• Paired with additional components</li> <li>• High frequency</li> <li>• Monitoring over a sustained period</li> <li>• Low baseline compliance at the start of intervention</li> </ul>	Additional components (goal setting and social interaction) are vital pre-conditions to support the psychological processes that enable learning. The need for monitoring over a sustained period of time links to the role of mastery, progression and commitment in the current model.
Qualitative lessons learned from US hospitals (Bradley et al., 2004)	<ul style="list-style-type: none"> <li>• Perceived validity and credibility of the data</li> <li>• Source and timeliness</li> <li>• Benchmarking</li> <li>• Physician leaders</li> <li>• Avoiding of individual profiling that could be misconstrued as punitive</li> <li>• Persistence of data feedback</li> <li>• Organisational context</li> </ul>	Credible source, timely delivery, benchmarking, peer leadership and a non-punitive purpose and approach are all required characteristics in this model. The local context is included as an important pre-condition to consider, particularly in relation to the climate for quality improvement, levels of transparency across colleagues and available time and resources. The need for monitoring over a sustained period of time links to the role of mastery, progression and commitment in the current model.
Effects of audit and feedback on professional practice and healthcare outcomes (Ivers et al., 2012; Jamtvedt et al., 2006)	<ul style="list-style-type: none"> <li>• Low baseline performance</li> <li>• Source is a supervisor or colleague</li> <li>• Feedback is provided more than once</li> <li>• Delivered in both verbal and written formats</li> <li>• Includes explicit targets and action plans</li> </ul>	Having a credible peer leader is a required characteristic in the model. Goal setting, as an additional component, is a vital pre-condition to support the psychological processes that enable learning.
Feedback from medical registries to healthcare providers (van der Veer et al., 2010)	<ul style="list-style-type: none"> <li>• Trust in data quality</li> <li>• Motivation of the recipients</li> <li>• Intensity of feedback</li> <li>• Organisational factors</li> </ul>	Credible source, timely delivery and a non-punitive purpose and approach are all required characteristics in this model.

	<ul style="list-style-type: none"> <li>• Outcome expectancy of recipients</li> <li>• Timeliness</li> <li>• Dissemination of information</li> <li>• Confidentiality/non-judgemental tone</li> </ul>	
Using quality indicators to improve hospital care (De Vos et al., 2009)	<ul style="list-style-type: none"> <li>• Feedback reports in combination with an educational implementation strategy and/or the development of a quality improvement plan</li> <li>• Awareness</li> <li>• Credibility</li> <li>• Supportive local management</li> <li>• Available hospital resources</li> </ul>	Additional components (goal setting and social interaction) are vital pre-conditions to support the psychological processes that enable learning. Credibility of source and the need for managerial support are both required characteristics in this model.
Assessment, feedback and physicians' clinical performance (Veloski et al., 2006)	<ul style="list-style-type: none"> <li>• Provided systematically over multiple years</li> <li>• Authoritative, credible source</li> </ul>	Credible source is a required characteristic in this model. The need for monitoring over a sustained period of time links to the role of mastery, progression and commitment in the current model.
Effects of feedback of information on clinical practice (Mugford et al., 1991)	<ul style="list-style-type: none"> <li>• Timeliness</li> </ul>	Timely delivery is a required characteristic in this model.
The SAIFIR framework and identified requirements for effective feedback from incident reporting (Benn et al., 2009)	<ul style="list-style-type: none"> <li>• Multiple levels of the organisation</li> <li>• Mode of delivery or channel</li> <li>• Relevance of content</li> <li>• Integration within the design of safety information systems</li> <li>• Sensitivity to information requirements of different user groups</li> <li>• Empowerment of front-line staff</li> <li>• Capability for rapid feedback cycles</li> <li>• Direct feedback to</li> </ul>	The requirements for effective feedback from incident reporting link to a number of both characteristics and psychological processes in the current model. For example, 'empowering front-line staff to take responsibility for improving safety in local work systems' is related to the psychological processes of group membership/group identification/communities of practice and involvement in the model which promote culture change and development as an intermediary outcome to professional behaviour change.

	<p>reporters and key issue stakeholders</p> <ul style="list-style-type: none"> <li>• Established, continuous, clearly defined and commonly understood processes</li> <li>• Integration within working routines of front-line staff</li> <li>• Visible improvements to local work systems</li> <li>• Credibility of source and content</li> <li>• Confidentiality</li> <li>• Visible senior-level support</li> <li>• Double-loop learning</li> </ul>	
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The core value of the iFAB model, in light of the existing literature and conceptual understanding, is that it provides an integrative and sociotechnical view which draws upon the necessary design characteristics and pre-conditions as well as the psychological processes that they promote in individuals. It also demonstrates how professional behaviour change can be viewed in light of its intermediary effects of learning and culture development. Previous models, presented across various disciplines, have tended to focus on either design characteristics or various processes and there is a lack of integration between the two. Prior work has also tended to be centred around one core discipline such as informatics or psychological learning theory. This model instead strives to combine conceptual understanding and provide policy makers, healthcare managers, clinicians and researchers with a practical sociotechnical framework for both the design and evaluation of future initiatives. It is also important to note that this model has been developed based on consultation with end users rather than experimental study of the outcomes of feedback. This has provided a greater insight into the psychological processes experienced by individuals when they interact with feedback in a real life context and change their behaviour based upon it. This is of great importance when understanding feedback for the purpose of practical application in a complex environment such as healthcare. In this sense, the model is based upon empirical mixed methods research studies which have been designed specifically to respond to the overarching research question of how (through what characteristics and mechanisms) feedback impacts on professional behaviour in healthcare.

## **5.3 Limitations of the PhD**

There are a number of limitations that should be considered when interpreting the findings of this PhD. Individual limitations sections have been included throughout the thesis at the end of each research study. Therefore, the limitations presented in this broader section are of more general relevance to the methodological and operational approach taken.

### **5.3.1 Limitations of quantitative approach and components**

Survey measures, in general, are open to a number of respondent biases, though subjectivity may be considered a strength where an "end-user" or "stakeholder" perspective is required. A cognitive walkthrough process was employed in the development of both surveys in order to ensure that potential recipients would interpret and comprehend survey items in the way that was desired. This process also supported iterations of the survey layout in order to reduce the cognitive load on the recipient.

### **5.3.2 Limitations of qualitative approach and components**

Both Hospital One and Hospital Two are teaching hospitals. It is possible that findings based upon teaching hospitals may reduce generalisability. However, it might conversely be argued that in the preliminary stages of research in this area, clinicians in an academic medical setting are likely to be practicing within a data-rich environment and therefore better able to rate utility and discuss experiences.

The reliability and validity of the qualitative work in this thesis was ensured through a number of mechanisms. For example, multiple perspectives on all datasets were incorporated into analyses and specific attention was paid to discrepancies and disconfirming evidence. However, results of analyses were not fed back to interviewees and this may have been a useful step in ensuring accurate interpretation (Mays & Pope, 1995). The design of the initial qualitative study in work stream one (research study two) was formulated for the purposes of a broader project with multiple research aims rather than for the specific purposes of this PhD. This could be viewed as a limitation particularly in light of the influence of this dataset on the following qualitative research studies in the thesis. If the data had been collected purely for this PhD it may have been designed in a slightly different way. However, the wealth of available data allowed for a broad inductive analysis as a starting point which was effective at driving the selection of theoretical lenses through which to approach future data collection and analysis. In this sense it allowed for "ex post" incorporation of

theory to understand the mechanisms of improvement within a programme (Dixon-Woods et al., 2011).

### **5.3.3 Strengths and limitations of the overall research approach**

#### *5.3.3.1 Limitations of mixed methods designs*

As mentioned previously in the thesis, there are obvious limitations in trying to combine research findings from multiple paradigms that have different epistemologies and ontologies. Using a positivist approach that is based on the belief that there is a discoverable truth and reality independent of the researcher is very different to using a social constructivist approach that is underpinned by the principle that all realities are socially constructed and dependent upon individuals and context. An awareness of this has been demonstrated throughout the thesis and a number of measures have been put into place to accommodate it. It is hoped that the strengths of each approach can offset the weaknesses of the other to some extent (Creswell & Clark, 2007). All conceptual integration has been based on a fundamental understanding of the core differences between the two paradigms.

Use of a sequential mixed methods design has limitations. The influence of the investigator on decisions regarding which of the outcomes from the first study influences the design and approach of the following study must be acknowledged (Creswell et al., 2011). Overall merging of the data also has limitations. It is difficult to guarantee that the investigator does not unintentionally place more emphasis on the findings of one study compared with another. This is particularly relevant in light of their own expectations and experiences. Attempts have been made to offset these potential weaknesses by using as systematic and transparent a methodology as possible to integrate, compare and contrast the findings from the multiple research studies (Dixon-Woods et al., 2004). This provided greater opportunity to identify and control for any biases in approach as they emerged. All stages of the qualitative work included multiple perspectives on both design and analysis and secondary input on the classifications made across the studies and the categorisations developed for the iFAB model itself was sought from the supervisors of this PhD.



### *5.3.3.2 Limitations of case study methodology*

Selection of case studies was partly opportunistic in terms of the feedback interventions that were accessible for evaluation and exploration. However, they synchronised well with the selected work streams and responded well to research needs in the specific areas. For example, anaesthetists rarely receive systematic feedback on the outcomes of their performance (Benn et al., 2012) and there is a call for an improved understanding of how the wealth of data from the NRLS can be used more efficiently to result in wide scale improvements to patient care in the NHS (Mitchell et al., 2015; Sujan, 2015; Williams & Osborn, 2006). The PhD did not specifically explore feedback at the team/unit level. An additional work stream devoted to this area may have further developed and strengthened the iFAB model. However, it is worth noting that the exploration of personalised feedback to anaesthetists does comment on the team/unit perspective to some extent.

The specific feedback interventions that were selected for evaluation may have influenced the extent to which end users could comment on the characteristics and psychological processes of effective feedback (i.e. they may have been constrained by the features of the interventions themselves). This could therefore have influenced the characteristics that emerged as being important (i.e. the defining features of the individual interventions could have contaminated the developing model to some extent). Actual exposure to the feedback interventions was not measured. Although this has been captured to some extent through the qualitative interviews it would have been beneficial to explore this more objectively in parallel (i.e. through a measure of how often the various feedback reports successfully reached recipients, how many people opened their reports, and how accurate the data were etc.).

It is important to consider the extent to which the proposed model can be viewed as generic, or instead is specific to the case study areas that form the thesis. The dual focus on feedback at the individual and organisational level has been reconciled in the model through the various syntheses that have been performed on the datasets. The fact that similar characteristics and psychological processes emerged across the two work streams is encouraging. It may be the case that feedback at the individual level predominantly influences professional behaviour change through learning as an intermediary outcome, whereas feedback at the organisational level mainly influences professional behaviour change through culture change and development as an intermediary outcome.

Applied research looking at real life quality improvement projects removes the type of controls available to experimental researchers. However, it also provides the opportunity to understand a

research problem in a real life context and makes the model more ecologically valid for the design of future initiatives (as it is grounded in practice).

#### *5.3.3.3 The influence of context*

This work overlapped with a number of other broader programmes of research. This had advantages in the opportunity for collaboration and access to case study feedback interventions. However, this also presented some limitations in designing and conceptualising the programme of research as a whole. For example, some of the data used in this thesis had been previously collected as part of broader projects with specific research objectives. However, the analyses of these datasets were used to inform the design of research studies specifically for the purposes of this PhD, including further data collection. The involvement with broader projects also permitted access to a wider research team with a multitude of professional backgrounds and experiences. This was particularly valuable in terms of gaining multiple perspectives on the qualitative data and associated analysis as well as the design of interview schedules and valid survey instruments.

## 5.4 Implications for future research

The outputs from this work, as well as the experiences of conducting it and recognition of its limitations, point to a number of areas for future research.

**1. The application of the iFAB model should be explored in multiple novel contexts and developed further based on end user evaluation.**

As mentioned in the limitations section, the contextual influence of the selected work streams and case study feedback interventions may restrict the generalisability of the model. Future work should therefore include further evaluation of existing initiatives in various healthcare contexts. Results should be compared against the existing model and used to drive further iterations of the conceptual understanding of relationships. Dependent on findings, this approach could also potentially provide further empirical validation for the current model. Specific contexts for future exploration may include other specific clinical specialties for feedback at the individual level and various types of regulatory reports for organisational level feedback. Feedback at the team/unit level should also be explored to strengthen the model further.

**2. The iFAB model should be expanded to include additional influences and reduce constraining factors.**

The work streams were specifically focussed upon understanding the impact of feedback on professional behaviour change. However, it is acknowledged that additional factors will come into play at all levels of the model. Future research should expand the model to include external influences on psychological processes that may interact with the effects of specific design characteristics. For example, personality traits of the recipient themselves may come into play here.

**3. The reciprocal relationship between learning and culture should be further explored.**

The model presented in this thesis emphasises the interaction between learning at the individual and group level and culture change and development as intermediary effects of the relationship between feedback and professional behaviour change. Future research should endeavour to investigate this relationship further to see if one predominantly influences the other and therefore needs to be more heavily targeted. It may be the case that different types of feedback are predisposed to influence behaviour primarily through

one intermediary outcome. Drawing upon the work streams in this thesis, feedback at the individual level may be more likely to influence behaviour through individual and group learning whereas feedback at the organisational level may have a more prominent effect on culture change as an intermediary effect to professional behaviour change.

**4. Further mixed methods research in this area is required to further understand the experiences and perceptions of end users in a real life and every day context.**

Experimental studies exploring the objective measurable effects of feedback on behaviour are unlikely to provide an adequate understanding of how people respond and interact with such information in a natural environment. The current programme of research demonstrates the value of mixed methods when exploring complex, social initiatives. Despite epistemological contradictions, it is possible to draw upon the complementary strengths of qualitative and quantitative approaches in order to design the most effective research studies for this topic area. As part of the broader research programme with which this PhD was affiliated a quasi-experimental design was used to evaluate the anaesthetics feedback intervention. This work demonstrated positive results on meaningful outcomes for patients. Future feedback interventions that are developed using the iFAB model should be evaluated using mixed methods research designs.

**5. The value of end user owned and directed feedback initiatives should be further explored.**

The findings from this research have further emphasised the importance of end user involvement in the development and evaluation of feedback initiatives. Future work should strive to gain a better understanding of the ways in which involvement can be optimised.

## 5.5 Practical recommendations for the design of better feedback systems

**1. Policy makers, healthcare managers, clinicians and researchers need to recognise feedback as a complex, social intervention when designing and evaluating initiatives.**

The proposed model demonstrates the complexity of interactions between feedback characteristics, psychological processes, learning, culture and professional behaviour change. Policy makers, healthcare managers, clinicians and researchers therefore need to better recognise the requirement to consider and explore a multitude of factors when designing and evaluating future initiatives. For example, it is not sufficient to simply employ the characteristics of feedback that are thought to be effective without understanding the psychological processes that they promote in individuals. It is these processes that combine with the intermediary effects of learning and culture change to form the mechanisms through which feedback impacts on professional behaviour change. The lack of attention being given to the mechanisms through which feedback impacts on behaviour was the main driver for this PhD and the findings support the requirement to consider these in detail when designing and evaluating initiatives.

**2. There is a need to better support clinicians through the revalidation process by providing them with effective personalised feedback on their performance.**

In order to use the revalidation process optimally to support developments in quality and safety clinicians require effective personalised feedback that has been designed specifically to promote learning and professional behaviour change. The model presented in this thesis can support the design of such initiatives to some extent. Clinicians cannot be expected to demonstrate continuous professional development without sufficient feedback to learn from and guide their future performance. Professional behaviour change can be demonstrated as part of the revalidation process. Alternatively, it can be prompted as a result of it. Either way, in order for it to occur, it must be determined by learning and/or culture change which will be a result of psychological processes prompted by the characteristics and pre-conditions of feedback. The iFAB model demonstrates that individual level learning is primarily influenced by psychological processes such as dissonance, focus of attention and mastery/progression/commitment. These are determined by specific design characteristics such as the format of feedback and its delivery.

**3. More attention needs to be paid to how feedback from incident reporting systems is designed and disseminated in order to have an optimal effect on professional behaviour at all levels of the organisation.**

The results of this PhD demonstrate the lack of integration of feedback from incident reporting with the working lives of front line staff. Future feedback of this type should be designed to funnel down through organisations from direct (e.g. risk managers) to indirect (e.g. front line clinicians) end users. It may be the case that feedback from incident reporting predominantly impacts on professional behaviour change via culture development (as opposed to individual and group level learning). If this is the case, then psychological processes such as identification/association/affiliation/connection, trust and involvement may be the most important to promote at the individual level. The iFAB model suggests that these processes can be prompted by design characteristics such as the purpose and source of feedback.

**4. End users need to be involved in the design, iteration and evaluation of feedback initiatives if they are to be successful**

As per the findings, and the call for future research above, there is a need for end users to be consistently involved in the development and evaluation of feedback initiatives as a matter of course. The term 'end user' refers to the individuals who ultimately use or are intended to ultimately use feedback as a product as opposed to the individuals who design, develop and implement the feedback. This work has demonstrated the depth and insight that can be gained from the involvement of end users in understanding and conceptualising the effects of feedback on professional behaviour. Such involvement enabled the identification and exploration of the key psychological processes that contribute to the mechanisms through which feedback impacts on professional behaviour change. Without an understanding of these psychological processes it becomes impossible to successfully select the required characteristics and pre-conditions when designing initiatives. Involving end users in the design and evaluation of future initiatives will enable further developments of this type and will contribute to the refinement of the iFAB model as further psychological processes are identified.

**5. Professional behaviour change should be viewed in light of both learning and culture**

The iFAB model breaks professional behaviour change down into two intermediary outcomes of learning and culture. The importance of these two mediators should be

considered when designing feedback initiatives. Different sets of psychological processes are in place when learning is the primary intermediary effect compared to when it is culture. Therefore different design characteristics of feedback will require targeting dependent on the desired intermediary effects. Policy makers, healthcare managers, clinicians and researchers should give sufficient thought to this when designing feedback initiatives. For example, although learning and culture are likely to influence one another (as demonstrated in the model) it may be that the mechanisms of feedback are likely to work through one rather than the other dependent on the specific circumstances. As mentioned previously, feedback with the goal of professional development may strive to promote learning at the individual or group level whereas feedback aimed at improving organisational practice may be better suited to culture change.

## 5.6 Conclusions of the PhD

This work set out to describe and investigate the characteristics and mechanisms by which feedback influences professional behaviour in healthcare. Case study feedback interventions have been explored from the perspective of their end users and insights have been combined both within and across two core work streams (feedback at the individual level and feedback at the organisational level) in order to form an improved understanding of the characteristics and mechanisms by which feedback influences professional behaviour in healthcare. The iFAB model provides an integrative understanding of how the desired output of professional behaviour change is mediated by intermediary outcomes (learning and culture) which themselves are the result of a number of psychological processes prompted by the specific design features and pre-conditions of feedback. This addresses the complexity of feedback in a real life context and should be used by policy makers and researchers to design and further evaluate its effects on end users and their performance.



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## APPENDICES

### Appendix A: Evaluative survey of feedback on quality of anaesthetic care

#### Survey: Feedback on quality of anaesthetic care

##### Instructions to respondents

This questionnaire is concerned with your experience of the data that is fed back to you on the quality of care delivered by **anaesthetic services at [Hospital One]** and how that information is used. Where we refer to "feedback" we mean quantitative data from measures and indicators, rather than anecdotal reports or conversations. We ask that you give your name to enable follow-up measurement. Responses will be analysed and reported anonymously.

##### A) PERSONAL DETAILS

<b>Name</b>		<b>Grade</b>	<b>Trainee</b>		<b>Year of qualification</b>	
<b>Hospital &amp; Dept</b>			<b>Consultant</b>			
<b>Specialty</b>					<b>Country of qualification</b>	

##### B) FOCUS OF CURRENT QUALITY FEEDBACK

<b>Dimensions of quality</b>			
Do you receive <b>regular quantitative feedback</b> on each of the following dimensions of quality? Regular feedback = at least monthly. Please circle Yes or No.			
Yes	No	<b>Clinical effectiveness of care</b> (e.g. clinical outcomes, pain control, etc.)	B01
Yes	No	<b>Compliance with best practice guidelines</b> (e.g. hand hygiene, perioperative temperature control, etc.)	B02
Yes	No	<b>Productivity and efficiency</b> (e.g. waste, patient flow, throughput, delays)	B03
Yes	No	<b>Financial performance</b> (e.g. cost efficiency of care delivered)	B04
Yes	No	<b>Patient safety</b> (e.g. freedom from adverse events/critical incidents and hospital acquired infection)	B05
Yes	No	<b>Patient experience</b> (e.g. patient satisfaction, waiting times, clarity of info, quality of interaction, respect & dignity)	B06

<b>Level of feedback</b>			
Considering <b>clinical effectiveness, patient safety and patient experience</b> as a whole, please circle True or False for each of the following:			
True	False	I receive monthly or more regular feedback concerning the care delivered <b>by the Trust or Hospital</b>	B07
True	False	I receive monthly or more regular feedback concerning the care delivered <b>by my department</b>	B08
True	False	I receive monthly or more regular feedback concerning the care I delivered <b>personally</b>	B09

##### C) EFFECTIVENESS OF CURRENT QUALITY FEEDBACK

Please consider the adequacy of feedback you receive from quality indicators against each of the following dimensions and circle the appropriate number on the scale provided:

<b>Your perceptions of current quality of care indicators in your area:</b>		<b>Completely inadequate</b>							<b>Excellent</b>
		1	2	3	4	5	6	7	8
C01	<b>Comprehensiveness:</b>								

	The degree to which the data you receive is comprehensive and covers all important dimensions of care quality.	
C02	<b>Relevance:</b> The degree to which care quality indicators are unambiguous and specific to our service area and the care we routinely deliver to patients.	1 2 3 4 5 6 7 8
C03	<b>Reliability:</b> The degree to which indicators are objective and reliable indicators of current standards of care, promoting confidence in the accuracy of the data over time.	1 2 3 4 5 6 7 8
C04	<b>Improvability:</b> The degree to which indicators measure aspects of care that you and your unit can have a direct impact upon through changing behaviour, the care process or local systems.	1 2 3 4 5 6 7 8

<b>Your perceptions of the current feedback you receive:</b>		<b>Completely inadequate</b>	<b>Excellent</b>
C05	<b>Level of analysis:</b> The degree to which the data you receive is broken down to a level that is directly relevant to you (e.g. for your team, your ward, your operating theatre, your patients).	1 2 3 4 5 6 7 8	
C06	<b>Timeliness:</b> The degree to which the frequency of feedback you receive helps you to monitor how care quality varies over time.	1 2 3 4 5 6 7 8	
C07	<b>Means of communication:</b> The degree to which the channel and method for dissemination (e.g. meetings, email, reports, posters) are useful and engaging.	1 2 3 4 5 6 7 8	
C08	<b>Data presentation:</b> The degree to which the format in which data is presented (e.g. tables, graphs, scorecards) is clear and easy to use, with the right amount of data presented.	1 2 3 4 5 6 7 8	
C09	<b>Data credibility:</b> The degree to which the data is viewed as credible and from a trustworthy, unbiased source.	1 2 3 4 5 6 7 8	
<b>Your perceptions of how quality of care data is used for improvement:</b>		<b>Completely inadequate</b>	<b>Excellent</b>
C10	<b>Identifying problem areas and good practice:</b> The degree to which data feedback helps us to rapidly detect problems and identify instances of excellent care.	1 2 3 4 5 6 7 8	
C11	<b>Benchmarking:</b> The degree to which the data feedback allows us to compare ourselves against similar units and/or national guidelines in a meaningful way.	1 2 3 4 5 6 7 8	
C12	<b>Prioritising action:</b> The degree to which data feedback supports prioritising where we put our efforts to improve care and which specific processes to focus upon.	1 2 3 4 5 6 7 8	
C13	<b>Setting measurable objectives:</b> The degree to which data feedback supports setting quantifiable targets for improvement.	1 2 3 4 5 6 7 8	
C14	<b>Monitoring progress:</b> The degree to which data feedback supports evaluation of our progress towards targets over time and whether any gains are sustained.	1 2 3 4 5 6 7 8	
C15	<b>Overall usefulness for improvement:</b> The degree to which current data feedback is useful in monitoring variations and improving care.	1 2 3 4 5 6 7 8	

#### D) THE ENVIRONMENT IN WHICH YOU WORK

Please consider the extent to which you would agree with the following statements and circle the appropriate number on the scale provided.

		<b>Strongly Disagree</b>	<b>Strongly Agree</b>
D01	In this department we are proactive in striving to continuously improve standards of care	1 2 3 4 5 6 7 8	

D02	In this department we routinely review data on quality of care outcomes	1 2 3 4 5 6 7 8
D03	In this department it is clear as to what are acceptable standards of care	1 2 3 4 5 6 7 8
D04	In this department we monitor compliance with best practice guidelines for clinical care	1 2 3 4 5 6 7 8
D05	In this department we respond to variation constructively, to improve care, rather than blaming and punishing individuals	1 2 3 4 5 6 7 8
D06	In this department we openly discuss minor failures in care to learn lessons	1 2 3 4 5 6 7 8
D07	In this department we review critical incidents and serious failures to improve systems	1 2 3 4 5 6 7 8
D08	In this department we can demonstrate to senior levels of the organisation the quality of care we are delivering	1 2 3 4 5 6 7 8
D09	In this department we are supported by the organisation in our efforts to collect and use data	1 2 3 4 5 6 7 8
D10	I have adequate knowledge and training on the statistics required to interpret quality of care data	1 2 3 4 5 6 7 8
D11	I have adequate knowledge and training in quality improvement methods	1 2 3 4 5 6 7 8
D12	In this department variations in the quality of care delivered to patients often go undetected	1 2 3 4 5 6 7 8
D13	In this department it is clear who is responsible for taking action to make changes and improve care processes	1 2 3 4 5 6 7 8
D14	In this department we use personal data on the quality of care that individuals deliver in a constructive way	1 2 3 4 5 6 7 8
D15	I am comfortable for the quality of care received by my patients to be monitored and fed back to me	1 2 3 4 5 6 7 8
D16	In this department we are effective in taking action based upon audit and data feedback	1 2 3 4 5 6 7 8

## Appendix B: Hospital One interview schedule time point one

### A) Preamble to interviews

Provide standard information form to read. Prompt for clarity/questions. Obtain consent. Provide brief verbal overview of the project and aims. Start recording.

- Please could you introduce yourself and state your role/specialty for the recording?

### B) General views upon feedback:

1. In your view, what are the most important aspects of quality of care relevant to anaesthetics practice?
  - Prompt for perspectives of anaesthetists, patients, other HC professionals, managers.
2. Do you think anaesthetists generally get adequate feedback upon these aspects of quality of care?

### C) Evaluation of the current initiative:

1. What are your general thoughts about this initiative and the feedback reports that you receive? [Introduce feedback report template]
2. What do you think of the quality indicators that are currently reported?
  - Have we missed anything important?
  - Respond to the following (prompt for explanation of ratings)

	For each measure please rate (on a scale of 1 - 5):	PONV	Pain	Temp
1	Importance to overall quality of anaesthetic care? (Validity)			
2	Confidence in the accuracy of the measure? (Reliability)			
3	Degree to which you can influence this measure? (Controllability)			

- (Review the matrix above and check that our interpretation is correct)
3. What was your initial reaction to seeing your data?
    - Were the results as you expected?
    - What are the benefits? What do the reports tell you that you didn't know before?
  4. How do you use the information contained within the reports?
    - Are there any examples of changes you've made to your practice?
    - Does the data help you identify and address underlying reasons for variations?
    - Do you think it's possible for you to influence the data through changing your practice?
    - If the data suggested there was an opportunity for improvement, would you change your practice?
    - How do you think anaesthetists should use the data?

- What do you think might prevent anaesthetists from making improvements based upon the data?
- How do you think the department should use the data?
- 5. What do you think about the current report format?
  - Frequency, length, graphical/text content, technical complexity.
- 6. Would you rather see your data compared with others, your data displayed over time, or both?
  - How do you feel about being compared with your colleagues? Prompt for any case-mix issues. Is competition important?

**D) Future development:**

1. Are there any measures, features or functionality that you would like to see included in future versions of the reports?
  - Would you be interested in a longer report with a more detailed breakdown/analysis of your data?
2. What further support could be provided for anaesthetists to use this data to improve care?
3. Can you see a role for initiatives of this type in revalidation?

**E) Broader context:**

1. Do you see any barriers to engagement with and utilisation of this initiative?
  - Any concerns around use of the data?
2. Is there anything about the organisation or context in which you work that might make a system like this one more or less successful?
3. Do you think there is an atmosphere of transparency here amongst the clinical group concerning quality issues?
  - Prompt for comfort with disclosing and discussing personal performance data with peers. Are such discussions constructive/punitive?
  - What other factors influence whether you are comfortable for your data to be collected and used in this way?
4. What support from the broader organisation/department/specialty would you need to use this data effectively for continuous improvement?

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Indicator ratings template for use during interview:

	For each measure please rate: (Low) <b>1-----2-----3-----4-----5</b> (High)	<b>PONV</b>	<b>Pain</b>	<b>Temp</b>
<b>1</b>	<b>Importance to overall quality of anaesthetic care?</b>			
<b>2</b>	<b>Confidence in the accuracy of the measure?</b>			
<b>3</b>	<b>Degree to which you can influence this measure?</b>			

## Appendix C: Hospital One interview schedule time point two

### **Introduction to interview**

#### **Give out participant information sheet and complete consent form**

- Have you previously been interviewed as part of this project?
- If so...
- As you may know the feedback initiative has changed and developed significantly and is now a Trust wide initiative. We have made many improvements to the reports based on previous interviews and discussion but we are still looking to develop them even further. In order to do this we would like to discuss a number of key areas with you today.
- Do you receive the feedback reports?
- How often?
- Do the reports contain all of your cases?
- What are your general impressions/reflections on this initiative and the fact that you are receiving these feedback reports?
- Have your views about the feedback reports changed or developed in any way over time?

#### **Data to information**

- How do you make sense of the data? How do you give it meaning? How do you translate the data into something that is meaningful to you?
- What information do you think the individual clinician needs to get from these reports in order to learn and make improvements?
- What do you do with the information that we provide to you?
- Do you review it/carry it with you/discuss it with colleagues?
- You now receive data on the quality of recovery score. What do you think about receiving this data?
- How do you interpret this data?
- What is your understanding of what it shows/adds?

#### **Information to action**

- How do you use the information that is provided to you?
- Have you changed your practice based on this feedback?
- Do you intend to change your practice based on the feedback reports that you receive?
- Are the feedback reports sufficient?
- If you wanted to change your practice would this initiative be enough to support you in doing so? If not, what is missing?
- How could you use this report for appraisal/revalidation purposes? Would it be useful? If not, why not? What is missing to help you do this?
- When revalidation is introduced would you be comfortable using this report as evidence for your fitness to practice? If not, why not?

- What do you think the consequences are of using this data to make improvements? Do you think they are good or bad?
- What do you think are the barriers and facilitators to using this data effectively to make improvements?
- What supports you in using this data?
- What makes it easier/more difficult to use this data to make improvements?
- Do you feel that you have the resources to effectively use the data that we provide you with?
- Do you feel any sense of responsibility to act upon the data that we provide you with?
- What would encourage you to act upon the data that we provide you with in the reports?
- How does the fact that the reports are anonymous help or hinder you in your use of them to make improvements?
- Have your perceptions about anonymity changed over time?

### **Conceptualisations of the report**

- What does the report show about you as a professional?
- What do you think it says about your department that you are involved in this type of initiative in the first place?
- Is this initiative compatible with current guidelines and best practice for perioperative units?
- How do the reports make you think or feel differently about your professional practice?

### **Context**

- How does your local environment affect the way in which you use the feedback reports?
- Do your peers support you in using the feedback reports? If so how?
- What do your peers think about you using this data to make improvements?
- What is the general feeling across the department about the use of this data to make improvements?

### **Further developments**

- How do you visualise this initiative going forward?
- How can we make further improvements to support you in your use of the reports?
- What could we change about the feedback that would encourage you to change your practice based upon it?



## Appendix D: Hospital Two interview schedule time point one

### **Introduction**

- *Brief the participant on the purpose of the project and interview*
- *Describe the nature of the interview (i.e. that it is recorded) and discuss confidentiality*
- *Give participant information sheet and consent form to sign*
- *Start recording*

Please could you introduce yourself and state your role/specialty for the recording?

- How long have you been an anaesthetist for?
- How long have you been an anaesthetist at this particular Trust?

### **General views upon feedback:**

In your view, what are the most important aspects of quality of care relevant to anaesthetics practice?

- Prompt for perspectives of anaesthetists, patients, other HC professionals, managers.

Do you think anaesthetists generally get adequate feedback upon these aspects of quality of care?

- Prompt for any past experience of feedback of comparative data/indicators.
- Do you follow up your patients in recovery?
- Roughly what proportion of your patients do you follow up in recovery?
- Do you feel like it is your responsibility as an anaesthetist to do this?

### **Expectations of the initiative**

Please can you describe your understanding of the feedback initiative that is going to be initiated here?

How do you feel about the fact that this quality improvement initiative is being introduced at your organisation?

- Do you welcome it? Do others welcome it?

What do you expect the consequences to be of introducing a feedback initiative in this department?

- Unintended consequences for yourself or others?

What do you see as the potential benefits of the initiative?

- How might a feedback initiative support you in your work as an anaesthetist?
- Do you expect this type of data to be meaningful to you as a clinician?
- If not, why not?

How do you think it will make you feel to see your data for the first time?

- How do you feel about being compared to your peers?

How anonymous do you think a feedback initiative of this type should be ideally?

- To what extent do you expect/plan to discuss your feedback with your peers?  
(If participant expects to keep data confidential prompt for why this might be the case)

How do you think anaesthetists should use the data?

- What aspects of data feedback might influence you to change your practice?

What might help or hinder the effectiveness of this quality improvement initiative?

- What factors do you think are of most importance for its success?
  - Engagement?
  - Measures/data quality?
  - Confidentiality/anonymity?
  - Constructive/punitive approach?
  - Senior support?

Do you think the department should use the data in any way?

- If so, how and why?
- If not, why not?
- What about at the organisational level?

## Appendix E Hospital Two interview schedule time point two

### **Introduction**

- *Brief the participant on the purpose of the project and interview*
- *Describe the nature of the interview (i.e. that it is recorded) and discuss confidentiality*
- *Give participant information sheet and consent form to sign (if they haven't already completed one previously)*
- *Start recording*

Please could you introduce yourself and state your role/specialty for the recording?

- Have you previously been interviewed as part of this project?

### **Do you receive the feedback reports?**

#### **What do you think about the feedback reports?**

- What was your initial reaction to seeing your data?
- Were the results as you expected?
- Do the reports tell you anything that you didn't know before?

#### **What do you do with the reports?**

- How do you translate the data into something that is meaningful to you?
- Would you use these reports for professional development or as evidence of your fitness to practice?
- How are your colleagues using the data?
- Do you have any suggestions/proposals for how this data could be used either at individual or group/departmental level?

#### **Have you changed your practice based on the feedback reports?**

- Please describe any changes to practice that you have planned or implemented based upon the data
- Has there been any quality improvement or audit activity linked to the feedback reports?

#### **How could the reports be made better?**

- Are there any specific issues with the reports that you would like to discuss?
- Is there any additional information that you think the individual clinician needs to get from these reports in order to learn and make improvements?
- If you wanted to change your practice would this initiative be enough to support you in doing so? If not, what is missing?
- Do you think it's possible for you to influence the data through changing your practice?
- Has the introduction of this initiative at your organisation been a worthwhile use of resources in your opinion?

- Would you like to share any other thoughts on the feedback that you have received as part of this initiative?

## Appendix F: Interview schedule for safety science experts

### **Stage 1: Standardised description of research focus**

“The focus of the research we are undertaking is upon feedback of safety-critical information from incident reporting schemes and broader safety management and quality assurance systems that might address the safety issue. We are interested in both the specific mechanisms within your domain that are implemented to feed back information into operations to improve safety and the general characteristics of effective feedback. To the extent that processes concerning the communication and analysis of safety incidents also influence the quality and relevance of information for remedial action, we are also interested in the characteristics of incident reporting systems and issues surrounding their success or failure.”

### **Stage 2: Relevance and representation**

- Please could you outline your role relevant to safety management and/or incident reporting systems in particular?
- Please could you describe the primary industry/sector in which you currently work and any other work domains/industrial sectors in which you have had experience relevant to safety management.

### **Stage 3: Open ended questions to probe concepts of interest**

#### **A) Description of safety management and information processing/incident reporting systems**

- Within the domains with which you are familiar, what are the formal systems that have been implemented to improve safety?
- Can you describe the process by which safety issues within operations are detected, analysed and [information fed back to improve safety?] (What happens to an issue as it is reported and passes through the information system?).
  - What established formal or informal mechanisms are in place to achieve this?
  - How is data collected and analysed, and what is the output from this process?
  - How are recommendations/issues prioritised – what is the risk analysis process?
  - Can you give some examples of the types of issues that get dealt with?
- What types of reports are received?
- How is the effectiveness of changes made in operations evaluated? How do you know that they've worked?
- Is there any facility within the system to fast track important issues?

#### **B) Focus upon feedback of safety-critical information**

- Is feedback provided to individual reporters on the progress of their issues?
  - If so what kind of feedback and when.
  - Why? What effect does this have upon the success of the safety system?
- On what level of organisational systems is information fed back/targeted?
  - Aimed at operational level (ultimately) but directly e.g. newsletters/bulletins.
  - Aimed more at recommendations for management to implement?
  - What about higher-levels e.g. industry-wide/world-wide/national and international regulation.
- What types of changes are implemented as a result of operation of the system?
  - Procedural changes?
  - Changes to tools and equipment?
  - Quick fixes/workarounds/temporary solutions?
  - Any good examples of success stories?
- What types of feedback are produced?
  - Newsletters, bulletins, procedural amendments, documentation, published incident reports?
  - What are the best ways to present data/safety information to operations personnel? e.g. graphs of trends, risk analyses,
- What formal channels/means of communication already exist/are in place for feeding back information to the operational level?
- Are there any good examples/success stories relating to the effective use of feedback to improve safety in operations?

### **C) Barriers and facilitating factors for effective feedback processes**

- How important is senior management support for incident reporting and feedback?
- What cultural factors influence the success of safety information feedback processes?
  - Presence of a reporting culture? What factors contribute to this/how is this supported?
- De-individualisation of reports? - At what stage?
  - Absence of a blaming culture? What factors are involved?
- What technological/IT factors influence the success of these systems?
- What are the implications of the scale of the task? E.g. scope of operations/size of organisations covered by safety management systems? (May be relevant to healthcare systems in particular – e.g. can't provide individual level feedback).

### **(Additional) Specific questions for dedicated incident reporting programs**

- How many reports has the system dealt with to date?
- What is the typical annual/quarterly/monthly throughput?
- What are the predominant trends in the data? Is use on the increase? Why?
- Is there a standardised reporting form? Why? Does this link to a database?
- What information processing takes place within the database? Can it be queried?
- What is the output from the database? What metrics are tracked/reported periodically?
- What type of analysis of stored information takes place – qualitative or quantitative?
- What's the difference between the two?
- What types of reports are received? Major incidents, minor incidents/events? Are near miss events reported? How is this information used?

### **Stage 4: Evaluation and close**

- Are there any supporting documents or resources that you can provide us with that might expand upon the information you've provided today?
- What do you think of the adequacy of the interview process in terms of the aims of the project?
  - What questions should we be putting to the expert panel?
  - Is there anything you might have expected to have been asked that you haven't?

## Appendix G: NRLS Evaluative survey

### **Survey for evaluation of NRLS feedback**

This survey assumes that you are a current user of NRLS data in your organisation. Please take a moment to review the following definitions before completing the survey. Thank you very much for your participation.

#### **Key Term Definitions**

**NRLS data:** The data that is compiled through combining your locally reported data with that of other organisations nationally under the NRLS taxonomy.

**The current NRLS feedback system:** The means by which NHS organisations receive NRLS data in the form of monthly, quarterly and six monthly reports. Please note that this term does not refer to safety alerts/guidance etc.

#### **Demographics (free text questions)**

What is your full name?

What is the name of your organisation?

What is your role within the organisation?

What is your role within the organisation in relation to incident reporting?

What is your role within the organisation in relation to NRLS data?

#### **End-user perspective of feedback from NRLS data (categorised questions)**

**Participants will respond to these questions on an ordinal scale with categories: Never, very rarely, rarely, occasionally, frequently, very frequently**

Which of the following staff groups currently use feedback from NRLS data in your organisation?

- Senior organisational managers/strategic level board
- Risk managers/governance/organisational quality assurance
- Clinical service leads and frontline staff
- Nursing leads and frontline staff

Which of the following staff groups do you think should be using feedback from NRLS data in your organisation?

- Senior organisational managers/strategic level board
- Risk managers/governance/organisational quality assurance

- Clinical service leads and frontline staff
- Nursing leads and frontline staff

**For all remaining questions responses will be measured on 8 point Likert scales ranging from strongly disagree (1) to strongly agree (8)**

### **VALUE OF NRLS DATA TO YOUR ORGANISATION**

The local priorities suggested by NRLS data reflect valid patient safety concerns at our organisation

NRLS data is integrated with our local risk management processes

NRLS data provides us with timely information

### **DATA QUALITY**

The current NRLS feedback system helps us to understand how our approach to reporting compares to that of other organisations

The current NRLS feedback system helps us to find and correct data quality issues

The current NRLS feedback system has resulted in improvements in how we collect data locally

### **INTERPRETATION AND SENSE-MAKING**

The current NRLS feedback system provides useful ways of analysing and interpreting incident data in order to identify learning opportunities

The current NRLS feedback system helps us to prioritise patient safety issues that require local corrective action

### **BENCHMARKING AND UNDERSTANDING VARIATION**

The current NRLS feedback system allows us to understand the strength of our reporting culture compared to others

The current NRLS feedback system allows us to compare our data with that of other organisations in a meaningful way

### **COMMUNICATING AND RAISING AWARENESS**

The current NRLS feedback system supports me in cascading learning to other levels of our organisation

The current NRLS feedback system is supportive of adapting NRLS data for the needs of specific stakeholders in our organisation



## **ACTING ON RISKS TO PATIENT SAFETY**

The current NRLS feedback system helps us to respond rapidly to patient safety issues

The current NRLS feedback system provides us with the level of detail and specificity that we need to support local improvement initiatives

## **ABOUT YOUR ORGANISATION**

Within this organisation, staff are engaged in incident reporting and aware of the need to report incidents

This organisation responds to incidents in a constructive way that maximises learning

Within this organisation, staff are actively engaged in learning from incidents and improving frontline safety

Within this organisation, staff receive feedback from local incident reporting

Within this organisation, divisions and departments work together to share learning and improvement actions from incident data

Within this organisation, leadership welcomes information concerning local patient safety

Within this organisation, learning from incidents is a strong strategic priority backed up by policy

## **End-user perspective of the current NRLS feedback system (free text questions)**

### **YOUR VIEWS ON THE CURRENT NRLS FEEDBACK SYSTEM**

What is the reason for you using the current NRLS feedback system?

How does the current NRLS feedback system support you in your specific role?

Does the current NRLS feedback system support you in disseminating key learning to relevant others?

How useful is the current NRLS feedback system for continuously improving patient safety?

What could be changed about the current NRLS feedback system that would enable you to use it more effectively to make improvements to patient care?

Is the current NRLS feedback system currently adaptable to different people with different purposes in your organisation?

How does your local environment affect the way in which you can use the current NRLS feedback system to make improvements to patient care?