ADDRESSING THE PATIENT EXPERIENCE IN MEDICAL IMAGING

THIS THESIS IS SUBMITTED IN TOTAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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# Table of Contents

- List of figures ........................................................................................................... 8
- List of tables ............................................................................................................... 11
- List of appendices ...................................................................................................... 14
- Acknowledgements .................................................................................................... 15
- Abstract ....................................................................................................................... 16
- Declaration of authenticity and statement of authorship ........................................ 17

Chapter 1 – Introduction ............................................................................................... 18
  - Chapter Overview ..................................................................................................... 18
  - Introduction: .............................................................................................................. 18
  - Researcher: ............................................................................................................... 20
  - Structure of the report: ............................................................................................ 21

Chapter 2 – Background ............................................................................................... 22
  - Chapter overview ..................................................................................................... 22
  - Background: .............................................................................................................. 22
  - Critical Theory: ........................................................................................................ 25
  - Action Research: .................................................................................................... 29
  - Action research in medical imaging ...................................................................... 31
  - Susman and Evered Model: .................................................................................. 33
  - Systematic Reviews: .............................................................................................. 35

Chapter 3 – Quantitative Review Methods .................................................................. 37
  - Chapter overview ..................................................................................................... 37
  - Purpose ..................................................................................................................... 37
  - Inclusion criteria ..................................................................................................... 37
  - Search strategy ........................................................................................................ 39
  - Methods .................................................................................................................. 40

Chapter 4 – Quantitative review results ...................................................................... 41
  - Chapter overview ..................................................................................................... 41
  - Search results ......................................................................................................... 41
LIST OF FIGURES

Figure 1: The cyclical process of action research as advocated by Susman and Evered71

Figure 2: Number of studies found and retrieved (Quantitative Review)

Figure 3: Meta-analysis of information for anxiety

Figure 4: Meta-Analysis of audio-visual interventions on sedation: Overall numbers of children requiring sedation for scanning

Figure 5: Meta-analysis of audio-visual interventions on sedation: Children aged 3-4 to 10 years requiring sedation for scanning

Figure 6: Meta-analysis of audio-visual interventions for sedation: Children aged 10-18 years requiring sedation for scanning

Figure 7: Qualitative review search results

Figure 8: Meta-synthesis 1

Figure 9: Meta-synthesis 2

Figure 10: Meta-synthesis 3

Figure 11: Meta-synthesis 4

Figure 12: Meta-synthesis 5

Figure 13: Meta-synthesis 6

Figure 14: Meta-synthesis 7

Figure 15: Meta-synthesis 8

Figure 16: Meta-synthesis 9

Figure 17: Meta-synthesis 10

Figure 18: Meta-synthesis 11

Figure 19: Kolb's Learning Cycle

Figure 20: Taken medications

Figure 21: Information

Figure 22: Usefulness of information

Figure 23: Anxiety

Figure 24: Anxiety in patients scanned before

Figure 25: Anxiety first time scanned

Figure 26: No information (anxiety)

Figure 27: Anxiety received information

Figure 28: Anxiety no medication

Figure 29: Anxiety taken medication

Figure 30: Satisfaction

Figure 31: Satisfaction scanned before

Figure 32: Satisfaction (first scan)

Figure 33: Satisfaction (no information)

Figure 34: Satisfaction (received information)
Figure 73: Satisfaction and anxiety scatter plot ................................................................. 262
Figure 74: Anxiety survey 1 compared to Anxiety survey 2 .............................................. 264
Figure 75: Providing patient care .................................................................................... 267
Figure 76: Actions to help claustrophobic patients .......................................................... 268
Figure 77: Rating of actions ............................................................................................. 269
Figure 78: Radiographer’s concerns at the initial stages of the study ............................... 278
Figure 79: Radiographer’s concerns at the conclusion of the study .................................. 278
Figure 80: The action research process ............................................................................ 279
Figure 81: Model for radiographer practice change ......................................................... 285
Figure 82: Model for the patient experience in medical imaging ..................................... 288
LIST OF TABLES
Table 1: A summary of Habermas’ knowledge-constitutive interests and how various authors have aligned them .................................................................................................................. 27
Table 2: Search Strategy for Radiography Action Research Studies ........................................ 32
Table 3: Results of critical appraisal of included Randomised Control Trial / Pseudo-randomised Trial ........................................................................................................................................ 43
Table 4: Results of critical appraisal of Comparable Cohort / Case Control Studies ............... 44
Table 5: Table of Included Studies .......................................................................................... 86
Table 6: Taken medications .................................................................................................. 151
Table 7: Information ............................................................................................................. 151
Table 8: Usefulness of information ....................................................................................... 152
Table 9: Anxiety .................................................................................................................. 153
Table 10: Anxiety Descriptive statistics ............................................................................ 153
Table 11: Anxiety in patients scanned before ....................................................................... 154
Table 12: Descriptive statistics Anxiety in patients scanned before .................................... 154
Table 13: Anxiety first time scanned .................................................................................... 155
Table 14: Descriptive statistics anxiety first time scanned .................................................. 155
Table 15: No information (anxiety) ..................................................................................... 156
Table 16: Descriptive statistics no information (anxiety) .................................................... 156
Table 17: Anxiety received information .............................................................................. 157
Table 18: Descriptive statistics anxiety received information .............................................. 157
Table 19: Anxiety no medication ........................................................................................ 158
Table 20: Descriptive statistics anxiety no medication ........................................................ 158
Table 21: Anxiety taken medication ..................................................................................... 159
Table 22: Descriptive statistics anxiety taken medication ..................................................... 159
Table 23: Satisfaction ........................................................................................................ 160
Table 24: Satisfaction descriptive statistics ........................................................................ 160
Table 25: Satisfaction scanned before ................................................................................ 161
Table 26: Descriptive statistics satisfaction scanned before ............................................... 161
Table 27: Satisfaction (first scan) ....................................................................................... 162
Table 28: Descriptive statistics satisfaction (first scan) ....................................................... 162
Table 29: Satisfaction (no information) ............................................................................... 163
Table 30: Descriptive statistics satisfaction (no information) .............................................. 163
Table 31: Satisfaction (received information) ..................................................................... 164
Table 32: Descriptive statistics satisfaction (received information) ..................................... 164
Table 33: Satisfaction (no medication) ............................................................................... 165
Table 34: Descriptive statistics satisfaction (no medication) .............................................. 165
Table 35: Satisfaction taken medication ............................................................................. 166
Table 74: Cause of anxiety (cause only)........................................................................................................249
Table 75: Actions of staff to reduce anxiety .................................................................................................251
Table 76: Actions of staff to reduce anxiety descriptive statistics...............................................................251
Table 77: Previous scan................................................................................................................................251
Table 78: Previous anxiety ..........................................................................................................................252
Table 79: previous anxiety descriptive statistics.........................................................................................252
Table 80: Previous satisfaction....................................................................................................................253
Table 81: Previous satisfaction descriptive statistics..................................................................................253
Table 82: Scan type......................................................................................................................................253
Table 83: Providing patient care................................................................................................................267
Table 84: Effect of actions...........................................................................................................................269
## LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quantitative Review Search strategy</td>
<td>298</td>
</tr>
<tr>
<td>2</td>
<td>Quantitative Appraisal instruments</td>
<td>300</td>
</tr>
<tr>
<td>3</td>
<td>Data extraction instruments</td>
<td>303</td>
</tr>
<tr>
<td>4</td>
<td>Quantitative Excluded studies</td>
<td>305</td>
</tr>
<tr>
<td>5</td>
<td>Quantitative Included studies</td>
<td>306</td>
</tr>
<tr>
<td>6</td>
<td>Qualitative review detailed search strategy</td>
<td>312</td>
</tr>
<tr>
<td>7</td>
<td>JBI QARI Critical Appraisal Checklist</td>
<td>314</td>
</tr>
<tr>
<td>8</td>
<td>JBI QARI Data Extraction Form for Interpretive and Critical Research</td>
<td>315</td>
</tr>
<tr>
<td>9</td>
<td>Qualitative Excluded studies</td>
<td>316</td>
</tr>
<tr>
<td>10</td>
<td>Plain Language Statement for Staff</td>
<td>317</td>
</tr>
<tr>
<td>11</td>
<td>Plain Language Statement for Patients</td>
<td>318</td>
</tr>
<tr>
<td>12</td>
<td>Consent form</td>
<td>319</td>
</tr>
<tr>
<td>13</td>
<td>Letter of support</td>
<td>320</td>
</tr>
<tr>
<td>14</td>
<td>Ethics Approval</td>
<td>321</td>
</tr>
<tr>
<td>15</td>
<td>MRI Department Staff Survey</td>
<td>322</td>
</tr>
<tr>
<td>16</td>
<td>MRI Department Outpatient survey</td>
<td>323</td>
</tr>
<tr>
<td>17</td>
<td>Thematic Analysis</td>
<td>325</td>
</tr>
<tr>
<td>18</td>
<td>MRI Poster</td>
<td>345</td>
</tr>
<tr>
<td>19</td>
<td>MRI Booklet</td>
<td>346</td>
</tr>
<tr>
<td>20</td>
<td>Music list</td>
<td>352</td>
</tr>
</tbody>
</table>
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“A journey of a thousand miles must begin with a single step.”

Lao Tzu
ABSTRACT

When presenting to an imaging department, the person who is to be imaged is often in a vulnerable state and out of their comfort zone. It is the role of the radiographer to produce a high quality image and facilitate patient care throughout the imaging process. However, often the radiographer’s primary focus is the technology, rather than the patient. This dissertation addresses the patient experience in medical imaging and radiographer practice change, with a particular focus in the MRI setting, through the conduct of two systematic reviews (one quantitative and one qualitative) and an action research project.

The qualitative systematic review was conducted to explore how patients experienced medical imaging. The findings of the review highlight the diverse, unique and challenging ways in which people experience imaging with MRI and CT scanners. It was recommended from the review that all health professionals involved in imaging need to be aware of the different ways each patient may experience imaging, and provide them with ongoing support and information.

The quantitative systematic review was conducted to assess interventions to reduce anxiety, claustrophobia, sedation and non-completions and improve satisfaction for patients undergoing medical imaging. Open MRI, newer MRI scanners, quieter machines, information in combination with psychological support or an anxiety reduction protocol, mock MRI, team training, prone scanning, AV systems, cognitive behavioural therapies, guided imagery, fragrance administration, patient positioning devices and paediatric preparation booklets were all found to have some positive effect on at least one outcome, whilst the findings for additional information were mixed. It was recommended form the review that interventions that can improve the patient experience (by reducing anxiety, claustrophobia etc) should be considered by health professionals involved in the medical imaging process.

An action research project was initiated to implement the findings of these two systematic reviews into practice. During the course of this project, issues unique to the imaging department were identified and therefore the aim of the research broadened to include these as well. Through a process of engagement, discussion and reflection, the following changes were able to be achieved: improvements in patient satisfaction and anxiety, an increased focus on patient care by the staff, and changes in departmental practice. From the results of this research, a model for practice change in a medical imaging department and a model detailing the patient experience of medical imaging are proposed.
DECLARATION OF AUTHENTICITY AND STATEMENT OF AUTHORSHIP

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree. I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968. I also give permission for the digital version of my thesis to be made available on the web, via the University’s digital research repository, the Library catalogue and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

Zachary Munn

Date
CHAPTER 1 – INTRODUCTION

‘The prime concern of radiographers shall be for the welfare and safety of patients, staff and the public.’

Australian Institute of Radiography Code of Conduct

CHAPTER OVERVIEW
In modern healthcare, the use of medical imaging is widespread and it plays a vital role in the patient’s journey through illness and disease. Despite the importance of medical imaging the question of how patient’s experience this process has largely remained unanswered. The aim of this work is to discover what the patient experience is and how it might be improved, and to apply these findings in practice through working with staff in an imaging department.

INTRODUCTION:
Since the discovery of x-rays by Wilhelm Roentgen in 1895,1 medical imaging has moved forward in remarkable scientific leaps and bounds. As early as the 1920s, the use of X-rays was widespread and well-established in society.1 Throughout the twentieth century, rapid developments in medical imaging continued and in 1971, the first clinical Computed Tomography (CT) scan was performed on a patient with a brain tumour.2 Magnetic Resonance Imaging (MRI), which was developed gradually over the latter half of the century, had become pivotal for diagnosing brain pathology by the 1990s.3

In healthcare today, diagnostic imaging, whether it is a simple chest X-ray or a complex scan, plays an essential role in the diagnosis, therapeutic management and surveillance of illness. Diagnostic imaging may refer to a range of medical procedures, including radiographic and nuclear medicine procedures, Magnetic Resonance Imaging (MRI), Computed Tomography (CT), Positron Emission Tomography (PET), Ultrasound (US) and Single Photon Emission Computed Tomography (SPECT), along with many other imaging investigations. CT produces cross sectional images via the use of x-rays and computer processing.1 PET and SPECT are nuclear medicine procedures where radioactive tracers are used to produce an image, and the machines themselves detect the radiation given off from the radioactive tracer, rather than create it.4 MRI uses a combination of magnetic fields and radio signals to produce images and does not use ionising radiation as required by CT, PET, X-rays and SPECT.1
Medical imaging is an ever changing field and there have been significant advancements in imaging techniques and technologies over the years. These have seen the amount of imaging and the subsequent costs associated with it rise rapidly in many parts of the world, leading to a larger percentage of people being exposed to these different imaging modalities. Advanced, high technology imaging in particular, such as CT, MRI, PET and SPECT, have seen significant increases in their use. However, the improvements in imaging technology did not necessarily guarantee a similar advance in patient care.

It has been found previously in medicine that professionals involved in direct patient care may unwittingly objectify patients, and not necessarily see them as people in pain or distress, but as problems needing to be solved. As Rhodes (1999) highlighted when quoting Coulehan, (1985, p. 371), patients may be viewed as ‘a translucent screen through which we peer to find a diagnostic entity within.’ In no setting is this statement more fitting than within a medical imaging department. Due to the complex and technical nature of medical imaging, the patient and patient care can often be ignored or overlooked, as the focus of the imaging technician is directed largely towards the technology and not the patient. The Australian Institute of Radiography’s code of practice for radiographers begins with the following statement: ‘the prime concern of radiographers shall be for the welfare and safety of patients.’ However, as Lewis et al. (2008) highlight, it doesn’t ‘seem to be the case... while the slogan is tossed around quite a lot, it seems to only be true in words, and on coffee cups rather than actually in practice.’

Although many patients are satisfied and pleased with their care when undergoing medical imaging, others experience fear and anxiety. For MRI in particular, one of the causes of this fear has been shown to stem from claustrophobia. Radiophobia can be an issue for people undergoing diagnostic imaging, as they fear exposure to radiation through these procedures. Another issue raised in the literature is dehumanisation, as patients organs are transposed as images on a screen.

For paediatric patients presenting for medical procedures such as diagnostic scans, feelings of anxiety are common, which can also lead to anxiety in the parent of the child. This anxiety can make acquiring images that require the child to be still for thirty minutes or more exceedingly difficult, especially in young children. Procedures often need to be repeated due to movement artefacts, which results in increased healthcare costs, increased exposure to radiation, and can be inconvenient for families and individuals getting scanned. Due to this, sedation is often used to assist patients in keeping still and is routine for young children undergoing MRI in some organisations, although there are costs and side effects associated with its use in both adults and paediatrics.
There have been many advances in the design of the scanners, particularly MRI, as manufacturers have become aware of the increased costs of claustrophobic and anxiety related events. In recent years, MRI designs have become more patient-friendly, with the introduction of shorter bores, open MRI machines and reduced noise.\textsuperscript{23} Despite these technological advancements, there has not been a complete reduction of claustrophobic reactions,\textsuperscript{24,25} and head examinations in particular still seem daunting for claustrophobic patients, even in more patient friendly designs.\textsuperscript{25}

When presenting to an imaging department, the person who is to be imaged is often in a vulnerable state and out of their comfort zone. It is the role of the medical imaging technician to produce a high quality image and facilitate patient care throughout the imaging process. Research is therefore necessary to better inform the medical imaging technician, to help them to understand the experience of the person being imaged and provide strategies to improve this experience.\textsuperscript{26}

**RESEARCHER:**
My undergraduate degree was in medical radiation, specialising in nuclear medicine. Following on from the completion of this degree and after fieldwork I took up a position in research, which led to a position at the Joanna Briggs Institute, an international not-for-profit research and development organisation focusing on the translation of research evidence into practice globally.\textsuperscript{27} Systematic reviews comprise much of the workload undertaken by the Institute and I originally enrolled in a Master of Philosophy in order to complete a qualitative systematic review on the patient experience of medical imaging. Determining how patient's experience medical imaging has always been an interest of mine since commencing my undergraduate degree and I found that I often sought out stories from friends or relatives regarding their experiences when undergoing a scan. After completing the qualitative systematic review to investigate patient's experiences, I wanted to determine how this experience could be improved. At this time, it was suggested I upgrade from the masters program to a doctorate, a challenge I readily accepted. Entering the Doctoral program allowed me to conduct another systematic review, this time quantitative in nature, investigating interventions to improve the patient experience (by reducing anxiety, fear etc) of medical imaging. On completion of this review, driven by the ethos of the Joanna Briggs Institute, I was compelled to ensure that these findings were implemented into practice. I originally viewed action research as a vehicle to do this and hence applied to various imaging departments to determine if they were interested in taking part in this study. Eventually a suitable department responded that they were willing to take part and I was able to begin my action research study in the MRI department of a major metropolitan hospital in an Australian capital city.
STRUCTURE OF THE REPORT:
This Doctoral dissertation reports on a three-part research project on the patient experience and patient care in medical imaging, with a specific focus on MRI. The first two-parts of the project involved conducting a qualitative and quantitative systematic review regarding patient care and the experience of people undergoing high technology medical imaging. One of the reviews focused on describing the experience of patients undergoing high technology imaging (and thus included qualitative study designs) whilst the other review focused on the effectiveness of interventions to reduce anxiety, claustrophobia and the need for sedation during imaging. I was not content with only producing these two reviews as I wanted to translate the results into practice and determine radiographer’s views on patient care, the patient experience and how this may be improved. To this end, an action research study was proposed and carried out in an MRI department. This dissertation contains the results of both the systematic reviews and the action research project, and is presented in three discrete but interrelated sections.
CHAPTER 2 – BACKGROUND

‘Philosophers have only interpreted the world, in various ways; the point is to change it’

Karl Marx

CHAPTER OVERVIEW
To determine the patient experience of medical imaging, and to identify interventions that can affect this experience, both quantitative and qualitative study designs are required. The systematic review is a method to combine the findings of primary research studies into a comprehensive synthesis, which can then be used to guide practice. However, introducing change is not necessarily a straightforward process, and often there is a gap that exists between theory and practice. One possible strategy to address this gap is action research, a method of inquiry philosophically aligned with critical theory and the work of Jurgen Habermas.

BACKGROUND:
Much has been written about the unique nature of medical imaging in the healthcare system and the brief patient encounter that it entails. This, along with the operation of sophisticated technology, can often lead to patient care being overlooked. Research in medical imaging largely stems from the positivist paradigm, where hypotheses are tested through quantitative research designs. This focus on quantitative research may stem from the historical dominance of the medical profession in medical imaging and the aim of medical imaging itself to quantify the disease process. However, quantitative research designs are not always suitable to answer all questions generated from the medical imaging process, as they are limited to observations and data that can be measured and analysed mathematically using statistical methods. However, these methods aren’t necessarily suitable to answer all questions related to radiography practice, particularly the ‘human’ side of the profession, including the patient encounter and staff working relationships. One strategy touted to preserve the ‘humanity’ in our profession is to conduct qualitative research. Medical imaging generates a unique interface between high-level technology and the patient, and has been described as a human-technical science. This is a meeting of two worlds, with technology and machines used to improve patient outcomes on one side, and the social encounter with the patient and provision of holistic care on the other. The drive towards better technology through advanced machinery and software to create more accurate visual representations of the body to improve health outcomes largely sits within the positivist...
approach of natural sciences, whilst the patient encounter is more fitting to an interpretive approach. This interpretive approach can lead to increased understanding of the imaging technician’s role and encounter with the patient. Both of these approaches are appropriate forms of inquiry for medical imaging research and can be considered important and complimentary to each other. It is the question that is being asked that should direct the choice of the research approach. Multi-method studies, incorporating both qualitative and quantitative approaches, can be useful to inform medical imaging professionals. However, it is imperative that these studies are not ‘mix and match research’ but that there is congruence with the methodological approach for each method and that the research strategies used supplement each other.

For questions looking at experience, perception, meanings, understanding and acceptance of imaging, qualitative (interpretive) methodologies are the most appropriate approach for inquiry. It has been suggested that information generated from qualitative studies can support the clinician when dealing with patients, assist in improving communication with the patient and in understanding and addressing their concerns, making procedures more acceptable to the patient. In recent times a role for qualitative research has been identified in medical imaging, which is reflective of a paradigm shift from a dominance on technology-focused research to one which also values patient-focused research. Recently, there has been a significant uptake of qualitative methods by radiographers and researchers in diagnostic imaging. This increase may stem from a number of influential articles discussing the need for a focus on and an increase in qualitative research, including the work of Dowd (1992) and Hammick (1995) late last century, and the likes of Adams, Smith (2003), Ng and White (2005) early this century. There now exist examples of qualitative literature across a number of modalities within diagnostic imaging, including MRI, CT, ultrasound, bone densitometry, general radiography and interventional radiography. The aim of much of this interpretive research is to ‘more clearly define what radiographers do and how they do it’ (p. 194).

Equally important is the need to identify issues relating to the patient in medical imaging, and the need to highlight the patient’s experience and perspective of health care.

There are a number of studies that report on the patient experience in diagnostic imaging which have been conducted using both quantitative and qualitative methodologies, as well as in articles based on expert opinion. It many studies it has been shown that anxiety and claustrophobia are issues that can arise during the imaging process, and patients who are to undergo diagnostic imaging procedures may experience a wide range of emotions. In a survey of radiographers, 71.6% of respondents stated that patient anxiety was a common issue in their imaging department when patients presented for MRI. Causes of anxiety during scanning include the enclosed nature of the scanner leading to a claustrophobic reaction; anxiety regarding results, or having to keep still for long periods of time when in pain or discomfort.
It is imperative that the patient remains motionless during scanning to acquire optimal images due to the artefacts that appear as a result of moving, which lowers the quality and diagnostic value of the scan.\textsuperscript{22,23,47-49} However, high levels of anxiety or claustrophobia regarding imaging can lead to increased patient movement during scanning.\textsuperscript{50} In extreme cases, scans may need to be aborted or patients may refuse to have the scan, sedation may need to be used, or additional sequences performed.\textsuperscript{24} These missed or increasingly difficult scans have financial implications as valuable staff and equipment time is lost.\textsuperscript{24,51}

To improve the scan experience, and reduce feelings of anxiety, claustrophobia and fear prior to scanning, a number of interventions have been developed. These interventions vary significantly in terms of their ease of implementation, and burden on staff time and costs.\textsuperscript{52} Some of these include information/education, different patient positions, manipulation of the environment, prism glasses, lighting levels, movement of air/fans, company, installation of panic buttons, music, open design of MRI, psychological preparation, hypnotism, aromatherapy, sedation, mock MRI, patient positioning devices and screening of patients for claustrophobia, or a combination of different methods in an anxiety reduction protocol.\textsuperscript{50,53-56} One cross-sectional survey found that although many MRI departments implement strategies to reduce anxiety during scanning, including information, pre-scan visits, and music, high levels of anxiety still prevail.\textsuperscript{45}
Critical Theory:
Critical theory has at its origins the philosophy of Karl Marx, who once stated that until his time, ‘philosophers have only interpreted the world, in various ways; the point is to change it’.\(^{57}\) In his writings Marx emphasised the need to be critical, relentlessly so, in an attempt to ‘find the new world through criticism of the old.’\(^{58}\) He stressed that the findings of this criticism should not be feared, nor should any conflict with the ‘powers that be’ arising from this criticism be feared.\(^{58}\) Influenced by Marx, Kant and others, the development of critical theory is attributed to the Frankfurt school in Germany, with former director of the school Max Horkheimer being credited with originally defining the term in ‘Traditional and Critical Theory’, his 1937 essay, where he contrasts critical theory to traditional theory. Traditional theory, seen typically in the natural sciences, is deemed by Horkheimer as objective and value free, designed to reinforce the status quo, generating ‘technically useful knowledge for the purposes of domination.’ (p 110)\(^{59}\) Traditional theory views society as an object and, due to this, social life is objectified so much so that subjects are treated as objects.\(^{60}\) Critical theory differs from traditional theory in that it ‘expressly aims at becoming a factor in social change by becoming part of the self-consciousness of oppressed social groups.’ (p.16)\(^{61}\) Critical theory incorporates critical reflection of ideas ‘in order to reveal their ideological function in maintaining the system.’ (p.110) \(^{59}\) Therefore, when the true social cause and functions of the ideas are known, the reflective person is able to be in a position where they can freely and rationally accept or reject these ideas.\(^{59}\)

Critical theory can be characterised by the following six points:\(^{60}\)

1. It is an analysis of contemporary society
2. The central point of interest is the ambiguous nature of progress
3. Society is seen as a totality and thus it examines all areas of society
4. It is interdisciplinary in nature
5. It is a combination of social philosophy and empirical social science
6. It involves self-reflection

Critical theory, or critical theories, are interested in determining the justice and happiness of contemporary society and ‘its primary aim is not the discovery of statistical patterns enabling the prediction and technical control of social and political processes but the proffering of critical enlightenment regarding the justness and goodness of social and political institutions.’ (p.xxi)\(^{59}\)

From these beginnings, other members of the Frankfurt school continued their work on critical theory, leading to how it is conceptualized today by its leading proponent, Jurgen Habermas. In his early-published work ‘Knowledge and Human Interests’, Habermas criticised both positivism and hermeneutics. In regards to positivism, he shows that it is not as value free as its advocates declare and that it has no claim to be put forward as ‘the model of all knowledge.’ (p.25)\(^{60}\) For
Habermas proposes that there are three human interests, which he describes as 'basic orientations rooted in specific fundamental conditions of the possible reproduction and self-constitution of the human species, namely work and interaction.' (p. 196) The first of these interests is the 'Technical Interest.' This is an interest in 'technical control over objective nature.' (p. 27) This interest can be aligned to positivism and the empirical-analytical approach found in the natural sciences. The second interest is the 'Practical Interest', aimed at human interaction and mutual understanding of social activity. This interest can be linked to hermeneutics and interpretivism and is not interested in domination and control. The final interest is 'Emancipatory Interest', which focuses on emancipation from forces that dominate and raising self-consciousness through the use of reason. Habermas' critical theory aims at emancipation and he stresses that during enlightenment there can only be participants; meaning here, 'others cannot do the enlightening for participants, in the end, they are or are not enlightened in their own terms.' (p. 95)

These interests have been aligned with different types of knowledge, investigative methods, questions, research interests and paradigms. A tabular summary of these alignments follows.
Table 1: A summary of Habermas’ knowledge-constitutive interests and how various authors have aligned them

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<th>Interest</th>
<th>Knowledge Type</th>
<th>Type of knowing</th>
<th>Paradigm</th>
<th>Examples</th>
<th>Research methods</th>
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</thead>
<tbody>
<tr>
<td>Technical</td>
<td>Empirical</td>
<td>‘Knowing that’</td>
<td>Positivism</td>
<td>Natural sciences</td>
<td>Positivistic (empirical-analytical methods)</td>
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<td>Practical</td>
<td>Hermeneutic</td>
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<td>Interpretive, naturalistic, constructivist, phenomenological, hermeneutic, symbolic interaction, microethnography</td>
<td>Humanities/social sciences</td>
<td>Interpretive research (hermeneutic methods)</td>
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<td></td>
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<tr>
<td>Emancipatory</td>
<td>Critical</td>
<td>‘Knowing why’</td>
<td>Critical, neo-marxist, feminists, race-specific, praxis-oriented, participatory</td>
<td>Marx/Freud</td>
<td>Critical social sciences (critical theory methods)</td>
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<tr>
<td></td>
<td>Reflection</td>
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</table>

Habermas shared the view of Gadamer that communication had the capacity to ‘expand our moral horizons and open up ever broader horizons of agreement and “truth,”’ (p.125) which led to the development of his theory of communicative action. Communicative action is described here as that in which the following three features are present:67

1. People knowingly and purposefully aim to achieve intersubjective agreement, which in turn leads to;
2. Mutual understanding
3. And results in an ‘unforced consensus about what to do in the particular practical situation in which they find themselves.’ (p. 293)67
Habermas believed that the mediation of theory and praxis requires the following:

1. ‘formation and extension of critical theorems, which can stand up to scientific discourse
2. the organisation of processes of enlightenment in which such theorems are applied and can be tested in a unique manner by the initiation of processes of reflection carried on within certain groups toward which these processes have been directed; and
3. the selection of appropriate strategies, the solution of tactical questions, and the conduct of political struggle.’ (Habermas cited in Kemmis 1993)

Habermas discussed the importance of opening a communicative space through communicative action; a space in which solidarity is built between people, and where decisions and understandings that people reach achieve legitimacy (opening a communicative space is discussed in more detail in Chapter 10).

Action research, like critical theory, was created as an approach to bridge the theory-practice gap. The philosophy of Habermas has provided a theoretical background to action research, in his critical theory, which emphasises both the importance of critique and self reflection to emancipate, and views communication as a means to produce legitimacy and mutual understanding regarding actions amongst people.

Other philosophical underpinnings for action research have been described by Susman and Evered, and trace as far back as Aristotle’s practical philosophy and his notion of Praxis, defined as ‘the art of acting upon the conditions one faces in order to change them.’ (p.594)

Hermeneutics, and the hermeneutic cycle, whereby ‘knowledge is gained dialectically by proceeding from the whole to its parts and then back again’ (p.595), is akin to the notion of Lewin’s action research spiral. Existentialism and action research share common features, including concern with limitations evident in rationalistic science, the importance of human choice/values, and the notion that human interest and individual choice is behind action. Additionally, pragmatism, which focuses on the practical consequences of accepting whether a statement is true; process philosophies; which emphasise change in social systems; and phenomenology, with its focus on subjective experience, propose ideas that are reflected in action research studies today.
ACTION RESEARCH:
When planning a research project, the question being asked should direct the choice of the research approach. Both quantitative and qualitative approaches to inquiry are appropriate in medical imaging research. There is scope to perform multi-method studies, which incorporate both qualitative and quantitative approaches, which may be particularly useful to inform the practice of medical imaging professionals. However, it is imperative that these studies are not ‘mix and match research’ (p. 191), but that there is congruence with the methodological approach for each method and that the research strategies used are supplemental to each other. One such research design that can incorporate both quantitative and qualitative methodologies is action research.

Action research is a form of critical inquiry based on the works of Kurt Lewin, a social psychologist whose early work focused on community action programs in the United States of America during the 1940s. Lewin’s approach ‘combined generation of theory with changing the social system through the researcher acting on or in the social system.’ (p.586) Lewin stated that research that produced nothing but books was insufficient, and believed that the research needed for social systems required action as a central component, which would emerge through the process of research. Lewin’s action research can be defined as a ‘method that enabled theories produced by the social sciences to be applied in practice and tested on the basis of their practical effectiveness,’ (p.423) with the aim to bridge the gap between theory and practice.

A number of definitions for action research have been put forward by numerous authors, which reflects the variety seen in the approaches defined as action research. Waterman et al. performed a systematic review with the aim of providing a definition for action research, and produced the following comprehensive explanation:

‘Action research is a period of inquiry that describes, interprets and explains social situations while executing a change intervention aimed at improvement and involvement. It is problem-focused, context specific and future-oriented. Action research is a group activity with an explicit critical value basis and is founded on a partnership between action researchers and participants, all of whom are involved in the change process. The participatory process is educative and empowering, involving a dynamic approach in which problem identification, planning, action and evaluation are interlinked. Knowledge may be advanced through reflection and research, and qualitative and quantitative research methods may be employed to collect data. Different types of knowledge, including practical and prepositional, may be produced by action research. Theory may be generated and refined, and its general application explored through the cycles of the action research process. (p.11)’
Action research is unlike traditional qualitative (or interpretive) studies, which can be viewed as taking a passive approach to research; action research takes an activist approach with the end goal being action-taking resulting in change. From these beginnings, action research has evolved over the years into many different types, each with their own unique aims and perspective. However, there do exist some key principles of action research common across the different approaches.

Action research is an inclusive research methodology, where the traditional model of investigator studying or observing subjects does not necessarily apply. The action researcher accepts that there exists not only a need to be aware of how people understand their actions and practice (as in interpretive studies) there is also a need to engage with them to actively change by forming a partnership. There is no clear delineation between those conducting the research and the subjects (those being researched) as in traditional positivist study designs. This is exemplified in the terminology of action research, where those being researched are not necessarily called subjects, but co-researchers or participants. As Kemmis states, ‘action research is first and foremost research by practitioners – something they do, not something done ‘on’ or ‘to’ them.’

Action research is a complex, reflexive and cyclical research methodology that cannot be reduced to a single method of inquiry, such as qualitative or quantitative methods, and it is often the case that multiple approaches to collecting and analysing data are taken. Multiple approaches lead to triangulation, which allow a deeper understanding and a more full and rounded picture of the construct under investigation as it is viewed through a number of lenses and different datasets. By utilising a number of different data collection methods, the credibility (and therefore trustworthiness) of the research can be improved by complimenting the limitations of one stated method with the strengths of another.

Different types of action research exist and Carr and Kemmis have aligned these with Habermas’ knowledge-constitutive interests; technical, practical and emancipatory action research. Technical action research is ‘oriented towards functional improvement measured in terms of its success in changing particular outcomes of practices.’ In this type of action research, facilitators may have ‘co-opted practitioners into working on externally-formulated questions which are not based in the(ir) practical concerns.’ Technical action research focuses on problem solving, whilst not questioning the goals that are aiming to be achieved, or the social situation. Although this type of action research can generate substantial changes in outcomes, the value of these changes may have more meaning to the facilitator rather than the practitioner.

Practical action research also aims for change, but in addition it aims to ‘inform the (wise and prudent) practical decision-making of practitioners.’

This type of action research...
includes self-reflection by the participants and aims at not only changing outcomes but changing the participants themselves.64 In this type of action research, facilitators who are external to the setting form 'cooperative relationships with practitioners, helping them to articulate their own concerns, plan strategic action for change, monitor the problems and effects of changes, and reflect on the value and consequences of the change actually achieved.' (p.203)70

The final type of action research described by Carr and Kemmis, which builds on the foundations of the aforementioned practical type, is emancipatory action research.64, 70 Similarly to technical action research, it aims at improving outcomes; similar to practical research, it aims at improving self-understanding of practitioners. However, this type of action research goes further in that it aims to also assist 'practitioners to arrive at a critique of their social or educational work and work settings...one might say, the work, the worker, and the workplace.' (p.92)64 This action research is critical and reflective in nature, as it aims to provide an understanding 'of the way both particular people and particular settings are shaped and re-shaped discursively, culturally, socially and historically.' (p.92)64

In their book, 'Action research for health and social care', Hart and Bond 79 outline a typology for action research and describe four distinct approaches: experimental, organisational, professionalising, and empowerment. Experimental action research is linked most closely with the work of early action researchers, which include Lewin's work and the use of a scientific approach to social problems.79 Organisational action research is used to address organisational issues, for example staff absenteeism, and create productive working environments that are not resistant to change.79 The empowering approach focuses on working with vulnerable groups, and is anti-oppressive.79 The professionalising approach, which may be particularly useful in radiography, 'is informed by an agenda grounded in practice which also reflects the establishment of the new professions...to enhance their status on a par with the established professions, such as law and medicine, and to develop research-based practice.' (p.45) 79 This type of study can contribute to the developing research base in radiography, which needs to continue to be enhanced to bring the field in line with other health care professions, in addition to improving the quality of patient services in radiography and contributing to the professionalisation of radiography.80

ACTION RESEARCH IN MEDICAL IMAGING
Radiography is a relatively new profession and to ensure the development of this profession critical enquiry is pivotal. This should focus on monopolistic practices and address services to the patient, the well being of members within that profession, and the efficiency of service delivery.33

Radiography has been shown to be a profession characterised by low self-esteem, resistance to change, and apathy, which may be a result of medical dominance, low autonomy, and the power
structures in place. There is an inferiority complex amongst radiographers, particularly in the diagnostic field, where the role of a radiographer in the treatment and care of a patient is devalued. These factors decrease ‘willingness and ability to continue learning...(and prevents the radiographer) from venturing beyond their comfort zone of daily workplace practices ... (which) impacts on their ability to advance clinical practice.’ (p.203) Without lifelong learning, radiographers will be less able to adopt evidence-based approaches and provide improved services to patients. To break radiographers free from this apathy, Sim and Radloff (2009) state that continuing professional development programs should ‘aim to empower practitioners to develop their reflective skills ...(as) helping practitioners to become more reflective provides an effective way to address the major challenges that are currently confronting the medical radiation science profession.’ (p.203)

In her polemic supporting the importance of research in radiography, and specifically qualitative research, Hammick (1995) described the need for action research to be performed in radiography. This type of research, which involves researchers and practitioners collaborating, can be used to investigate problems in need of solving. This is an essential feature of action research, although this should not be misconstrued as implying that there is something wrong in the department. Rather, this process will involve finding out what is currently happening in the department (the real), whilst comparing this to the ‘ideal,’ which will emerge from discussions with those involved in the project. This gap between the real and ideal is where the problem (area for improvement) will be identified. Action research in radiography can encourage practitioners to be reflective in their practice and support the implementation of research into practice. By encouraging reflection and promoting critical thinking, the development of new and better practices will be uninhibited. Not only this, reflection has the ability to empower practitioners and lift ‘them from their apathy.’ (p.206)

To determine the uptake of action research in radiography, searches of Medline (1996-2011) via Ovid were conducted using a number of key terms. Only articles describing the use of action research in radiography were considered relevant.

Table 2: Search Strategy for Radiography Action Research Studies

<table>
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<th>Search strategy</th>
<th>Results Obtained</th>
<th>Relevant Results</th>
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<td>Search 1: [action research (keyword) or Health Services Research MeSH] and [Radiography (MeSH) or radiography (Keyword)]</td>
<td>27</td>
<td>0</td>
</tr>
<tr>
<td>Search 2: [action research (keyword) or Health</td>
<td>46</td>
<td>0</td>
</tr>
</tbody>
</table>
Despite Hammick's 1995 article positioning the need for action research to be performed in radiography, it has not been readily adopted. Although there are numerous examples of action research being undertaken successfully in other areas of healthcare, no examples of its use in radiography were found via the Medline search. However, a Google scholar search did present one example of action research being used in diagnostic imaging education by Palarm et al (2004), but not in radiography practice.

Susman and Evered Model:
A methodological framework should guide the conduct of action research. The action research project described in this dissertation was informed by the approach to action research advocated by Susman and Evered (1978). Susman and Evered identified five phases necessary in action research, presented in a cyclical fashion. These phases are diagnosing, action planning, action taking, evaluating, and specifying learning. At the centre of this cyclical process is the development of a client-system interface, which can inform all five phases (Figure 1). This framework was chosen as it represented the action research process simply and was conducive with the aims of the author's project. As an outside facilitator, the type of action research carried out can be considered as a mix between the practical and emancipatory forms of action research discussed by Kemmis and Carr, and the professionalising and empowering types of action research put forward by Hart and Bond following the framework outlined by Susman and Evered.
Prior to undertaking phase 1 (diagnosing), the client-system interface was established by interaction with the group prior to undertaking the action research process (discussed in more detail in Chapter 10). This approach was advocated by Pearson 1989 (cited in O’Brien 1991) and followed by O’Brien. This involved preliminary meetings and introductions with key staff and members of the imaging department, including discussions regarding what the project hoped to achieve, timelines, and provided an opportunity to ask questions. These also included discussions on the roles of key staff in the project, including the researcher, and what everyone would contribute.
**SYSTEMATIC REVIEWS:**

Interest in practising Evidence-Based Medicine (a term first coined in 1992)\(^{35}\), and evidence based healthcare, has increased exponentially since the 1990s. Evidence based medicine has been defined as 'the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients.'\(^{85}\) Systematic reviews can be seen as the pillar on which evidence based healthcare rests, as they provide health professionals with a comprehensive synthesis of the existent literature on a certain healthcare topic.\(^{85-87}\) Evidence-based organisations such as the Cochrane Collaboration and the Joanna Briggs Institute, both established in the 1990s, have been set up to develop methodologies and guidance on the process of systematic reviews. The applicability, importance and need for systematic reviews for medical imaging professionals has been stressed in previous articles, \(^{88-90}\) and there does exist published examples in radiography\(^ {91} \) and radiotherapy.\(^ {92}\) However; the focus of all of these reviews is quantitative in nature. Qualitative systematic reviews also play an important role in evidence based-healthcare, to inform healthcare professionals regarding issues that are not conducive to empirical research methods.\(^ {93} \)
SECTION 1 – QUANTITATIVE SYSTEMATIC REVIEW
CHAPTER 3 – QUANTITATIVE REVIEW METHODS

‘Evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.’ Sackett 1996

CHAPTER OVERVIEW
Quantitative systematic reviews with meta-analysis are positioned at the pinnacle of hierarchies for study designs. These systematic reviews differ from traditional literature reviews in that they have a specified a priori research protocol for the conduct of the review; as such they are considered a type of research design, and often labelled secondary research. A search of Medline, the JBI Library of Systematic Reviews and the Cochrane Library did not return any systematic reviews on the effectiveness of strategies to reduce anxiety, claustrophobia, or the need for sedation in medical imaging. It was therefore the aim of this systematic review to determine the strategies that are effective in reducing fear, anxiety and claustrophobia in persons undergoing imaging with high technology scanners.

PURPOSE
The primary objective of the review was to identify the effectiveness of interventions aiming to improve the patient experience of high technology imaging by reducing fear, anxiety, distress, claustrophobia and any other negative emotions that may arise during the scanning process. Additionally, the effectiveness of interventions which result in improved patient satisfaction of high technology imaging were also addressed; this included secondary outcomes, such as throughput, comfort, scan completion and sedation rates of patients which were also of interest in the review.

INCLUSION CRITERIA
Types of participants
This review considered studies that included patients of any age who had undergone high technology imaging in a medical imaging department. The participants may have received imaging for a wide range of indications, and have had any pre-existing condition or disability. For the purposes of this review, MRI, CT, PET and SPECT were considered to be high technology medical imaging, and were searched for specifically. Advanced, high technology imaging procedures are increasingly prevalent and there is rapid growth in these imaging modalities.
These scans are more complex than other basic procedures (such as x-rays), and can be more difficult to operate, which may have an effect on the holistic care of the patient, as it distances the imaging technologist from the patient. All diagnostic imaging procedures considered for this review were non-invasive or minimally invasive. Interventional diagnostic procedures were not included, as the invasive component of the investigation may have increased negative connotations associated with it and therefore they were not compared to non-invasive diagnostic tests.

Types of interventions

This review considered studies that evaluated interventions designed to reduce fear, anxiety, or feelings of claustrophobia during scanning compared to usual care. The review also considered interventions that aimed to improve the satisfaction of persons undergoing imaging. This included a number of interventions delivered individually or in combination. These interventions may have resulted in changes to outcomes such as throughput, sedation rates, comfort and completion rates.

Types of studies

This review considered both experimental and epidemiological study designs including randomised controlled trials and non-randomised controlled trials. In the absence of these trials, other study designs, such as quasi-experimental, before and after studies, prospective and retrospective cohort studies, case control studies and analytical cross sectional studies were considered for inclusion. If there was a significant lack of analytical literature on this topic, than the review was also to consider descriptive epidemiological study designs including case series, individual case reports and descriptive cross sectional studies for inclusion, although this was not necessary.

Types of outcomes

This review considered studies that included measurement of the outcomes using scales, validated tools, or other means.

Primary outcome measures included:

- Patient anxiety
- Patient fear
- Patient distress
- Patient claustrophobia
- Patient satisfaction
- Completion rates
• Sedation rates

Secondary outcome measures included:

• Patient throughput
• Patient comfort
• Patient acceptance

SEARCH STRATEGY
The search strategy aimed to find both published and unpublished studies. A three-step search strategy was utilised in this review during the period of August to October 2011. An initial limited search of MEDLINE and CINAHL was performed followed by analysis of the text words contained in the retrieved titles and abstracts, and of the index terms used to describe articles. A second search using all identified keywords and index terms was then undertaken across all included databases. Thirdly, the reference list of all identified reports and articles were searched for additional studies. Studies published in English were considered for inclusion in this review, and there was no time limit imposed on the review.

The databases searched included:

• CINHAL
• Ingenta Connect
• Embase
• Medline
• PsychINFO
• Sociological Abstracts
• Web of Science
• SCOPUS
• The Cochrane Library (including CENTRAL)

The search for unpublished studies included:

• Mednar
• Intute
• Google Scholar
• Current Contents
• Digital dissertations

Initial keywords/search terms used were:

Magnetic resonance imaging, positron emission tomography, Computed tomography, Nuclear Medicine, fear, anxiety, claustrophobia
A detailed search strategy is presented in Appendix 1.

**METHODS**

*Critical Appraisal*

Papers selected for retrieval were assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardised critical appraisal instruments from the Joanna Briggs Institute Meta Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (Appendix 2). Any disagreements that arose between the reviewers were resolved through discussion, and there was no need for a third reviewer.

*Data collection*

Data was extracted from papers included in the review using the standardised data extraction tool from JBI-MAStARI (Appendix 3). The data extracted included specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objectives.

*Data synthesis*

Quantitative data was, where possible pooled in statistical meta-analysis using JBI-MAStARI. All results were subject to double data entry. Effect sizes expressed were as odds ratios (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals were calculated for analysis. Heterogeneity was assessed statistically using the standard Chi-square test. Where statistical pooling was not possible the findings are presented in narrative form including tables.
CHAPTER 4 – QUANTITATIVE REVIEW RESULTS

The powerful ability of evidence synthesis to integrate data from variable sources whilst decreasing the uncertainty of the result will allow an increased confidence of decision making for clinicians and policy-makers.”

Athanasiou and Darzi 2011

CHAPTER OVERVIEW
Following a comprehensive search, a large number of studies were retrieved for critical appraisal. These studies varied in their quality, and addressed many different interventions in different imaging modalities. The majority of the studies assessed MRI. A small number of studies were homogenous enough to include in meta-analyses; the remaining are discussed in a narrative summary.

SEARCH RESULTS
From the search, 6869 potentially relevant papers were identified (excluding duplicates). The titles (and abstracts where necessary) were then reviewed to determine their relevance to the review question and objectives. During this process, 6773 studies were excluded, leaving 98 studies, which were retrieved in full text for detailed examination. Following the review of the full text, a further three additional studies were retrieved for detailed examination from the reference lists of the studies. Of these papers, 51 were excluded as they were deemed not to be relevant on the basis of the inclusion criteria, leaving 48 papers for critical appraisal. Following appraisal, 38 studies were deemed to be of high enough quality to be included, based on their study design and critical appraisal.
Following the search process, two independent reviewers critically appraised 48 studies to assess their methodological quality prior to including or excluding them from the review. No disagreements regarding the critical appraisal process occurred, and both reviewers agreed that 10 of the studies were not of satisfactory methodological quality and were therefore excluded. The main reason studies were excluded was due to the lack of a control or comparison group (Appendix 4). Of the final 38 studies, there were 21 randomised or pseudo-randomised controlled trials, and 17 quasi-experimental studies with a comparison group of varying designs. Overall, the methodological quality of the randomised controlled trials was high, although for questions 2, 3, 4 and 5 (details on allocation blinding, allocation concealment and outcomes of withdrawals from the study) of the quality appraisal checklist there was no or little compliance (table 3). For question 2 this is understandable, as it is difficult to blind the patient to the interventions received in this review, and only 1 study met this criteria, which assessed fragrance delivered via nasal cannula, with one group receiving a fragrance and the other humidified air only. In question 5, outcomes were deemed to have been measured with objective criteria if they were not self-reported or able to be influenced by the researcher. As
many studies used the Spielberger State-Trait Anxiety Inventory (STAI) or other scales to measure anxiety, these were deemed to be subjective, as they are self-reported.

Table 3: Results of critical appraisal of included Randomised Control Trial / Pseudo-randomised Trial

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<td>Westerman 2004</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td>N/A</td>
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<td>Y</td>
<td>Y</td>
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<td>Youssefzadeh 1997</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td>N/A</td>
<td>U</td>
<td>Y</td>
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Table 4: Results of critical appraisal of Comparable Cohort / Case Control Studies

<table>
<thead>
<tr>
<th>Citation</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
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<th>Q7</th>
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<tr>
<td>Argue 1995\textsuperscript{10}</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>O’Halloran 1993\textsuperscript{11}</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>U</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Verhoek \textsuperscript{112}</td>
<td>N</td>
<td>N</td>
<td>N</td>
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<td>N</td>
<td>Y</td>
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</tr>
<tr>
<td>%</td>
<td>85.71</td>
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<td>6.25</td>
<td>19.05</td>
<td>90.48</td>
<td>100.0</td>
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</table>

Y=Yes; N=No; U=unclear; N/A=Not applicable
Of the 38 studies, the majority addressed interventions utilised in MRI. Of the final 38, 29 assessed interventions for MRI, 8 Nuclear Medicine procedures, and one in CT. There was wide variety in where the studies were performed and population studied, with 14 studies conducted in the USA, 5 in Germany and England, 3 in Australia, 2 in Canada and Switzerland, and 1 in Spain, Italy, Turkey, Ireland, Egypt, Sweden and Austria. The earliest study included was published in 1986 with the latest in 2010. Interventions ranged in complexity from providing simple information to complex cognitive behavioural therapies. The samples varied amongst the studies, and included both paediatric and adult patients (the age ranged from 0 to 99 years) and patients with or without known malignancies. Outcomes were measured both subjectively and objectively, with the most common outcomes being the need for sedation, scan completion, and anxiety/distress as measured on a self-report scale, such as the STAI. A number of interventions were assessed in the studies and results were combined in a meta-analysis where possible and are discussed in a narrative summary below in their own sections under which the scanning modality examined, and a summary table of all included study designs is presented in Appendix 5.

**Magnetic Resonance Imaging**

Out of the 38 included studies, 29 studies assessed interventions used to address a range of outcomes during MRI examinations. The interventions and the studies assessing these are discussed below.

**Open MRI**

Out of the 29 studies examining interventions for use during MRI, four studies specifically looked at the impact of having an open MRI in terms of claustrophobic events, anxiety, acceptability and the need for sedation. Due to heterogeneity in populations and the outcome measured, it was not possible to perform a meta-analysis and a narrative summary of the studies follows.

Bangard et al. (2007) conducted a quasi-experimental before and after study with a control group in Germany in a MRI department of 36 adult patients (18-75 years of age) with known claustrophobia, 34 of whom had undergone an MRI examination in a closed bore magnet (thereby acting as their own control group for many of the outcomes), along with a non-
claustrophobic group of 36 patients who were measured with an anxiety visual analogue scale and the STAI, both of which were self-reported. For both of these scales, a higher score indicates more severe anxiety. Of the 36 claustrophobic participants, previously there had been issues either completing the scan (n=19) or undertaking a scan (n=2) in a closed bore magnet due to their claustrophobia, a total of 21 failed scanning attempts (58.3%). From this group, 33 patients were able to complete a scan with an open MRI system (1.0 Tesla Panorama, Phillips, with a patient aperture of 160cm and a horizontal magnetic field), showing a reduction in termination from 58.3% to 8.3%, a finding that was statistically significant (p ≤ 0.001). For this outcome, the claustrophobic patients acted as their own control group. There was high anxiety (mean of 67.3 ± 28.3) reported by the claustrophobic patients prior to scanning, compared to the non-claustrophobic patients (4.8 ± 11.5) on a visual analogue scale anxiety score. The state anxiety (as measured by the STAI) significantly reduced after the scan (39.5 ± 12.5) from what it was before the scan (60.5 ± 10.6), a finding that was statistically significant (p ≤ 0.001). In the past, for scans with a closed bore scanner, anxiety (as determined by a visual analogue scale) during the scan was 87.1 ± 16.7, whilst during the open MRI scan, this decreased to 30.4 ± 30.8 (p ≤ 0.001). The authors concluded that claustrophobic patients accepted open MRI machines more readily than closed bore systems, with increased completion rates and lower anxiety scores.

Michel et al. (2002) performed a crossover trial in Switzerland of 30 women (25-35 years of age) undergoing maternal pelvimetry (15 were pregnant) who were scanned both with an open vertical, low field (0.5 Tesla) system compared to a closed system. A 100mm visual analogue scale was used to measure acceptability with the system in terms of duration, noise level, physical discomfort, claustrophobia, confinement and emotional stress. No significant differences were reported between scan duration, noise level, physical discomfort and emotional stress between the open and closed systems. However, there were significant differences between groups for claustrophobia (open 92±12, closed 54±35, p<0.001) and feeling of confinement (open 96±6, closed 66±36, p<0.001), which impacted overall satisfaction (open 85±12, closed 70±19, p=0.002). Claustrophobia and anxiety were reported as less in the open system than in the closed system. The authors concluded that most women preferred the open MRI system, and that for claustrophobic or persons subject to fear, it may be a feasible alternative.

Rupprecht et al. (2000) performed a quasi-experimental study with an intervention group of an open low field (0.2 Tesla) MRI system (271 children, 136 male, 138 female) compared to a historical control group of closed high field MRI (111 children, 68 male, 43 female) in children over 2 years of age in Germany. For children undergoing imaging in the open scanner, 74 children (27%) required sedation, compared to 52 children (47%) in the closed scanner (p ≤ 0.001). There was no significant difference between the groups in terms of sedation in a sub-
analysis of children aged older than 10 years. In children aged under ten years, the difference between the two groups in sedation rates was even more marked; 68 out of 232 (29%) in the open scanner, compared to 51 out of 84 (61%) in the closed MRI ($x^2, p \leq 0.001$). The authors noted that it is easier to monitor children who are sedated in open MRI and that general anaesthesia was no longer required with the new system. The authors concluded that the open MRI design is of major advantage when imaging paediatric patients.

Spouse and Gedroyc (2000) conducted a quasi-experimental before and after study of 50 adult claustrophobic patients (25-71 years) in England who had failed to complete or undergo a conventional MRI scan, to determine if they would be able to tolerate an open interventional configured MRI scanner. Out of the 50 participants, 47 were able to undergo successful scanning with the open MRI scanner (94%), whilst 3 were unable to complete the scan (6%). A questionnaire that was administered to the patients displayed that self-reported claustrophobia scores (on a scale of 1 to 10, with 10 being extremely claustrophobic) were decreased with the open scanner compared to the conventional scanner, and with more patients stating they would attend for an MRI scan again in an open MRI scanner, but not in a conventional scanner. The authors conclude that the interventional configured open magnet design for MRI reduces claustrophobia related anxieties, and is a valuable tool for imaging claustrophobic patients.

Summary

In the four studies included in this review assessing open or interventional configured MRI scanners, all studies showed evidence of benefit from these studies. Completion rates were increased; sedation rates decreased, and overall satisfaction and feelings of claustrophobia were improved. However, all of these studies were performed in specific populations; children under 10 years, women undergoing pelvimetry, and already known claustrophobic patients.

Newer MRI/ shorter/wider bore

Out of the 29 studies addressing interventions for use during MRI scans, two studies specifically looked at the impact of having a newer MRI unit with a shorter, wider bore in terms of the number of claustrophobic events, the need for patient sedation and the number of successful scan completions. Due to the heterogeneity in populations (as one study specifically focused on claustrophobic patients) and variability of outcomes measured, meta-analysis was not appropriate, and a narrative summary of the two studies follows.

Dewey et al. (2007) performed a large quasi-experimental study in patients undergoing MRI in Germany comparing claustrophobic reactions in a conventional MRI scanner with a flat front and a bore length of 2.25 metres and width of 0.6 by 0.53m (42,998 patients) in a historical control group to a newer MRI scanner with 97% noise reduction with a bore length of 1.6m and a width of 0.6m of 12376 patients in the intervention group. If the patient became anxious or
panicked and either refused to undergo the scan or required sedation, a claustrophobic reaction was said to have occurred. Out of the 42998 patients scanned on the conventional scanner, 911 had a claustrophobic reaction, or 2.1% of patients (95% CI, 2.0–2.3%; p<0.001). On the newer scanner, out of the 12376 patients, 93 had a claustrophobic reaction, or 0.7% of patients (95% CI, 0.6–0.9%). This resulted in an absolute difference of claustrophobic reactions of 1.4% (95% CI, 1.2–1.6%) when the two scanners are compared. In terms of sedation, 36 of 12376 patients (0.3%) required sedating for the newer scanner, whilst 574 of 42998 patients required it on the conventional scanner (1.3%; p<0.001; OR, 4.8; 95% CI, 3.4–6.7). In terms of claustrophobia related MRI preventions, 57 preventions of 12,736 (0.4%) occurred for the newer scanner, compared with 337 of 42,998 for the conventional MR scanner (0.8%; p<0.001; OR, 1.8; 95% CI, 1.3–2.3). The authors concluded that newer scanners reduce the rate of claustrophobia, and that these scanners may increase both the applicability and clinical utility of MRI, as claustrophobia, sedation and scan preventions are reduced in the general population.

Hunt et al (2011)\textsuperscript{25} performed a quasi-experimental before and after study on 56 claustrophobic patients (age 7 – 88 years) in the USA who had been previously unable to complete an MRI scan on a standard, 60cm wide and 1.9m long bore scanner, to determine if they were able to undergo an MRI on a 70cm wide, 1.25m long bore scanner. Although there was no concurrent control group, it was reported that the 56 patients had failed to undergo MRI previously, therefore the study was included, and treated as a before and after study. Of the 56 patients, 50 were able to undergo scanning on the scanner (89%) whilst only 6 patients (11%), who were all scheduled for head examinations, could not complete scanning. As all 56 patients were scheduled for an anaesthesia assisted MRI if they could not complete the scan, the wider and longer bore reduced the need for anaesthesia substantially. The authors concluded that a wide, short bore MRI reduces the need for general anaesthesia and increases examination success in claustrophobic patients.\textsuperscript{25}

\textit{Summary}

In the two studies\textsuperscript{24, 25} assessing shorter and wider bore MRI scanners, both showed evidence of benefit. Completion rates were increased; sedation rates decreased, and claustrophobic reactions were decreased. The large study by Dewey et al.\textsuperscript{24} showed that this held true across the general population, and not only in claustrophobic patients, as shown in the study by Hunt et al.\textsuperscript{25}

\textit{Dedicated low field MR scanner}
Out of the 29 studies addressing interventions for use during MRI, one study\textsuperscript{112} specifically looked at the impact of having a dedicated low field MRI scanner compared to a whole body scanner in terms of patient acceptance. A narrative summary is below.

Verhoek et al. (1998)\textsuperscript{112} performed a crossover controlled trial in adults (19-74 years of age) in Switzerland to compare a dedicated low field .2 Tesla MRI scanner and a whole body 1 Tesla MRI scanner in terms of image quality and patient acceptance, for 41 patients undergoing ankle or foot imaging. The images produced were judged to be of better quality on the whole body system by radiologists. A questionnaire was used to judge acceptance, with patients answering six domains (comfort, examination time, noise, claustrophobia, confidence in the diagnosis, willingness to repeat the examination) on a scale of 1-10, with 10 being defined as ‘perfect’ and 1 ‘terrible’. Statistically significant differences were seen between the two scanners in terms of comfort (mean score of 9.2 on the whole body system compared to 5.7 on the dedicated scanner, Wilcoxon Signed Rank Test \(p<.0001\)), examination time (5.4 compared to 2.6, \(p<.0001\)), confidence in the diagnosis (9.4 compared to 8.5 \(p=.004\)), and willingness to repeat the examination (8.8 compared to 7.5, \(p=.05\)), all in favour of the whole body system. There was no difference between claustrophobia (9.9 compared to 9.9, \(p=.47\), although it rated highly with both systems, and for noise, patients preferred the dedicated low field system (6.0 compared to 9.7, \(p<.0001\)). The authors concluded that whole body systems are preferred by patients and produce better images.

**Quieter Machine**

Out of the 29 studies addressing interventions for use during MRI, only one study\textsuperscript{114} specifically looked at the impact of having a quieter MRI scanner in terms of patient acceptance. A narrative summary is below.

McNulty and McNulty (2009)\textsuperscript{114} conducted a quasi-experimental controlled study in Ireland in patients undergoing brain or lumbar MRI scans to assess the noise levels from two different MRI scanners (21 in each group), and the effect on the patient’s experience as measured by a 10 item questionnaire, including two 5-point Likert scales which were used to measure acceptability and perceived noise of the scanners. One question addressed the acceptability of the noise produced, ranging from completely acceptable to completely unacceptable, whilst the second question measured perceived noise, from quiet to very loud. The participants were found to be much more accepting of the system with improved gradient technology (2.45 overall mean acceptability), which was quieter than the comparison machine (3.71 overall mean acceptability). The authors concluded that newer, quieter machines improve patient comfort and acceptance of MRI.

*Detailed information and additional strategies*
Out of the 29 studies addressing interventions for use during MRI, five studies specifically looked at the impact of providing additional information for MRI, which could be verbal or written and delivered with or without additional strategies in terms of anxiety, depression, and ability of patients to complete the scan. Although four of the studies utilised the self reported measure STAI scale to measure anxiety in their studies, due to heterogeneity in populations, the intervention and the timing of when the outcome was measured, a meta-analysis was only appropriate for combining data from two of these studies.

**Narrative Synthesis**

Caruso et al. (2006) conducted a randomised controlled trial in Italy with the aim of reducing anxiety in women who had either been diagnosed (or were suspected to have) breast cancer. The aim of the study was to determine the impact of providing psychological support and routine information compared to routine information alone for women undergoing an MRI scan. Of the 44 participants, 23 of the participants met with a psychologist for further information and emotional support for 45 minutes, with the aim to help the participants adapt to the diagnostic procedure. The 21 participants in the control group received routine information alone. There were no significant differences between the two groups at baseline in terms of socio-cultural characteristics. In both groups, state anxiety was significantly reduced following the scan compared to a baseline measurement, although it was significantly lower in the experimental group as measured by the STAI (p=0.048). The results also showed that the psychological intervention group had significantly lower levels of depression before (p<0.001) and after (p<0.001) the MRI exam compared to the control group, as measured on the Zung Self-Rating Depression Scale. The authors conclude that a psychological intervention was able to result in a reduction of anxiety and depression in a population of female patients undergoing MRI.

Grey et al. (2000) conducted a pseudo-randomised controlled trial in neurology or neuropsychiatry patients (over 16 years of age) undergoing brain or spinal MRI scans to assess the effectiveness of a complex anxiety reduction protocol compared to the provision of standard information in England. Of the 64 included patients, 35 patients received standard (limited) information regarding the scan, whilst 29 received a booklet containing information regarding the scan, cartoons, as well as cognitive and relaxation strategies. In addition, they were given a tape recording of the noise the scanner makes, the participants were shown the control room to orient themselves in the scan environment, and provided with information regarding the timing of each scan. Both groups were comparable in their characteristics at baseline. Pre-scan anxiety was not significantly different between the two groups as measured on the STAI (standard group, mean 41.03 ±2.02, intervention group 36.72 ±2.68), nor was anxiety after immediately...
entering the scanner, as reported by the participant on a scale of 1 to 10 (3.66 ±0.51, 3.10 ±0.52). Statistically significant differences were seen however in anxiety during the scan on the self reported scale out of 10 (3.63±0.49, 2.28±0.36, p<0.05) and at completion of the scan on the STAI (40.60±2.50, 32.48±2.05), with the experimental group having lower anxiety at both times. The authors conclude that introducing this low cost protocol could reduce scan related anxiety.

Youssefzadeh et al. (1997) conducted a randomised controlled trial in Austria to assess the effect of providing additional information compared to standard information in women undergoing breast MRI, as well as to compare the difference in anxiety between breast MRI and non-breast MRI imaging. Out of the 336 breast examinations, 144 women received additional information, which included a detailed verbal explanation of breast MRI by the radiologist prior to their scan, and the radiographer and radiologist engaged the patient in conversation whilst preparing for the scan, suggesting relaxation techniques. The control group of 189 women undergoing breast MRI received only routine information and standard care. The outcome of interest was termination of the scan due to anxiety events, 10 of the 189 women who received standard care needed to have their scan stopped due to anxiety (5.5%), whilst all 144 women in the experimental condition were able to complete their scan, which was a statistically significantly difference (p=0.01). An additional group of patients undergoing non-breast MRI had 27 terminations out of 5837 patients, which was statistically significantly less than the breast MRI routine care group (p=0.01); this non-breast MRI group also received standard information. The authors conclude that by providing information and support, patient compliance can be achieved in breast MRI.

Selim (2001) conducted a randomised controlled trial in patients with no prior history of undergoing an MRI (aged 20-69 years of age) in Egypt to investigate the impact of providing additional information in terms of anxiety. Of the 60 participants, 30 received standard care (which included only routine hospital directions), whilst 30 received specially designed additional information with discussion on relaxation techniques. Following the MRI, there was a statistically significant difference between the two groups in terms of mean state anxiety as measured by the STAI scale (experimental 43.97, control 61.34, t-test, p = 0.001), which was assessed immediately post MRI with retrospective reports of anxiety felt during the procedure. The patients in the experimental group had either mild (n=16) or moderate (n=14) anxiety, compared to the control, which had moderate (n=12) and severe (n=18) anxiety. In both groups, there was a significant increase in self-reported anxiety during MRI compared to pre-MRI (experimental group [pre-MRI] 39.97 ± 07.16, [post-MRI] 43.97 ± 07.34, control group [pre-MRI] 41.93 ± 7.55 [post-MRI] 61.34 ± 8.85). The authors conclude that the provision of additional information reduced anxiety, and recommend that patients undergoing MRI should receive detailed information and training in relaxation techniques.
Tornqvist et al (2006)\textsuperscript{106} performed a non-randomised quasi-experimental controlled trial in outpatients (over 18 years of age) in Sweden undergoing MRI of the head and/or spine to assess the effect of providing increased written information regarding procedural, sensory and temporal information along with explanations, compared to a routine information group on the number and severity of motion artefacts, and levels of patient anxiety and patient satisfaction. Of the 242 patients included in the trial, 118 were in the routine information group (control), with 124 in the experimental group. There were no statistically significant differences in anxiety prior to the scan (control group 33.8 ± 0.90, experimental 35.0 ± 1.08, \(p=0.641\)) or during the scan between the two groups (30.5 ± 0.89, 32.0 ± 1.05, \(p=0.635\)) as measured with the STAI, nor when divided into the subgroups of men and women, or patients who had not received a scan previously (31.7 ±1.34, 31.9 ±1.74, \(p=0.928\)). There was also no statistically significant difference in terms of patient satisfaction with information provided as measured by a questionnaire. However, there were significantly more motion artefacts in patient’s images in the control group compared to the intervention group (4.0\% versus 15.4\%; \(p=0.003\)). The authors conclude that additional information assists in helping patients to lie still during their scan and thereby reduce motion artefacts, but it did not affect patient anxiety.

\textit{Meta-analysis}

Due to the similarity in the intervention and population studied, a meta-analysis was conducted between two of the above studies, despite the differences in study design.\textsuperscript{104, 106} As there was statistically significant statistical heterogeneity when using a fixed effects model (Chi square = 33.44, \(p=0.0\)), a random effects model was used. As one of the studies\textsuperscript{106} only reported standard errors, standard deviations were calculated to allow meta-analysis to be conducted. This was done following the guidance of the Cochrane handbook.\textsuperscript{120} Only a subgroup of patients from Tornqvist et al.\textsuperscript{106} who had not had an MRI previously was included, even though there was data for those who had, as Selim\textsuperscript{104} only included those who had not had an MRI previously.

\textbf{Figure 3: Meta-analysis of information for anxiety}
As can be seen from the forest plot, there is statically significant heterogeneity between the included studies (Chi square = 33.44, p=0.0). There was no statistically significant effect when the studies were combined (WMD -8.6, CI -25.82 to 8.62), and there was a wide variance in the magnitude of the effect size from the upper and lower confidence intervals. This may be due to the population and settings of the studies, as well as differences in the actual intervention compared to standard or routine care. Another contributing reason may be due to the fact Tornqvist\textsuperscript{106} only scanned heads/spines, whilst Selim\textsuperscript{106} did not disclose the scan type. Also, one of these studies was a randomised controlled trial,\textsuperscript{104} whilst the other did not use randomisation.\textsuperscript{106}

**Summary**

In the 5 studies assessing information with or without additional strategies, the results were somewhat mixed. In the studies that assessed provision of additional information along with a psychological intervention\textsuperscript{99} or an anxiety reduction protocol,\textsuperscript{100} there were positive results. In studies assessing additional information alone, 2 found positive benefits in terms of anxiety\textsuperscript{104},\textsuperscript{109} whilst one did not.\textsuperscript{106} This may be due to a wide range of reasons, including how the information was delivered, what the other aspects of the intervention included, and the standard of care given in the control or routine group.

**Mock MRI**

Out of the 48 studies retrieved, four studies\textsuperscript{53, 54, 121, 122} specifically looked at the impact of having mock or pretend MRI on the need for sedation or general anaesthesia. Only two of these studies were deemed of high enough quality to be included in this review.\textsuperscript{53, 54} Due to heterogeneity in populations and the outcome measured, it was not possible to perform a meta-analysis and therefore a narrative summary of the studies follows.

Carter et al. (2001)\textsuperscript{54} conducted a quasi-experimental retrospective audit (before and after study) in Australia to determine the impact of introducing mock MRI to a paediatric imaging department on the rate of general anaesthesia use for clinical MRI. Data was presented for patients of ages between 3 and 14 years old in both the pre-mock MRI period (1072 scans) and post-mock MRI period (1205 scans). A drop from 26.8% of children undergoing general anaesthesia in the pre mock group to 18.2% in the post-mock group was observed, a difference of 8.6% (p<0.05). However, only 132 patients actually underwent a mock MRI during the post-mock period. In the post-mock period alone, the rate of general anaesthesia in the group who received a mock MRI (132) compared to those who did not was higher, at 21.2% in the mock group to 17.8% in the non-mock group, although this difference was not statistically significant (p<0.34). In children aged between 3 and 8 years of age in the post-mock group, the rate of
children who required general anaesthesia in the mock group was 21.8%, compared to 37.9% in those who did not receive a mock MRI, resulting in a difference of 16.1% (p<0.001). The authors concluded that mock MRI was effective in reducing rates of general anaesthesia, particularly in children aged between 3 and 8 years of age.

Rosenberg et al. (1997)\textsuperscript{53} performed a quasi-experimental case control study with 16 healthy children (6-17 years of age) and 16 who had obsessive-compulsive disorder who underwent mock MRI with a simulation scanner, along with an additional group of 10 healthy children who did not undergo a mock MRI in the USA. There was a significant decrease in subjective distress in the mock MRI group by the end of the simulation scan as measured by the Subjective Units of Discomfort Scale (p<.01), which was maintained during the real scan, and all were able to complete the real scan without sedation, including patients with obsessive compulsive disorder. In the non-simulation group, one out of the ten children could not complete the scan due to a severe claustrophobic reaction. Also, those who did not undergo a simulation scan had higher levels of self-reported distress and heart rates during the actual scan than those who underwent the simulation. The authors concluded that simulation prepared children for MRI without the need for sedation by reducing anxiety.

\textit{Summary}

In two studies\textsuperscript{53,54} assessing mock or simulation MRI prior to a true scan, both showed evidence of benefit. The sedation rate was decreased for certain age groups, showing that this may be most effective in children up to 10 years of age, including children with obsessive compulsive disorder.\textsuperscript{53}

\textit{Team training (including hypnosis)}

Out of the 29 studies addressing interventions for use during MRI, one study\textsuperscript{113} specifically looked at the impact of a team training exercise to improve MRI completion rates. A narrative summary is below.

Lang et al. (2010)\textsuperscript{113} conducted a quasi-experimental study in the USA with a historical control group of 6654 patients prior to the intervention, which consisted of clerical personnel and non-licensed health care professionals within the department receiving training in advanced rapport skills for 8 hours, with licensed health care professionals (including doctors, nurses and technologists) being trained in advanced rapport skills plus rapid hypnotic techniques for 17 hours, to determine its effect on completion rates. Rapport skills training focused on building confidence, validating the patient’s state of mind, adapting to the patients preferred mode of communication, decoding body language, attentive listening, avoiding and replacing negative words, providing perception of control, and use of encouragement. The hypnosis training explained the components of hypnosis, and ‘familiarised students with various models of
induction and extensive practice with a variety of scripts, managing distress and pain, use of
metaphors, and ego-strengthening exercises (p.20). In the control group, 80 of the 6654
patients undergoing scanning could not complete the examination (1.2%) during the 3 month
period before the intervention was introduced. After half the staff within the department were
trained, this dropped to 0.74% (52 of 7008 patients) the following 3 months. The department
also had an open scanner where the most anxious patients were scanned, which saw a drop in
non-completion from 3.43% (37 of 1078) to 1.45% (19 of 1098). In the quarter following on
from this, large departmental reshuffling was undertaken, and the non-completion rate rose to
1.13% (77 of 6798) and 3.04% on the open MRI scanner (33 of 1085). In the next two quarters,
the non-completion rate was .93%, after things within the department had settled down. The
authors concluded that team training in advanced rapport skills and hypnosis can improve
completion rates, and also noted the change in outcomes due to organisational disruptions.

**Prone positioning**

Out of the 48 studies retrieved, 3 studies98,116,123 specifically looked at the impact of prone
positioning compared to supine positioning in terms of claustrophobia and scan termination.
Only two of these studies were deemed of high enough quality to be included in this review.98,116
Due to heterogeneity in populations and the outcome measured, no meta-analysis was able to be
performed, and a narrative summary of the studies follows.

Eshed et al. (2007)116 performed a large cohort study in Germany to determine the rate of
claustrophobia and prematurely terminated scans in 5798 scans (age range 5-99 years). Within
this cohort, they also compared prone to supine positioning to determine its effect on scan
completion. Women undergoing breast scanning were positioned in the prone position, and out
of the 326 scans performed, only one scan was terminated due to claustrophobia; an incidence
of 0.31%, whereas the incidence overall was 1.22% (59 of 5798). Head/neck scanning resulted
in the highest incidence of terminations, with 1.73% of patients unable to complete their scan
(34 of 1968 patients). The authors concluded that claustrophobic reactions are still an issue with
MRI scanning, and that prone positioning might help reduce termination of scans due to
claustrophobia.116

McCaulley et al (1992)98 performed a randomised controlled trial in the USA of women
undergoing pelvic imaging over a 7 month period, where the two groups were prone (32
patients) or supine (27 patients) positioning. The main aim of the study was to determine if
positioning had an effect on image quality, and the authors found that there was no statistically
significant difference between the images as judged by two radiologists and measured in image
quality on a scale of 1 to 4 (average score of 2.8±0.9 for prone, 2.9±0.8 for supine). In terms of
ability to complete the scan, 2 patients were not able to, with one from each group. In the prone
group, 6 patients experienced claustrophobia, and in the supine group, 8 patients. Two patients
initially positioned supine were able to complete the scan after requesting to be placed prone. The authors concluded that the choice of patient positioning should depend on patient comfort and ease of positioning, and that patient positioning either supine or prone did not affect the quality of the images.

Summary

In the two studies\cite{98,116} assessing prone or supine positioning for an MRI scan, both showed evidence of benefit from prone scanning. Claustrophobia appeared to be reduced when scanned in the prone position in one study.\cite{116}

Audio-visual Systems

Out of the 48 studies retrieved, 3 studies\cite{22,23,124} specifically looked at the impact of audio-visual (AV) systems in terms of claustrophobia, scan termination and sedation in children. Only two of these studies were deemed of high enough quality to be included in this review.\cite{22,23} A meta-analysis was performed from the two studies for three different outcomes.

Harned et al. (2001)\cite{22} performed a quasi-experimental study in the USA with a historic control group to evaluate the implementation of an audio-visual system using goggles for paediatric patients (0 years and over, no maximum age provided) undergoing MRI in terms of the need for sedation. In the study, 1112 patients were scanned after the implementation of the audio-visual system, which was compared to a retrospective control group of 955 patients who received standard care. The intervention was an audio-visual system consisting of goggles and headphones, which could be used within the magnetic field of an MRI unit, allowing the child to watch a video of their choice. Overall, there was a significant reduction in the need for sedation in children, from 49% prior to the introduction of the goggles to 40% afterwards (p<0.001). When the data was analysed by age ranges, there was no significant difference between the ages of 0-2 years in terms of sedation, although there was a significant reduction in the age group of 3-10 years of age (53% to 40%, p<0.001) and in the group older than 10 (16% to 8%, p<0.001). Despite initial costs of setting up the AV system, it was shown that sedation required additional time to perform a scan and added costs. The authors conclude that the AV system reduced sedation in children undergoing MRI, which has a potential positive impact for patients and in cost reductions for the department.

Lemaire et al. (2009)\cite{23} performed a quasi-experimental study with a historic control group in Canada to evaluate the implementation of an audio-visual system for paediatric patients undergoing MRI in terms of sedation, wait times, image quality and patient experience. In the
study, 673 patients (0 to 18 years) were scanned following the introduction of the audio-visual system, which was compared with 558 scanned prior to the implementation of the system. The audio-visual system that was introduced was the Cinemavision AV system, which includes headphones and goggles able to be used during MRI, and the patient was allowed to choose what they would like to watch. There was an overall decrease in sedation of 15.4% following the introduction of the system, from 32.3% to 16.8%, although this was not statistically significant (p<0.32). When analysed by age ranges, the difference in the group between 4 and 10 years resulted in a statistically significant difference, with a drop in sedation of 34.6%, (p<0.05). For other outcomes, there was an overall decrease in waiting times for MRI of 33% (p<0.05). The authors conclude that the AV system used in this study could reduce patient motion and sedation.

Due to the similarity in the study design, intervention and population studied, a meta-analysis was conducted between the two studies. As there was statistically significant statistical heterogeneity when using a fixed effects model, a random effects model was used. Data was available for all children, as well as in subgroups of different age-ranges.

Figure 4: Meta-Analysis of audio-visual interventions on sedation: Overall numbers of children requiring sedation for scanning

The forest plot shows a significant reduction in the number of children requiring sedation for scanning (OR 5.4, 95%CI 0.34, 0.86), however there was statistically significant heterogeneity present in the meta-analysis (Chi squared = 9.27, p = 0.004), and therefore the results should be interpreted with caution. When combining the data from both studies, the total amount of children requiring sedation was significantly lower in the treatment group (OR 0.54% (CI 0.34-0.86)) compared with those in the control group. The lower end of this confidence interval (0.34%) would indicate that this would be considered important due to its large effect size, whilst the upper level of 0.86%, although indicating a smaller difference, is nevertheless an important difference as well.
Figure 5: Meta-analysis of audio-visual interventions on sedation: *Children aged 3-4 to 10 years requiring sedation for scanning*

The forest plot shows a non-significant reduction in the number of children 3-4-10 years requiring sedation for scanning (OR 0.3, 95%CI 0.08, 1.19); however, there was statistically significant heterogeneity present in the meta-analysis (Chi squared = 20.17, p = 0.00), and therefore the results should be interpreted with caution. Despite a high degree of variance within studies (as shown by the large confidence intervals), both report positive results. Although there is a lack of statistical significance in the results, due to the positive results of both of the individual studies, it is likely that there is an overall positive effect from an audio-visual system in this population.

Figure 6: Meta-analysis of audio-visual interventions for sedation: *Children aged 10-18 years requiring sedation for scanning*

The forest plot shows a significant reduction in the number of children aged 10-18 years requiring sedation for scanning (OR 0.42, 95%CI 0.25, 0.70). There was little statistical heterogeneity present in this meta-analysis (Chi squared = 1.27, p = 0.26). The results suggest that the audio-visual intervention is effective in reducing the number of children requiring sedation.
Summary

In the two studies assessing an audio-visual system for children undergoing MRI, both showed a reduction in sedation among children older than 3 years. However, the effect size (and variance) seen in Lemaire et al. is consistently larger than that in Harned and Strain. There are a number of potential reasons for this, as although the intervention itself is very similar, the AV system is different, there were more participants in Harned and Strain's study, and there is a time difference between when the two studies were conducted. However, from the results of these two studies, it is likely an audio-visual system largely results in positive outcomes for children undergoing MRI.

Cognitive Strategies, including Guided Imagery, Relaxation training and Cognitive Behavioural Therapies

Out of the 29 studies addressing interventions for use during MRI, seven studies specifically looked at the impact of cognitive strategies for MRI in terms of anxiety, distress and sedation. All of these studies were deemed of high enough quality to be included in this review. Due to heterogeneity in populations, interventions, the outcome measured and the timing of the outcome, meta-analysis was not appropriate, and a narrative summary of the studies follows.

Argue (1995) conducted a randomised controlled trial in adult patients aged 18-82 years undergoing MRI in the USA to assess the effectiveness of psychological techniques in terms of anxiety and distress. In the study, the 64 included participants were split into four groups; a control group of 17 who received standard care, a standard care plus progressive muscle relaxation and guided imagery group (relaxation training) of 15 patients, a standard care plus skills training in cognitive coping strategies group of 15 patients, and a final group who received both interventions (relaxation training and cognitive coping strategies). The relaxation intervention consisted of training in progressive muscle relaxation via videotape, along with instructions in diaphragmatic breathing and guided imagery. The cognitive skills training consisted of training in developing to redirect frightening cognitions towards peaceful thoughts via videotape. Anxiety was measured using a visual analogue scale and the STAI by the participants, whilst MRI technicians also measured behavioural levels of distress and anxiety. The results showed that there was a statistically significant reduction in anxiety in the difference between ratings of anxiety in the intervention groups and the control group; which was largest between the control group and the intervention group that received the combined intervention. On the visual analogue scale and the STAI, the mean result for the groups prior to MRI but following the intervention was as follows; Control group VAS, (41.92, SD 14.44) STAI (84.13, SD
Progressive relaxation VAS (35.20, SD 7.91) STAI (59.35 SD 39.34), Cognitive Skills VAS (38.87, SD 10.39) STAI (71.33, SD 28.98), and the combined group VAS (29, SD=11.16) STAI (48.69, 28.61). On the visual analogue scale and the STAI, the mean result for the groups during MRI were as follows; Control group VAS,(50.79, SD 12.82) STAI (102.43, SD 47.88), Progressive relaxation VAS (43.90, SD 12.28) STAI (69.84 SD 45.11), Cognitive Skills VAS (44.13, SD 8.75) STAI (74.44, SD 34.62), and the combined group VAS (33.26, SD=16.98) STAI (58.45,SD 36.48). The authors concluded that psychological intervention can reduce anxiety associated with MRI examinations in this population of patients.

O’Halloran (1993) conducted a randomised controlled trial in adults in the USA undergoing MRI of the head to determine the effectiveness of two psychological interventions, a cognitive coping group and a relaxation treatment group in terms of anxiety compared to a control group. The author was also interested in determining the effect of constructive thinking on anxiety levels in MRI, and whether the level of constructive thinking (high or low, as measured by the constructive thinking inventory) has an impact on the anxiety experienced during the scan. Of the 60 included participants, 20 received a cognitive coping intervention, focused on ‘combating patient’s negative thoughts with positive coping statements,’ whilst 20 were randomised to a relaxation intervention, where patients were taught to recognise areas of tension and then let it flow out of the body. The remaining 20 participants acted as a control group. In terms of anxiety as measured by the STAI, there was no a significant treatment effect seen between the groups. A statistically significant finding was found between high constructive thinkers and low constructive thinkers, with high constructive thinker’s anxiety levels remaining the same at baseline and post intervention (STAI-state pre 33.1, post 34.6), with low constructive thinkers reporting higher baseline anxiety, which decreased to the high constructive thinker’s level at the end of the scan (STAI-state pre 39.1, post 34.6). The authors concluded that low-constructive thinkers may benefit from targeted attention prior to MRI scans.

Smart (1997) conducted a randomised controlled trial in children between the ages of 4 and 8 years old undergoing an MRI in the USA to determine the effectiveness of music and guided imagery on the numbers of children who required sedation to complete their scan. Of the 20 participants, 10 were randomised to a control group, whilst 10 others received the intervention, which consisted of listening to a tape through headphones entitled ‘Magic Island,’ which involved relaxation, guided imagery and music. Eight out of the 10 children in the control group needed sedation to complete the scan, whilst only 3 did in the intervention group. However, the authors do note that is only a small sample size. Overall, the authors concluded that the use of the tape can reduce the need for sedation for children undergoing MRI.
Quirk et al. (1989) conducted a randomised controlled trial in outpatients undergoing MRI for the first time in the USA to determine the effectiveness of psychological interventions in terms of anxiety as measured by the STAI. Of the 50 subjects included, 16 patients received standard information regarding the procedure via a videotape, 18 received standard information in addition to a 5 minute counselling session including discussion around relaxation techniques, while the final 16 patients received standard information in addition to listening to a relaxation exercise audiotape, including breathing techniques and guided imagery, which was the longest of the three interventions studied. There were no significant differences amongst the three intervention groups in terms of pre-examination anxiety or in examination anxiety alone (information only, pre-exam 7.7, exam 10.2; counselling group, pre-exam 7.6, exam 8.4; relaxation group, pre-exam 7.6, exam 8.4). However, the relaxation audiotape group did show a significantly less increase in anxiety when compared to the other two groups (information only pre-examination 7.7, examination anxiety 10.2), (counselling pre-examination 7.6, examination anxiety 8.4), (relaxation pre-examination 10.4, examination anxiety 8.1). Also, patients in the standard information group alone displayed significant increases in anxiety. The authors concluded that preparation with psychological techniques including relaxation are more effective than providing information alone for reducing self-reported anxiety.

Tyc et al. (1997) performed a randomised controlled trial in children with cancer aged between 6 and 18 years of age in the USA to determine the effectiveness of a cognitive-behavioural intervention on levels of distress and anxiety during MRI. Of the 55 children included, 28 received a cognitive behavioural intervention package consisting of watching a 15 minute film that showed the MRI procedure, breathing exercises, emotive imagery/distraction, mock MRI and positive incentive. The remaining 27 children received standard care only, which included viewing the magnet and having the opportunity to discuss details about the MRI exam. Staff ratings of distress on a scale of 1 to 10 were significantly lower during the insertion of intravenous lines for the cognitive behavioural group (1.7 SD 1.9 compared to 2.7 SD 2.4), but not during MRI (1.3 SD 0.8 compared to 1.5 SD 1.3). Child and parents ratings of distress during IV insertion or the MRI did not reach statistical significance. No significant differences were noted in sedation rates. However, these findings may be influenced due to the sample’s previous experience with MRI exams. The authors conclude that the cognitive behavioural intervention produced a reduction in distress, although it was only a small reduction.

Thompson and Coppens (1994) conducted a randomised controlled trial in adults undergoing MRI in the USA to determine the effectiveness of guided imagery in terms of anxiety and movement during the MRI procedure. Of the 41 participants, 20 participants listened to a guided imagery tape, which ran for 10 minutes twice that included breathing techniques, relaxation and guided imagery, in addition to standard care. The remaining 21 participants received standard care alone, which included information regarding MRI, what to expect, and what they were
required to do. There was a significant reduction (approximately 72%) in pre-MRI anxiety in the intervention group when compared to initial anxiety and compared with the pre-MRI anxiety level of the control group (guided imagery group: initial anxiety 40.2, SD 13, pre-MRI anxiety 29, SD 10.3; control group: initial anxiety 38.6, SD 13, pre-MRI anxiety 37.3, SD 11.9, t=5.4, p<0.001). In both subject and operator reported movement, there was significantly less movement in the guided imagery group (subject or operator stated if movement occurred, yes or no). The authors concluded that guided imagery is useful as a therapeutic intervention prior to MRI.

Lukins et al. (1994) performed a randomised controlled trial in adult patients undergoing an MRI in Australia for the first time to assess a cognitive behavioural approach and its effect on anxiety during MRI as measured by the STAI. Out of the 137 participants, 44 received a 20 minute guided imagery audiotape incorporating elements of cognitive coping strategies. Another 43 participants received this intervention in addition to a modified version of the recording during the MRI scan in breaks between scanning sequences. The remaining 52 participants acted as a control group and received standard care alone. Anxiety ratings were found to significantly increase in the control group (before the scan 35.1 SD 9.2, during 38.5, SD 13) compared to the intervention groups (p<.01) in terms of the STAI, whilst it decreased in both the relaxation without prompts (before the scan 34.4, SD 9.9, during 33.6, SD 12.5) and the relaxation with prompts (before the scan 35, SD 12.1, during 32.2, SD 10.6). Between the two intervention groups, anxiety did not differ significantly. It was also found that at 7 months follow up, there was a positive correlation between those who had high levels of anxiety during the scan and the development of MRI related fears. The authors concluded that the guided imagery and relaxation intervention helped to reduce anxiety felt during imaging.

Summary

Out of the seven studies assessing cognitive or psychological strategies for anxiety or distress during MRI imaging, the majority of the studies reported that techniques such as guided imagery, cognitive coping strategies and relaxation and breathing techniques were effective for reducing anxiety in both adults and children undergoing MRI, although the size of this effect ranged greatly amongst the studies. This is likely due to the variance in the intervention delivered. None of the studies assessed the effectiveness of the interventions in patient populations who considered themselves claustrophobic.

Photo Diary

Out of the 29 studies addressing interventions for use during MRI, only one study specifically looked at the impact of providing a photo diary to children on stress and anxiety in children undergoing MRI imaging. A narrative summary is below.
Hartman et al. (2009) performed a randomised controlled trial in 52 children aged between 7 and 12 years in the USA to determine the effect of standard information plus a photo diary compared to standard information alone in terms of pre-procedural stress and anxiety of the child, and of the parent. The photo diary consisted of a 24 page booklet which outlined in detail what the child could expect from the scan with simple words and pictures illustrating the process, with a third grade reading level. Due to incomplete surveys, data was analysed for only 50 children, with 25 in the control group and 25 in the photo diary group. Following education with the photo diary, there were no differences in total anxiety as measured by the Revised Children’s Manifest Anxiety Scale (control group median anxiety 5.00, intervention group median anxiety 5.00, p=0.16) or total stress scores as measured by the Children’s Stress Symptom Scale between the two groups (control group median stress 11.00, intervention group median stress 10.00, p=0.88); however, there was a difference in general anxiety, with the education group reporting higher general anxiety (control group median anxiety 1.00, intervention group median anxiety 2.00, p=0.041). In terms of parental anxiety, there were no significant differences between the two groups. The authors concluded that a photo diary does not reduce pre-MRI stress and anxiety in school aged children or their parents.

**Fragrance administration**

Out of the 29 studies addressing interventions for use during MRI, only one study specifically looked at the impact of fragrance administration in terms of anxiety for patients undergoing MRI imaging. A narrative summary is below.

Redd et al (1994) performed a randomised controlled trial in the USA comparing fragrance administration via a nasal cannula compared to humidified air via a nasal cannula for adult patients undergoing MRI, to determine whether or not it had an effect on distress and anxiety during imaging. The intervention group consisted of 20 patients who received a vanilla scent through the nasal cannula, whilst the control group of 37 patients received only humidified air. Anxiety was assessed in multiple ways, which were both physiological (pulse and blood pressure) and self-reported (visual analogue scale and State-Trait Anxiety Inventory). In terms of termination of the scan, two patients did not complete their scan in the control group, whilst all managed to complete the scan in the intervention group. A significant decrease in anxiety as determined by the visual analogue scale was reported for patients who had fragrance admitted to them during the scan (pre anxiety 46.8 SD 25.2, post anxiety 29.5 SD 20.1). However, this was not replicated on the STAI or for physiological measures. The authors concluded that the results of the trial suggest that olfactory stimuli can reduce anxiety for patients undergoing MRI imaging.
Out of the 38 included studies, 8 studies assessed interventions used to reduce anxiety, need for sedation, patient comfort and satisfaction during Nuclear Medicine and PET examinations. The interventions and the studies assessing these are discussed in a narrative summary below.

Information Giving

Out of the 8 studies addressing interventions for use during Nuclear Medicine, four studies specifically looked at the impact of providing additional information in reducing anxiety during nuclear medicine procedures. Due to heterogeneity in populations and the outcome measured, meta-analysis was not appropriate, and a narrative summary of the studies follows.

Kaya et al. (2010) performed a quasi-experimental study in Turkey to assess the effect of giving detailed information about intravenous radiopharmaceutical administration on anxiety levels as measured using the STAI on adult patients who requested further information, and was conducted in two nuclear medicine departments. Of the 620 participants included in the study, 388 patients requested additional information from a simple informed consent form, and were provided with a detailed informed consent form with comprehensive information regarding risks and potential adverse events of the procedure, which was repeated orally by a nurse or physician. The remaining 232 participants did not request additional information and acted as the comparison group. There was no difference in anxiety between groups after both received simple information. In the group receiving additional information, a statistically significant increase in anxiety was reported after receiving the detailed information compared to only receiving simple information (post simple information, 41.45 ± 6.18, post detailed information 43.12 ± 6.73, p <0.001). However, despite this overall increase in self-reported anxiety, out of the 388 participants who requested additional information, an increase in anxiety was seen in 246 patients, no change in 32 patients, and a decrease in 110 patients. This shows that while the majority had increased anxiety after receiving detailed information, it was beneficial in some cases. The authors conclude that provision of detailed information in patients who request it increases their anxiety, although not for all patients.

Leckie (1994) conducted a randomised controlled trial in England in adult patients who had not been in contact with the nuclear medicine department previously who were undergoing bone scans for metastasis to determine the effect of an informational intervention on state anxiety (as measured by the STAI) of the patients. Of the 42 patients included in the study, 14 received standard information in an appointment letter, 14 received the standard information plus additional information in a leaflet, and a third group who received standard information in addition to being told verbally the information that was in the leaflet. There was a statistically significant difference in anxiety levels prior to the scan, with both the additional information groups reporting lower anxiety than the standard information group (mean score anxiety,
standard group 46, SD 12.8, verbal 35.9, SD 8.6, written 37.5, SD 7.9). There was no significant difference between the verbal and written information groups. The authors conclude that providing information of what to expect decreases anxiety.

Lledo et al. (1995) conducted a randomised controlled trial in Spain in adult outpatients attending a nuclear medicine service to assess their satisfaction with the service, and determine the impact of providing additional information on anxiety levels. Of the 243 participants, 125 patients received oral and written information with a graphic display of the scan they were to undergo, whilst 118 received no information and acted as a control group. Levels of satisfaction (as measured by a questionnaire) were higher in the informed group compared to the non-informed group, (7.69 plus or minus 1.84) compared to (8.62 plus or minus 1.03). There was an even larger difference between the level of anxiety experienced by both groups, which was significantly higher (7.47 plus or minus 2.33) compared to the informed group (1.33 plus or minus 0.9). When assessing the full sample, the following factors were significantly associated with high satisfaction scores; age, waiting time, treatment by assisting personnel, treatment by personnel at the service reception, waiting room habitability, communication variables, and low levels of anxiety. Those who received information also perceived factors associated with their scan more positively. The authors concluded that supplying information to patients reduces their anxiety and improves their perception of the nuclear medicine service.

Westerman et al. (2004) conducted a randomised controlled trial in Canada in adult patients undergoing a rubidium PET scan for the first time to assess the effectiveness of sending an informational pamphlet compared to usual care on anxiety regarding the test. Of the 39 patients included in the study, 17 received an information pamphlet mailed out to them prior to the scan in addition to usual care. The remaining 22 participants received standard or usual care, which consisted of a phone call two weeks prior the appointment with information about the appointment. Anxiety was measured by a visual analogue scale, the Hospital Anxiety and Depression (HAD) scale, and by serum cortisol levels. There were no statistically significant differences between the two groups in any of the measures of anxiety (visual analogue scale; intervention group 3.9 ± 3.5, control 3.0 ± 2.5, HAD intervention, 7.5±3.9, control 7.2±4.1, serum cortisol level; intervention 427.18 ± 230.30, control 388.95 ± 169.58). In addition, there were no statistically significant differences in terms of patient knowledge regarding the test between the two groups. The authors conclude that although information is important to provide prior to scans, an additional mailed pamphlet did not have any effect on patient’s level of knowledge or anxiety.

**Summary**

Out of the four studies assessing additional information for patients undergoing nuclear medicine, two studies resulted in positive outcomes, one study found no change, and one
reported an overall increase in anxiety. It is still unknown to what extent of detail information should be provided, and what period of time prior to the procedure is optimal to provide information.

**Patient Positioning Devices**

Out of the 8 studies addressing interventions for use during Nuclear Medicine, 2 studies specifically looked at the impact of patient positioning devices in terms of patient preference and comfort. Due to heterogeneity in populations and the outcome measured, meta-analysis was not performed, and a narrative summary of the studies follows.

Bretchel et al. (2007) conducted a quasi-experimental study to assess the use of a patient fixation device in whole body PET-CT scanning and its effect on pain, comfort and image quality in Germany. Out of the 230 adult patients included in the study, 200 underwent whole PET-CT scanning with a vacuum assisted fixation device, which had a size of 1 by 1.5 metres and can be deflated for each patient as needed. The other 30 patients acted as a control group and did not receive any device. The results of the study showed that the fixation device was technically superior to no device in terms of alignment quality between PET and CT images, whilst there were no artefacts produced by the device. In the fixation device group, 84 patients reported pain (46%) in at least one body region. However, the examination was still rated as comfortable in 75% of the patients. In the control group without the device, 17 of the 40 patients (61%) reported pain in at least one body region, with only 11 (39%) reporting the scan as comfortable. This difference in rating of comfort was statistically significant (P < 0.0005). The authors did state that using the fixation device lengthened the time taken to scan. The authors concluded that technical and patient aspects of the scan were improved through the use of the device.

Cooper and McCandless (1995) performed a randomised cross over controlled trial in the USA of a patient positioning device to be used during tomographic myocardial perfusion imaging in 179 adult patients. The patients were randomised to whether they would have the positioning device on the stress or redistribution images. The outcomes measured included incidence of motion, amount of motion, and patient preference, as measured by a 5-point scale. The two part device itself positions and supports the upper extremities with multi-angled plastic wings under the patients head, and the lower extremities with a foam triangle under the knees. Patient motion incidence and severity were both reduced in the group using a positioning device. In terms of preference, the vast majority of patients preferred the positioning device (no exact number given), although it was still disliked by 13 patients. The author’s conclusions support the routine use of the positioning device, and its removal in patients who find the device uncomfortable.

**Summary**
In the two studies\textsuperscript{55, 56} assessing patient positioning devices for scans both showed evidence of benefit from the different devices in terms of comfort and preference. The devices also resulted in improved image quality compared to no device control groups.

**Paediatric preparation booklet**

Out of the 8 studies addressing interventions for use during Nuclear Medicine, 2 studies\textsuperscript{19, 20} specifically looked at the impact of patient preparation booklets and information for paediatric populations and their parents/caregivers undergoing nuclear medicine procedures. Due to heterogeneity in populations and the outcome measured, meta-analysis was not appropriate, and a narrative summary of the studies follows.

Garcia et al. (2007)\textsuperscript{19} performed a quasi-experimental study in 71 paediatric patients (aged 2-8 years) who presented to a nuclear medicine imaging department for either a renal scan (MAG3 or DMSA) or a bone scan, with the aim of evaluating a paediatric preparation booklet in Australia. The booklet was written with language specifically targeted at children, with illustrations and photos. Out of the 71 participants, 30 were given the booklet and a standard information sheet, whilst 41 patients were given the standard information sheet alone. The parents of both groups of children were asked to fill out a survey relating to the child’s anxiety and behaviour patterns during their scan, and the parent’s self reported anxiety as well. The results of the anxiety survey reported no statistically significant differences between the two groups, with 21 of 41 patients in the control group reported as anxious, and 15 of the 30 in the booklet group ($p = 0.56$). There was also no significant difference between anxiety in the parents of both groups, with 26 of the 41 parents in the control group being reported as anxious, and 16 of 30 in the booklet group ($p = 0.27$). However, when the parents were asked what the cause of their anxiety was, there was a significant difference in causes for their anxiety, with more parents in the control group reporting that a lack of information/not knowing what to expect contributed to their anxiety. In the intervention group, all parents reported the booklet was informative, 96% indicated it was helpful to them, and 75% said it reduced their anxiety. The authors concluded that a paediatric preparation booklet that can reduce the anxiety of both children and their parents is a valuable tool in preparing for a nuclear medicine scan.

Train et al. (2006)\textsuperscript{20} performed a quasi-experimental study comparing distraction during medical procedures and environmental manipulation to a group receiving the aforementioned intervention in addition to a photo-booklet and a letter of advice to parents regarding preparation for the procedure in England. Environmental modification consisted of making the department more child-friendly by the addition of toys, posters and mobiles. Distraction was offered with books, blowing bubbles, singing or watching a video. These two intervention groups (20 participants in each) were also compared to a historic control group (81 patients). The aim of the study was to evaluate the effect of these interventions on sedation rates and distress.
during DMSA renal imaging in a paediatric population. Compared to the baseline (retrospective control group), the combined intervention group had a statistically significant reduction in the need for sedation, with 65% compared to 35% in the intervention group requiring sedation ($\chi^2 p=0.003$). A failed scan occurred only once in the intervention group, compared to 4 times in the baseline group. Between the two intervention groups, there were no significant differences in sedation rates, median parent state anxiety (STAI of 34 for both groups, $\chi^2 p=\text{not significant}$), and patient distress before cannulation as measured with a visual analogue scale (10 in the standard group, 4 in the photo-booklet group, $\chi^2 p=\text{not significant}$). Patients in the photo-booklet group did display less stress prior to the procedure. The authors concluded that a psychosocial approach incorporating environmental modification and distraction can lower distress and the need for sedation, and this can be enhanced by the addition of a photo-booklet.

**Summary**

In the two studies\textsuperscript{19, 20} assessing patient paediatric preparation booklets, both authors concluded that these were valuable tools to utilise in a nuclear medicine department. The booklet was viewed positively by parents in both studies,\textsuperscript{19, 20} and resulted in lower distress and sedation rates in one.\textsuperscript{20} Environmental manipulation was also found to be effective, either alone or in combination with a preparation booklet.\textsuperscript{20}

**COMPUTED TOMOGRAPHY**

Out of the 38 included studies, only one study assessed an intervention to reduce worry during computed tomography.\textsuperscript{115} The intervention and study details are discussed below.

**Patient Information**

One study\textsuperscript{115} assessed the impact of patient information on patient's attitudes towards CT. Merrill et al.\textsuperscript{115} (1986) conducted a quasi-experimental study of 210 adult patients in England, 110 of which received an information leaflet including a photograph of the scanner, and 100 who acted as a control group. Analysis also split patients into groups with a known malignancy or diagnostic scans. The use of an information leaflet was found to significantly reduce the amount of people who were worried (measured by a simple questionnaire) about having a CT scan in the group of patients who had a known malignancy, with 6% worried in the leaflet group, and 26% worried in the control group ($p<0.05$). In both diagnostic and known malignancy populations, there was a statistically significant difference between the leaflet and control group in terms of whether the scan differed from what they expected, with higher percentages seen in the control group (diagnostic patients; leaflet 16, no leaflet 55, $p<0.001$, known malignancy patients; leaflet 0, no leaflet 54, $p<0.001$). The final statistically significant difference between the leaflet and control groups was in reply to the question if they would like further information, with a higher percentage saying they would like further information in the control group in both
those with known malignancies or those who received diagnostic scans (diagnostic patients; leaflet 1, no leaflet 47, p<0.001, known malignancy patients; leaflet 0, no leaflet 46, p<0.001). There were no statistically significant differences between the groups regarding worry about the results of the scan. The authors conclude that a simple information leaflet can reduce misconceptions regarding CT, their need for further information and reduce patient’s worries about the scan, but not the results.
CHAPTER 5 – QUANTITATIVE REVIEW DISCUSSION, CONCLUSION AND RECOMMENDATIONS

‘However beautiful the strategy, you should occasionally look at the results.’ Winston Churchill

CHAPTER OVERVIEW
This review sought to synthesise the best available evidence regarding interventions to reduce claustrophobia, anxiety, distress and fear during high technology medical imaging. During the search and retrieval process, 38 studies were identified that met the inclusion criteria and were considered to be of suitable methodological quality. The number of studies identified in this area is promising, as it shows the importance that radiographers and researchers alike are putting on improving the scanning experience.

DISCUSSION
The vast majority of the studies included in this review assessed interventions for use during MRI, with 29 studies carried out in this area, 8 in nuclear medicine and 1 for computed tomography. This may be due to the design of traditional MRI machines which have been known to induce claustrophobia and anxiety reactions.\textsuperscript{24,44} It was pleasantly surprising to find 8 studies conducted in nuclear medicine and PET, as a qualitative systematic review found no studies for these modalities.\textsuperscript{30} Conversely, the lack of studies identified for CT interventions, which has also been shown to induce anxiety and claustrophobia,\textsuperscript{30} was disappointing, and is an area that requires further research.

The methodological quality of the studies varied; however, all the studies included had at a minimum a comparative data group. Of the final 38 studies, 21 were randomised or pseudo-randomised controlled trials, whilst 17 were quasi-experimental studies with a control or comparison group. As randomised controlled trials are the ideal design to determine effectiveness,\textsuperscript{27} identifying 21 to include in this review was deemed a good result. Although during critical appraisal none of the included studies scored a perfect result on the checklist criteria, this is to be expected due to the nature of the interventions studied, and the difficulty in blinding patients to these. At times, due to a lack of reporting, it was unclear if the studies met the critical appraisal criteria. One area not identified in the JBI critical appraisal checklists is sample size; this varied largely amongst the studies, with some having quite large sample sizes whilst others were much smaller. The largest study included had over 55,000 patients.
included, whilst many studies had sample sizes less than 50, with one study including only 20 participants.

This review is considered the first of its type in medical imaging. Although there have been other systematic reviews published in the field of medical imaging, none have specifically looked at interventions to reduce anxiety and claustrophobia and improve completion rates and satisfaction. Whilst searching, a literature review was identified, but this did not follow a systematic process and the information within it is now quite dated, as it was published in 1995. Systematic reviews are more appropriate than standard literature reviews for making recommendations for clinical practice, as they provide a comprehensive and unbiased summary of literature in one area, and include critical appraisal and methods to synthesise data from individual studies.

During medical imaging, patients may experience anxiety, fear and distress, but the extent to which these feelings are experienced can be difficult to measure, and the measurement of patient anxiety objectively is notoriously challenging. Currently, there are many scales that exist to measure these phenomena, of which many overlap. To measure pain, distress and anxiety, there are three approaches; self-report, observation (or behavioural) and physiological. State anxiety was a common outcome measured throughout the studies, normally by a version of the Spielberger State-Trait Anxiety Inventory, which is a widely used and validated tool. State anxiety can be defined as ‘a form of affective distress that is transient and stimulus specific’ (p.760) such as the anxiety that occurs upon an encounter with the MRI unit. On the STAI, a score of 40 or more indicates a high level of anxiety. Anxiety was also measured on visual analogue scales and others, such as the Hospital anxiety and depression scale. Only two studies assessed anxiety using a physiological measure (serum cortisol levels, pulse and blood pressure).

From the review, the following interventions were assessed for MRI; open MRI, newer MRI designs, dedicated low field MRI, quieter machines, mock MRI, psychological support, additional information, anxiety reduction protocols, team training, prone compared to supine positioning, AV systems, cognitive behavioural therapies including guided imagery and relaxation strategies, a photo diary and fragrance administration. Studies on play therapy, systemic de-sensitisation and hypnosis were also critically appraised but were excluded due to their low methodological quality. The majority of these interventions resulted in positive outcomes, including open MRI, newer MRI scanners, quieter machines, information in combination with psychological support or an anxiety reduction protocol, mock MRI, team training, prone scanning, AV systems, cognitive behavioural therapies, guided imagery and fragrance administration. Other strategies were not so effective, including a dedicated low field MRI scanner and a preparatory photo-
diary. The findings were mixed for providing additional information, with 2 studies finding positive benefits in terms of anxiety\textsuperscript{104, 109} whilst one did not.\textsuperscript{106}

Anxiety levels experienced in MRI may be related to a person’s constructive thinking.\textsuperscript{111} Individuals who have high levels of constructive thinking, when presented with a stressful situation, will react with ‘automatic thoughts that facilitate situational coping and result in positive affect (p.9).\textsuperscript{111}’ One study showed that those with low constructive thinking, defined as those who ‘experience automatic thoughts which augment their stressful experience (p.10),\textsuperscript{111} had higher levels of anxiety initially compared to high constructive thinkers. This finding may help inform why some people do suffer anxiety reactions whilst others don’t, and why interventions can have a wide range of effects. It may be that in some types of scans, there is increased risk of anxiety related events, such as in breast MRI.\textsuperscript{109} This may be due to patient’s having different preconceptions of the scan, perhaps expecting a scan more akin to mammography.\textsuperscript{109} In these cases, it is reasonable to think that inadequate preparation and information prior to a scan as well as worrying about the outcome, can lead to anxiety, which can be addressed by providing further information.\textsuperscript{109}

In breast MRI scans, the women undergoing scanning are positioned prone.\textsuperscript{116} This type of positioning has been found to reduce claustrophobia related terminations compared to supine positioning.\textsuperscript{116} In one study included in this review, prone positioning was compared to supine for pelvic examinations.\textsuperscript{98} However, as shown from another study in this review, pelvic examinations normally have a reduced rate of claustrophobic terminations, \textsuperscript{116} and therefore it may not be the most desirable study population to determine the effect of prone positioning on claustrophobic events. No studies were located which assessed the option of giving the patient a choice in what position they were to be imaged.

It has been stated that patients who are anxious, claustrophobic or panicked may be more likely to move during scans, resulting in motion artefacts.\textsuperscript{49} It was shown in the review that patients largely prefer open MRI to closed MRI systems.\textsuperscript{102, 119} As open MRI configurations increase comfort and reduce anxiety, it is likely that motion artefacts can be reduced with these systems.\textsuperscript{49} However, examination time can be up to twice as long in open systems, \textsuperscript{102} and these increased exam times in open-MRI may lead to increased scanning times,\textsuperscript{102} which could result in increased restlessness and therefore movement. In children, open MRI systems have the benefit of reducing sedation and general anaesthesia rates, particularly in children up to ten years of age, allowing reduction in adverse events from sedations.\textsuperscript{118} However, even when sedation is required, monitoring of the child or patient is simplified due to the design of open MRI systems.\textsuperscript{118} Interestingly, patient acceptance of open MRI machines was not replicated for a dedicated low field MRI scanner for the foot and ankle.\textsuperscript{112} This is likely due to the uncomfortable position required in the foot and ankle scanner studied.\textsuperscript{112} Newer shorter length, wide bore
scanners MRI machines also resulted in positive outcomes with a reduction in claustrophobic reactions which is likely due to their patient centred design, where there is more space between the patient and the bore walls, and a larger proportion of the patients body is outside the bore. These newer machines are normally quieter as well, and one small study noted that quieter machines were better received/accepted by patients. Therefore, these new scanners may be more economical than older scanners despite the cost to purchase them, as they reduce sedation rates and non-completions. However, they do not result in a total reduction of claustrophobic reactions, and head examinations may still seem particularly daunting for claustrophobic patients, even in more patient friendly designs.

A psychological support session lasting for 45 minutes was found to reduce anxiety after MRI slightly compared to a control group, but more substantial was the difference in depression between the two groups. Given that a 45 minute psychological support prior to MRI may not be feasible in many organisations but was shown to reduce depression, it may be useful to ensure patients can receive this but perhaps not during the imaging process. When changing a process in an imaging department, it can be expected that some staff may have concerns regarding new procedures, particularly if additional time is needed. However, the addition of an anxiety reduction protocol resulted in delays seldom occurring and the intervention was able to be implemented routinely. Team training interventions, which included rapport skills and hypnotic techniques, was found to be effective at reducing non-completion rates, which is likely to have a financial benefit to the department.

In the one trial assessing fragrance administration for anxiety during MRI, the authors used nasal cannulae and a computerised delivery system to administer the intervention, which may make this anxiety reducing measure impractical in real life settings. However, they noted that the above measures were put in place to ensure a controlled study design, and that in the non-experimental setting simpler methods could be employed.

In some organisations, sedation is routine for young children undergoing scanning, due to the difficulty in having them remain still during the scanning period. A number of the included studies for MRI in this review specifically addressed interventions for children. A small scale randomised controlled trial found that the use of a guided imagery audiotape was effective in reducing sedation for children aged between 4-8 years of age. Mock or simulation MRI has been found to be an effective way to prepare children for MRI examinations, and reduce the need for sedation. This may be a particularly important finding for functional MRI, where pharmacological agents may affect neuro-behavioural paradigms. For mock MRI, two studies were excluded, both due to the lack of a control group (Hallowell et al. 2008, De Amorim e Silva et al. 2006). However, both of these studies also reported that mock MRI is a safe and useful way to prepare children to undergo MRI without the need for sedation and general procedures.
anaesthesia. An AV system was found to be effective, although not so for all ages. It may be that children between the ages of 0-3 or 4 are not able to understand what is required of them whilst using the AV system, and hence still require sedation. At the other end of the spectrum, older children may comprehend the importance of keeping still for accurate diagnosis already, and therefore the AV system does not result in as large changes as seen for the younger children in the 3-4 to 10 age group.

In one MRI study, preparatory education in the form a photo diary did not result in decreased stress or anxiety prior to a scan for children undergoing MRI. When providing information in the form of a paediatric preparation booklet, there may be issues with compliance. In nuclear medicine, one study showed that of the parents who received a preparation booklet to show or read to their child, only 76% actually did. This may be a contributing cause to the fact there was no significant difference in patient anxiety between the two groups in one study. However, it does appear that these preparation booklets are well received, particularly by parents.

Despite the seeming growth in interest of environmental manipulation for children imaging environments, only one study in nuclear medicine was identified in this area. Further research is needed in this exciting area where imaging environments are specifically designed to make the scanning process less daunting and more exciting for children.

From the review, the following interventions were assessed for nuclear medicine and PET; information, patient positioning devices and a paediatric preparation booklet. Patient positioning devices and paediatric preparation booklets both resulted in positive outcomes, whilst the findings for providing additional information was mixed, with 2 studies finding it having a positive effect, one with no effect and one with possible detrimental effects. This may be due to the nature of the information provided in nuclear medicine. Whilst the additional information in the Leckie study appeared to be more reassuring, the information provided in Kaya et al. was more about adverse events and possible side effects. The decrease in anxiety that was seen may be due to a reduction in unpredictability, whilst the increases may be due to increased worry regarding adverse events. Decreases in anxiety due to additional information may also be due to addressing misconceptions regarding the scanning process, which can be common. In the study by Lledo et al. information was found to be effective, which may possibly be due to the display of images and providing information on the day of scanning.

Positioning devices have been shown to improve comfort with no detrimental effect on image quality, sometimes even improvement. However, some devices have been noted to result in longer positioning time, which in nuclear medicine scans, means a higher dose to technical staff. It may also have economic repercussions, as the scans take longer throughout the day, meaning fewer patients may be able to be imaged. However, if devices improve patient
compliance, any economic downfall from their use may be reduced. Patients did not always universally accept these devices as an improvement; in these cases, the patient may be offered the choice of a positioning device or none.

The identification of a single study related to Computed Tomography was not anticipated.\textsuperscript{115} This study, which assessed patient information, is now quite dated (1986) but remains the only one identified in this area of imaging. This may be due to the belief that CT is not as confronting for patients as MRI, PET or SPECT scans; however, this belief can be considered surprising as qualitative studies have found that CT can be intimidating or an unusual experience for patients.\textsuperscript{44} Further studies into interventions for computed tomography are therefore required.

In all four of the meta-analyses in this review, a random effects model was used. This was due to the significant heterogeneity which was identified between the studies. When heterogeneity occurs, random effects models are often used to analyse the data as they provide a more conservative estimate of the effect size, as the effect size is determined to be ‘random,’ or normally distributed, with both a mean and natural variance, rather than one true ‘fixed’ effect.\textsuperscript{27}

As a random effects model was used, DerSimonian and Laird methods were employed.\textsuperscript{27} Regrettably, meta-analysis could only be performed for two interventions; however, due to differences in study design, population and delivery of interventions, it was not appropriate to conduct further analyses for other interventions.

Other interventions were also highlighted during the search, although the studies were not included in the review due to their low methodological quality. Two studies\textsuperscript{134, 135} specifically looked at auditing to improve patient satisfaction. One study\textsuperscript{129} specifically looked at play therapy to assist children undergoing MRI imaging. Two studies\textsuperscript{131, 132} looked at the impact of hypnosis to improve patient tolerance of MRI. In both studies hypnosis was found to help facilitate MRI scans in claustrophobic patients. One study\textsuperscript{130} specifically looked at systemic desensitisation to assist patients undergoing MRI imaging.

\textit{Limitations of the review}

There are some potential limitations with this review. Although a thorough systematic search was conducted across multiple databases targeting both published and unpublished literature, it is possible that some articles may have been missed. Also, studies may have been conducted after the search and therefore have not been included. This may mean that as further studies are published in this area, an update of this review will be required. A further limitation is that only articles published in English were included. Systematic reviews are limited to the studies included in them; so as many of the studies included were not randomised controlled trials, confounders may be present.
CONCLUSION
This review identified 38 studies (29 MRI, 8 Nuclear Medicine and 1 CT) that assessed interventions to reduce anxiety, claustrophobia, sedation and non-completions and improve satisfaction for patients undergoing medical imaging. Open MRI, newer MRI scanners, quieter machines, information in combination with psychological support or an anxiety reduction protocol, mock MRI, team training, prone scanning, AV systems, cognitive behavioural therapies, guided imagery, fragrance administration, patient positioning devices and paediatric preparation booklets were all found to have some positive effect on at least one outcome, whilst the findings for additional information were mixed. A number of implications for practice and research were identified, and it is hoped that the findings of this review can now be utilised in practice.

IMPLICATIONS FOR PRACTICE
Open MRI systems may be of particular use in imaging select patient groups, such as children under ten years of age, women undergoing pelvimetry, and claustrophobic patients, to reduce the need for sedation, improve satisfaction and increase completion rates. (Grade B)

Newer, wider and shorter bore MRI systems which are quieter may be of particular use in imaging to reduce the need for sedation, reduce claustrophobic reactions and increase completion rates. (Grade A)

Mock or simulation scans may be considered for children between the ages of 3 and 10 years of age, to reduce the need for sedation during an MRI scan. (Grade B)

Team training of all staff working within an imaging department regarding rapport skills and hypnotic techniques may be effective at reducing non-completion rates. (Grade B)

Where feasible, the patient should be given the choice to be scanned either in the prone or supine position. (Grade B)

Where feasible, an audio-visual system for children older than 3 years of age undergoing MRI should be considered to reduce the need for sedation. (Grade B)

Where feasible, anxiety reduction protocols including a cognitive behavioural approach for patients undergoing MRI should be considered in both children and adults to reduce anxiety. This can incorporate elements of guided imagery, cognitive coping strategies, breathing techniques, additional information and relaxation therapy. (Grade B)

Administration of fragrances during MRI may be considered as a way to possibly reduce anxiety. (Grade B)
Information regarding the scan should be provided to patients prior to their scan. Whether verbal or written, it should be easy to comprehend and be in an understandable format. (Grade A)

Where feasible, children and their parents may be provided with a preparation booklet, written in simple language with illustrations and photos outlining their scanning process. (Grade B)

Environmental manipulation, by making imaging departments more child friendly, can be implemented as one way to reduce sedation rates and distress. (Grade B)

Information leaflets appear to be useful to reduce worries about CT scans, and can be recommended. (Grade B)

Healthcare professionals should be aware that there may be factors which contribute to increased anxiety during breast MRI, and therefore adopt a policy of providing simple but detailed information to these patients prior to their scan, along with support during the procedure. (Grade B)

**IMPLICATIONS FOR RESEARCH**

Further research studies, including large, rigorously conducted controlled trials, are required in normal adult populations to determine whether the benefits of open MRI systems in claustrophobic patients and children are reflected in the general population. (Grade B)

Further research studies, including large, rigorously conducted controlled trials, are required to determine the benefits of dedicated low field scanners compared to whole body systems empirically. (Grade B)

Further research studies, including large, rigorously conducted controlled trials, are required to determine the benefits of mock MRI compared to other interventions empirically. (Grade B)

Further research studies, including large, rigorously conducted controlled trials, are required to determine the benefits of team training including rapport skills and hypnotic techniques for patients undergoing MRI. (Grade B)

Further research studies, including large, rigorously conducted controlled trials, are required to determine the benefits of prone compared to supine positioning among different clinical groups in different scanning machines. Research into the effect of providing the choice of positioning is also required. (Grade B)

Further research studies, including large, rigorously conducted controlled trials, are required to determine the benefits of an audio-visual system children of all ages in terms of the effect on the need for sedation. (Grade B)
Further research studies, including large, rigorously conducted controlled trials, are required to determine the benefits of cognitive behavioural strategies in patients who identify as claustrophobic in terms of the effect on the need for sedation. (Grade B)

Further research studies, including large, rigorously conducted controlled trials, are required to determine the benefits of fragrance administration during MRI, particularly in a way that would be more feasible in practice. (Grade B)

Further research studies are required to determine the optimal means of information delivery for patients undergoing scans. These studies should address level of detail, presenting information (whether oral or written), when it should be delivered, and whether images should be included. (Grade B)

Further research studies, including large, rigorously conducted controlled trials, are required to determine the benefits of environmental manipulation for paediatric imaging departments. (Grade B)

Further research studies, including large, rigorously conducted controlled trials, are required to determine the benefits of interventions to reduce fear and anxiety in the area of computed tomography. (Grade B)
SECTION 2 – QUALITATIVE SYSTEMATIC REVIEW
CHAPTER 6 – QUALITATIVE SYSTEMATIC REVIEW METHODS

'It is increasingly acknowledged that the richness of qualitative evidence and process-related information provides credible, complementary material to address practice and policy-related questions.' Hannes and Lockwood 2011

CHAPTER OVERVIEW
No matter the type of evidence being included in a systematic review, the same series of overall steps for the conduct of the review does not differ. Qualitative reviews require an a priori protocol specifying the methods of the review. There was no known qualitative synthesis of the literature on the patient experience in medical imaging, therefore this systematic review aimed to identify and summarise the extant literature exploring the patient experience of diagnostic imaging.

PURPOSE
The purpose of this review was to critically appraise, synthesise and present the best available evidence exploring the patient experience of high technology medical imaging, to allow major themes and concepts regarding the patient experience to be identified.

The objective of this review was to identify and describe the experience, perception, and views of people undergoing diagnostic imaging with advanced imaging technologies, such as Magnetic Resonance Imaging, Computed Tomography, and Nuclear Medicine procedures.

INCLUSION CRITERIA
Types of studies
This review considered studies that reported qualitative data or included a qualitative aspect, including, but not limited to, designs such as phenomenology, grounded theory, ethnography, action research, qualitative descriptive studies, and feminist research. The search was limited to English language studies; however, there was no date restriction.

In the absence of research studies, other text such as opinion papers and reports were to be considered in a narrative summary, however this was unnecessary as sufficient research studies were identified.

Types of participants
This review included publications that included persons of any age who have undergone high technology medical imaging. These participants may have been receiving medical imaging for a wide range of indications, and may have had any pre-existing condition or disability.

*Phenomena of interest*

This review considered studies that investigated the patient experience of diagnostic imaging using high technology imaging, and the meaningfulness of that experience. All non-invasive or minimally invasive diagnostic imaging procedures were considered for this review. Interventional diagnostic procedures were not included, as the patient experience of these procedures may be considerably different due to their invasive nature.

Originally a search for the patient experience of all diagnostic imaging procedures was performed; however, due to the large amount of retrieved literature, it was deemed appropriate to focus the review on only high technology imaging.

**SEARCH STRATEGY**

The search strategy aimed to find both published and unpublished studies, and was conducted over a period between June – September 2010. No time limits were imposed on the search strategy, however the search was restricted to English language studies. A three-step search strategy was utilised in this review. An initial limited search of MEDLINE and CINAHL was undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe the article. A second search using all identified keywords and index terms was then undertaken across all included databases (Appendix 6). Thirdly, the reference list of all identified reports and articles were searched for additional studies.

The databases searched included:

- Medline
- CINHAL
- AMED
- Ingenta Connect
- Embase
- PsychINFO
- Sociological Abstracts
- Web of Science
- SCOPUS

The search for unpublished studies included:

- Mednar
INTUTE • GOOGLE SCHOLAR • CURRENT CONTENTS • DISSERTATION ABSTRACTS (DIGITAL DISSERTATIONS)

**METHODS**

*Critical appraisal*

All studies that met the criteria were selected for retrieval. They were then assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardised critical appraisal instruments from the Joanna Briggs Institute Qualitative Assessment and Review Instrument (JBI-QARI) (Appendix 7). This enabled the reviewers to determine which studies were of suitable methodological rigour to be included in the review. No disagreements arose between the reviewers, and therefore there was no need for the involvement of a third reviewer.

There is considerable debate and differing opinions about the critical appraisal, or evaluation of the methodological quality of qualitative studies. There are also different methods that exist for the synthesis of qualitative findings, some of which require critical appraisal, whilst others do not. However, within the approach outlined by the Joanna Briggs Institute, appraisal is regarded as a pivotal part of the qualitative systematic review process in order to inform reviewers of which studies to include and to establish the quality and congruency of findings in included studies that may be used to inform healthcare practice.

*Data extraction*

Data was extracted from papers included in the review using the standardised data extraction tool from the Joanna Briggs Institute Qualitative Assessment and Review Instrument JBI-QARI (Appendix 8).

The data extracted included specific details about the populations, imaging modality, setting, study methods and phenomena of interest relevant to the review question and specific objectives.

*Data synthesis*

Research findings were pooled using the Qualitative Assessment and Review Instrument (JBI-QARI). This involved the aggregation or synthesis of findings to generate a set of statements that represent that aggregation, through assembling the findings (Level 1 findings) rated according to their quality, and categorising these findings on the basis of similarity in meaning (Level 2 findings). These categories were then subjected to a meta-synthesis in order to produce a single comprehensive set of synthesised findings (Level 3 findings) that can be used as a basis for
evidence-based practice. The findings were pooled across the modalities to generate the categories and synthesised findings where appropriate. If the findings across the modalities were unique to their modality and could not be combined with similar findings from other modalities, they were not too have been grouped together.

Included papers were read and re-read multiple times closely before findings were extracted. Supporting text for each finding was also extracted, and each finding was assigned a level of credibility according to the QARI analytical module. These levels are:

Unequivocal (U) – relates to evidence beyond reasonable doubt which may include findings that are matter of fact, directly reported/observed and not open to challenge.

Credible (C) – those that are, albeit interpretations, plausible in light of data and theoretical framework. They can be logically inferred from the data. Because the findings are interpretive they can be challenged.

Not Supported (NS) – when 1 nor 2 apply and when most notably findings are not supported by the data.
CHAPTER 7 – QUALITATIVE REVIEW RESULTS

'I didn't want to open my eyes it felt as if I was trapped inside a coffin'

MRI Patient (Murphy15)

CHAPTER OVERVIEW
Qualitative systematic reviews with meta-synthesis provide a unique perspective on how patients experience healthcare and demonstrate the wide variation in this experience. For this qualitative systematic review, 15 studies were included, all of which were read for findings before being synthesised to produce a set of statements that can be used to inform healthcare practice.

SEARCHING
Following the systematic search, 5152 studies (disregarding duplicates) were identified as potentially meeting the inclusion criteria. This was reduced following review of the title to 665 studies. Following an in depth review of the title and abstract, 40 full text papers were retrieved. After reading the full text, 17 articles were deemed to have met the inclusion criteria. From the reference lists of these studies, 2 more papers were identified which met the inclusion criteria. All 19 articles were then reviewed by the primary and secondary reviewer, and following critical appraisal, 15 studies were deemed to meet the inclusion criteria and to be of sufficient quality to be included in the review. The four studies excluded following critical appraisal, and the reasons for exclusion, are outlined in Appendix 9.
DESCRIPTION OF INCLUDED STUDIES
Although all of the 15 studies involved a qualitative component, they were of varying study design and quality. The 4 excluded studies were either not truly qualitative in nature, were deemed to be of poor quality based on the results of the critical appraisal, or did not address the phenomenon of interest. All of the included studies were deemed of sufficient methodological quality, according to the QARI critical appraisal tool, although some were of higher quality than others. However, the quality differed significantly between the included studies, with the studies that were of the highest quality stating a specific methodological approach. The 15 studies were comprised of 8 various descriptive qualitative approaches with no explicit stated methodology\textsuperscript{10, 140-146}, three phenomenological studies\textsuperscript{39, 147, 148}, two mixed methods studies (of both quantitative and qualitative design)\textsuperscript{149, 150}, one grounded theory\textsuperscript{15} and one dramaturgical study.\textsuperscript{29} Out of the included studies, 9 focused on MRI, 4 included both MRI and CT, and 2 focused on CT.
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Methods/analysis</th>
<th>Participants</th>
<th>Modality</th>
<th>Phenomena of interest</th>
</tr>
</thead>
</table>
| Boljeko et al. (2008) | Qualitative study      | Semi structured interview Analysed according to a template analysis Consistent with themes specified in interview guide | 10 adult patients    | MRI      | 1. Patient’s experiences of MRI  
2. Assess the value of written information  
3. Evaluate patient’s perceptions of the information booklet |
| Cooke et al (2007)    | Qualitative study      | Questionnaire and Semi-structured interview Thematic analysis                     | 44 had a questionnaire, 10 interviews | fMRI and MEG | Participant’s experiences of taking part in research conducted using fMRI or MEG |
| Davies et al. (2004)  | Phenomenology          | Semi structured interviews, thematic analysis                                      | 6 deaf patients, 4 radiographers | Imaging department (CT and MRI) | 1. Experience of deaf patients in a diagnostic imaging department,  
2. Radiographer’s perceptions |
| Laidlaw & Henwood (2003) | Qualitative design   | Unstructured interviews, Open thematic coding                                    | 8 adults with MS     | MRI      | Patients with MS holistic experience of MRI                                          |
| Leithner et al. (2009) | Qualitative design     | Semi-structured interviews pre and post scan Qualitative content analysis         | 62 pregnant women    | MRI      | Perception of foetal magnetic resonance imaging                                      |
| Murphy (2001)         | Qualitative study      | Semi-structured interviews, iterative mode of analysis                            | 19 MRI, 21 CT        | MRI and CT | Patient’s beliefs and knowledge of imaging procedures (MRI or CT)                    |
| Murphy (2001)         | Grounded theory, Symbolic interactionism | Semi-structured interviews Coding, structuring and linking concepts to develop theories, Continuous interplay between analysis and data collection | 13 CT, 13 MRI        | MRI and CT | Patient experience when undergoing a high technology radiological investigation |
| Murphy (2009)         | Dramaturgical analysis | Radiographers and patients interviewed about their role in the MRI scanning Rigour maintained through reflexivity and reflection Thematic analysis as described by Burnard | 22 patients, 8 radiographers | MRI      | Practice and behaviour within the context of magnetic resonance imaging departments |
| Quirk et al. (1989)   | Mixed methods          | Structured interviews, anxiety inventories, quantitative data analysed with t test qualitative used a form of thematic analysis | 46 participants, 26 who had interviews | MRI      | The major sources of anxiety for patients undergoing MRI                             |
| Rhodes et al. (1999)  | Qualitative study      | Semi-structured interviews, thematic                                              | 54 participants      | All diagnosti | The meaning of diagnostic tests for |

Table 5: Table of Included Studies
From the 15 included studies, 127 findings were extracted. These are listed below.

**Paper 1: Meeting patient information needs before magnetic resonance imaging: development and evaluation of an information booklet.**

This study by Boljeko et al. (2008) aimed to assess the value of a patient information book for patients undergoing MRI scanning through qualitative interviews. In addition, the interviews aimed to discover the patient experience of MRI imaging and the perception of the booklet. The sample consisted of 10 adult patients.

Finding 1: Overall positive experience (C)

Illustration 'a minority of patients (3/10) expressed an overall positive experience of the MRI procedure' (p. 98)
Paper 2: The neuroimaging research process from the participants’ perspective.141

This paper by Cooke et al (2007)141 aimed to investigate the experiences of persons undergoing research with functional MRI or magnetoencephalography (MEG). The information was gathered through a questionnaire and a semi-structured interview, and analysed with thematic analysis. Only the data looking at fMRI was included in this review. There were 21 questionnaires and 10 interviews relating to fMRI.

Finding 1: Comfortable experience (U)
Illustration 'participants reported feeling at ease in the scanning situation and were confident researchers knew what they were doing'

'surprisingly relaxing' (p. 154)

Finding 2: Positive experience (U)

Illustration 'exciting' (p. 154)

'Quite enjoyable' (p. 154)

Finding 3: Viewing the brain (U)

Illustration 'it [fMRI] was quite enjoyable to take part in, especially afterwards being able to see like your own brain, it's quite good to see' (p. 154)

'fascinated to see what it looks like' (p. 155)

'really looking forward to seeing my brain' (p. 155)

Finding 4: Risking the brain (U)

Illustration 'you have to think of the ethical... repercussions of what would happen if you gave somebody a picture of their brain and then they later found out, because you had contacted their GP [general practitioner] that there was actually a problem with them, take for instance a tumour or something... If that was me who'd been led down the garden path "oh this is a picture of your brain doesn't it look great" only to find three weeks later that I've got a letter from my GP saying... "we think you've got a problem"... I certainly wouldn't like it to happen to me' (p. 155)

'What if they find something that they have to disclose to you, no that didn't really enter my head, because I - well it did sort of enter my head' (p. 155)

'I mentioned it to sort of friends and family, you know go home “ooh I had my head scanned today” [laughs] my husband was a bit worried he said “what did you have that done for?” he thought there was something wrong [laughs]' (p. 155)

Finding 5: Imaging for research is not as imposing as for medical reasons (U)

Illustration 'the thing is it's much more reassuring when you're not having it done for medical reasons' (p. 155)

'in terms of doing an experiment there's no stigma attached to that. It's not like you would say "I've had an MRI scan" and people would go "Oh you must have a disease or something"' (p. 155)
This paper by Davies et al. (2004) aimed to explore the experience of deaf patients undergoing imaging in an imaging department, as well as radiographer's perceptions of deaf patients. A phenomenological design was used, with data being collected through semi-structured interviews and analysis via thematic analysis. Only data relevant to high technology imaging was extracted. There were 10 deaf participants in the study, along with 4 radiographers.

Finding 1: Difficulties from the start (U)
Illustration 'the reception area is more of a problem than the actual radiographers' (p. 101)

Finding 2: Awful experience during MRI scan (U)
Illustration 'it was just horrendous, absolutely awful, it haunts me to this this day when I think about it' (p. 104)

Finding 3: Unpleasant noise (U)
Illustration 'all I could hear was this thudding of the machine, and with my tinnitus it was just a complete nightmare' (p. 104)

Finding 4: Staff are unhelpful (U)
Illustration 'very cold, very matter of fact... I didn't like their attitude' (p. 104)

Finding 5: Want for information (U)
Illustration 'it would have been nice to have known before I got there that I might have to have an injection, that I might have to have a cage put on my head and that my head would be pinned down...I think if I'd been more aware, then I would have been able to cope with it better' (p. 104)

Finding 6: Difficulty understanding radiographer instructions (C)
Illustration 'Deaf respondents considered that breathing instructions during CT scans were also problematic' (p. 104)

'Patients were required to remove their hearing aids prior to entering the scanner and were thus unable to hear instructions or reassurance. They reported that this was very stressful and added to distress they already felt' (p. 104)

Finding 7: Need for escape (U)
Illustration 'and I just went into overdrive, panicked and tried to get myself out of there' (p. 104)
This study by Laidlaw and Henwood (2003) aimed to investigate the holistic experience of MRI imaging, in patients with multiple sclerosis. A qualitative design was used, and data was collected through unstructured interviews and analysis through thematic coding. The sample consisted of 8 adults with multiple sclerosis who had underwent an MRI scan.

Finding 1: Lack of information provision has a negative effect on the scan experience (C).

Illustration 'All interviewees felt they should have received some prior information about MRI scanning' (p. 22)

Finding 2: The scan experience improves with subsequent scans (U).

Illustration 'Now I have got through one scan, I know what to expect' (p. 22)

Finding 3: Overload of information and consent forms (U).

Illustration 'I had enough to think about without the added pressure of having to read and understand information just prior to the scan' (p. 22)

Finding 4: Radiographic staff not providing sufficient information and rushing (C).

Illustration 'Ann felt she was being rushed, had been given little or no information and was treated badly.' (p. 22)

Finding 5: Wanting to see the images following scanning (C).

Illustration 'Nancy and Mary however asked to see the scan and found it helpful.' (p. 22)

Finding 6: Not wanting to see images following scanning (C).

Illustration 'Four interviewees did not want to see the images. Ann commented that the shock of the diagnosis of MS was enough to cope with' (p. 22)

Finding 7: Patient's want information prior to their scan (C).

Illustration 'Patients actively sought information because of feeling anxious in order to regain control, which increased their overall experience.' (p. 22)

Finding 8: Negative first impressions of the scanner (U).

Illustration 'How will I fit into that?' (p. 22)

'It's like a hole in the wall, I will never fit' (p. 22)

Finding 9: Claustrophobia during the scan (U).
Illustration 'it was like being placed in a box and someone putting the lid on' (p. 22)

'It's like being entombed or buried alive' (p. 22)

'How the hell do I get out of here?' (p. 23)

Finding 10: The need to persist despite fear (C)

Illustration 'the pressure of wanting a diagnosis gave Louise the courage to persist, despite this extreme reaction' (p. 23)

'All interviewees reported that the noise of the scanner was a shock, but again the desire for a diagnosis helped patients tolerate the discomfort' (p. 23)

Finding 11: The noise was a shock (C)

Illustration ‘All interviewees reported that the noise of the scanner was a shock, but again the desire for a diagnosis helped patients tolerate the discomfort’ (p. 23)

Finding 12: Deliberately withholding important information due to the need for a diagnosis (U)

Illustration 'I worked with welding equipment and regularly had metal fragments in my eye. I also knew that the scan could cause the metal fragments to move, but if the scan was the only way of finding out my diagnosis, I was prepared to take the chance.' (p. 23)

Finding 13: Feeling of no control (C)

Illustration 'the scanning environment was one major area where interviewees felt that they were not "in control"' (p. 23)

Finding 14: Taking control of their scanning experience using visualisation techniques (C)

Illustration 'At least two of the interviewees used a visualisation technique to imagine they were somewhere else in order to regain the feeling of being in control' (p. 23)

**Paper 5: Prenatal magnetic resonance imaging: Towards optimized patient information.**

This study by Leithner et al. (2009) aimed to determine the perception of foetal MRI in pregnant women with a suspected abnormality. The design was qualitative, and data was collected via semi-structured interviews. The data was analysed via qualitative content analysis. The study consisted of 62 pregnant women.

Finding 1: Easy to tolerate (C)

Illustration 'Thirty-nine (62.9%) women reported that fetal MRI was easy to tolerate' (p. 184)
Finding 2: Strenuous and distressing experience (C)

Illustration '16 (25.8%) women experienced the examination as strenuous' (p. 184)

'Regarding distressing conditions during MRI, the investigated women mentioned the following: the body position during MRI (n = 20, 32.3%); not being allowed to move (n = 14, 22.6%); the high temperature (n = 21, 33.9%); the breathing commands (n = 10, 16.6%); the noise level (n = 22, 35.5%); nothing (n = 7, 11.3%).' (p. 184)

Finding 3: Use of coping strategies (C)

Illustration 'With regard to coping with these anxious feelings, 28 (45.2%) women indicated that they calmed themselves during the scan by distraction or by thinking "agreeable" thoughts, 10 (16.1%) stated that anxiety decreased spontaneously during the examination, two (3.2%) mentioned the received sedative medication as very helpful in coping with anxiety and seven (11.3%) indicated that their anxious feelings were focused on their baby's well-being.' (p. 184)

Finding 4: Perception of the baby during imaging (C)

Illustration 'Fifty-five (88.7%) women made explicit comments on their perceptions of their baby during scanning and seven (11.3%) did not comment. From the comments, 11 (17.7%) perceived their baby as being calm during fetal MRI, whereas 44 (71%) women felt their baby was agitated. The experience of fetal MRI for the baby was stated as agreeable and good by 13 (20.9%) women and as disagreeable and not good for the baby by 16 (25.8%) patients.' (p. 185)

Paper 6: Lay beliefs and knowledge of medical imaging procedures

This study by Murphy (2001) aimed to assess patients' beliefs and knowledge of MRI and CT scans. Semi-structured interviews taking place immediately after imaging were used to collect data. An iterative mode of analysis was used. The sample consisted of 40 adults, 19 who underwent MRI, and 21 who had a CT scan.

Finding 1: False assumptions/misunderstandings about their scan (U)

Illustration 'the most common belief was that patients were going to have an MR scan be subjected to the additional problems that this presents' (for CT patients) (p. 12)

'I was dreading it in case I was shut in, I had to shut my eyes' (CT patient) (p. 12)

'I thought I was coming for an ordinary x-ray, I didn't know it was anything like this, especially the noise part of it' (MRI patient) (p. 12)

'I thought it was like the scan you have when you have a baby' (MRI patient) (p. 13)
Finding 2: Preconceived expectations from other sources (family members/friends, media) (U)

Illustration 'I was scared some people said it was a big thing, you know people who have had one before, they said it was claustrophobic' (CT patient) (p. 12)

'I thought it was an MR scan. I saw one on casualty and I thought oh! But it wasn't, it was fascinating actually'

'well, I've seen the photographs of the 'tunnel' where I was expecting to be' (CT patient) (p. 12)

'My sister in law said that she would never have another one...and my friend's husband had to be sedated to have his, so I was terrified before I even went along today' (MRI patient) (p. 13)

Finding 3: Desire not to know about the procedure (U)

Illustration 'I accept it for what it does...to know the in's an out's of the thing...I just let you lot (radiographers) get on with your work.' (CT patient) (p. 12)

Finding 4: Not as bad as expected (U)

Illustration 'It was nothing compared to what I thought it might be' (MRI patient) (p. 13)

**Paper 7: Understanding the humanistic interaction with medical imaging technology.**

This grounded theory study by Murphy (2001) aimed to gain an understanding of the experience of high technology (MRI and CT) imaging. Semi-structured interviews were used to collect data, with data analysis being done with coding and identifying emerging themes. The sample consisted of 13 people who underwent CT scanning, and 13 who had an MRI.

Finding 1: Imaging is a positive experience (CT and MRI) (U)

Illustration 'the girls (radiographers) were lovely. It didn't worry me at all, I wasn't frightened, it was very pleasant to be honest' (CT patient) (p. 197)

'It calmed me down in a funny sort of way and you could feel it [gradient coils] thumping away, it was like having a massage.' (MRI patient) (p. 198)

Finding 2: Radiological staff are very supportive (U)

Illustration 'the girls (radiographers) were lovely. It didn’t worry me at all, I wasn’t frightened, it was very pleasant to be honest' (p. 197)
'The nurses, or whoever they were, they were absolutely smashing, they came over as very caring, very concerned. . . I mean I know it is their job to be caring, but they actually sounded very concerned and were really nice.' (p. 197)

'The staff were great and put me at ease.' (p. 198)

Finding 3: Fear during CT scans (U)

Illustration 'It was sheer panic when that thing goes around and they [radiographers] tell you to close your eyes, I looked up and saw that thing [X-ray tube] going around me. I was expecting that thing [X-ray tube] to come . . . well you know, down on top of me, I really thought it was going to hit my head.' (CT patient) (p. 197)

'I could have had a heart attack in there I was so frightened.' (CT patient) (p. 197)

Finding 4: Claustrophobia during imaging (U)

Illustration 'Well literally my nose was touching the roof and I didn't like it.' (MRI patient) (p. 197)

'I felt trapped really, you can't breathe because you feel as if you haven't a lot of air circulating around you.' (MRI patient) (p. 196)

'It was frightening, it worried me, . . . if they had made it bigger or wider.' (CT patient) (p. 199)

'I am a bit claustrophobic, you see I assumed that you laid on the bed and a ring about that wide [demonstrates a large circle with arms] passes over you, well that was entirely different.' (CT patient) (p. 199)

Finding 5: Provision of information is important (U)

Illustration 'I got more (information) when I was actually in the department here, which I think is much more appropriate.' (p. 197)

Finding 6: Previous experiences affect current scan expectations (U)

Illustration 'I was virtually completely enclosed for the first scan, (very concerned expression) I just imagined that this would be the same.' (MRI patient) (p. 197)

Finding 7: Confusion differing between imaging technology (U)

Illustration 'I wasn't looking forward to that long tunnel but the staff nurse drew a rough picture in the air of a round circle [polo mint] and said it was the "other" scan.' (p. 198)

'I was expecting a scan like my husband's but I was told by one of the nurses that it was more like a "polo mint scan" rather than a complete scan like MRI.' (CT patient) (p. 198)
Finding 8: An alien experience (U)

Illustration 'one patient referred to the MRI scanner as "stargate" (a tunnel into another dimension in space)' (MRI patient) (p. 198)

Finding 9: Feeling trapped or buried alive (U)

Illustration 'I didn't want to open my eyes it felt as if I was trapped inside a coffin.' (MRI patient) (p. 198)

Finding 10: Concern for others who need to have a scan (U)

Illustration 'I don't know how you would manage with guys any bigger than me in there.' (MRI patient) (p. 198)

'I actually said to the nurse [radiographer], do people go in here [MRI scanner] head first? Because ehm. I would really feel claustrophobic.' (p. 198)

'It didn't bother me in the least, but to other people it could be very daunting, very daunting it's just so close to you.' (MRI patient) (p. 198)

Finding 11: Need for information (C)

Illustration 'Recommendations made were useful, with the most common request being to have someone to sit and explain the procedure before the examination or to be shown around the equipment.' (p. 198)

Finding 12: Misinformation prior to the scan from friends and family (U)

Illustration 'Different ones say you can feel the "roller" [not explained] and you can feel this and that.' (MRI patient) (p. 200)

Patient told: 'Oh you'll know when you've been in one of them.' (MRI patient) (p. 200)

Finding 13: The need to remain masculine (U)

Illustration 'Some male patients have come out of the examination, both in CT and MR, sweating profusely and visibly shaken by the whole experience, but remarkably when questioned have made a typical comment such as MRMALE1..."Yes it was okay."...Later said: 'I saw the machine, but I wasn't worried you know, well not until I got trapped, that's when I worried. I began to think this is "bloody dire", I feel like a cork in the neck of a bottle, if anything goes wrong here, I am stuck.'...One patient told of the male friend who had an MR scan previously: 'He said he went in straight away (with no problems) being so butch (6' 4'"), then when he went outside with my husband, she (his wife) said don't believe him it took him six times.' (MRI patient) (p. 200)
**Paper 8: Act, scene, agency: The drama of medical imaging**

This dramaturgical study by Murphy (2009) aimed to discover practice and behaviour of MRI departments. Interviews were used to collect data, and data analysis was done by dramaturgical thematic analysis. The sample consisted of 22 patients and 8 radiographers.

Finding 1: Staff are highly professional (C)

Illustration 'the vast majority of patients recognised the high professional standards that were evident in the MR room' (p. 37)

Finding 2: Using strategies to cope with imaging (C)

Illustration 'patients spoke of the deliberate use of coping strategies such as closing of eyes, counting, and singing' (p. 37)

Finding 3: Hit and run healthcare professionals (U)

Illustration 'they greet you, you get ready, you go into the room and they are gone' (p. 37)

'not having the time to engage in any social interaction was a problem frequently mentioned by radiographers and patients alike' (p. 38)

Finding 4: The unspoken desire for help (U)

Illustration 'I looked for the radiographers this time since I could see them in the mirror...I think I might have done it for a reason actually...I was kind of hoping that she would get up, and then I thought if she gets up she will be coming to get me out' (p. 38)

Finding 5: Reluctance to directly ask for assistance for fear of being embarrassed or ruining the scan (U)

Illustration 'the use of the emergency button may have negated the need for many response cries but interestingly it was rarely used. Many felt reluctant to use it claiming that they felt embarrassed or silly and did not want to spoil the examination' (p. 38)

**Paper 9: Anxiety in patients undergoing MR imaging**

This mixed methods paper by Quirk et al. (1989) aimed to determine the major sources of anxiety in patients undergoing MRI. The authors used 20 anxiety inventories and performed 26 structured interviews to collect data. Data analysis was performed by two judges who identified themes. The themes were then applied to the dataset and statements that supported the themes extracted.
Finding 1: Slight claustrophobia and anxiety related to spatial constriction (U)

Illustration 'At first I was a little nervous because it was so confining. I felt a bit claustrophobic, which I'm not usually' (p. 464)

'when they first started to put me back in, I got slightly claustrophobic because I had pictured it with more space between myself and the tube. When [the technologist] shut the door...it just got really warm. Just that type of claustrophobic sensation' (p. 464)

Finding 2: Severe claustrophobia and anxiety related to spatial constriction (U)

Illustration 'After about maybe 10 minutes, I got claustrophobic and my heart was pounding in my throat. It was very rapid. I got frightened...I'm a very small person and I could hear the heart way down into my stomach, a real pounding. My mind was going a mile a minute and I couldn't breathe.' (p. 464)

'I kind of panicked at first. They said I was breathing kind of heavy and swallowing too much' (p. 464)

'My heart was palpitating and I was just sweating. Absolute panic, pure panic' (p. 464)

'like being in a tomb' (p. 464)

'I looked at myself in the mirror over your head, and I said, "oh my God, I look like I'm in a coffin"' (p. 464)

Finding 3: Not knowing what to expect and being unprepared for the test (U)

Illustration 'my neurologist told me nothing, absolutely nothing, about what this would be like. I had no idea!' (p. 464)

'He [the subject's physician] told me that it would be painless and that it was noninvasive. But that's it. He didn't prepare me for this!' (p. 464)

'My doctor told me it was like a CT scan, so I thought it would be like a 10, 15 minute shot!' (p. 464)

Finding 4: A feeling of being buried alive (U)

Illustration 'like being in a tomb' (p. 464)

'I looked at myself in the mirror over your head, and I said, "oh my God, I look like I'm in a coffin"' (p. 464)

'when you're in there, it feels like an eternity' (p. 464)
Finding 5: The noise is disconcerting (C)

Illustration 'patients thought the noise of the MR imaging examination was so disconcerting that they ought to have been either insulated from or forewarned about it. Patients described the sound as a banging or like the noise of a jack hammer or pneumatic drill' (p. 464)

Finding 6: Uncomfortable temperature during the scan (U)

Illustration 'you're better off without that fan in there. It's just pushing heat on you...like a hot vent.' (p. 465)

'It just got really warm. You just feel like you're in a rocket thing! It's awfully hot in there' (p. 465)

Finding 7: Using strategies to cope (U)

Illustration 'I just thought of myself going to Hawaii' (p. 465)

'I thought of myself being at the beach. I imagined walking along the beach and I could hear the sound of the waves and I tried to imagine the sea breeze. So that sort of helped.' (p. 465)

Referring to blinding... 'I tell ya, it worked perfectly. First, they put me in and I panicked, you know...but then, one of the girls gave me a cold compress, you know, a damp cloth, and put it over my eyes and they put me back in and I was fine.' (p. 465)

'I had biofeedback so I tried to do some breathing exercises. I took a couple of deep breaths [before the examination] and let everything go.' (p. 465)

'I just took a few deep breaths before they put me in so that my breathing would be very slow, very relaxed and steady once I got inside' (p. 465)

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**Paper 10: The power of the visible: the meaning of diagnostic tests in chronic back pain**

This paper by Rhodes et al. (1999) aimed to explore the meaning of diagnostic tests for people with chronic back pain. Semi-structured interviews were used to collect data, and thematic analysis used to analyse the information. There were 54 participants in the study. Only information relating to MRI or CT scans was included in this review.

Finding 1: Legitimising symptoms (U)

Illustration 'they ran some tests and that's when they realized my whole spinal column was kitty catty womper' (p. 1194)
'I felt relieved. I felt like, well, here's proof. It's not just me going crazy or complaining. It's black and white and anybody can see it.' (p. 1194)

Finding 2: De-legitimising an injury (U)

Illustration 'I'm sure he thought that there was something wrong with the spine but nothing really serious. And they had done a CT scan which had turned up nothing. And they had done a normal x-ray which turned up nothing...And he kept telling me, we're just not finding anything.' (p. 1195)

'And then you've got the doctors for four years telling you, "well, we can't find anything wrong. It's all in your head." And you're going, no, it's right here. My head ain't down here.' (p. 1196)

Finding 3: Making the problem real (U)

Illustration 'the first CT scan (was) almost two years ago and that's when it was really concrete. It came back, yeh, it's just a bulging disc...degenerative disc disease. So that's when it was more of a reality and it's like, see, I told you. But you know it was solid proof, it wasn't just aches and pains anymore.' (p. 1194)

'...but if someone is truly in pain, the MRI is the only thing that is going to tell them what's wrong, where the root of the problem is.' (p. 1194)

**Paper 11: Ethical issues in neuroimaging research: An IPA study with research participants**

This phenomenological study by Shaw et al. (2008) aimed to discover how individuals made sense of their MRI brain scan experience, and from that identify any ethical issues for neuroimaging practices. Semi-structured interviews were used to collect data, with interpretive phenomenological analysis used to analyse the data. The sample consisted of 7 female volunteers.

Finding 1: Anticipating the MRI experience (U)

Illustration 'some participants were eager for a novel experience but sometimes this excitement was mixed with nerves' (p. 1054)

'I suppose I'm feeling quite nervous because I don't know what to expect but on the other hand I'm quite excited because I've never seen one of these scanners so it's quite exciting in that aspect, but yea I'll be fine. I'm happy with it' (p. 1054)

'I am a little bit worried because I don't know whether I'd like panic when I was inside or something' (p. 1054)

Finding 2: Eager to view images of themselves (U)
Illustration 'I'm just interested in finding out what my brain looks like and stuff like that, so I'm more interested and sort of curious' (p. 1054)

Finding 3: Expectations of a diagnosis/clean bill of health (U)

Illustration 'I'm not so [nervous], I think I might be a bit, not now but in my post scan [interview] I might be if I hear them whispering "oh there's something wrong there" or something like that [laughs]. Then I might be but other than that no I'm not' (p. 1054)

'I was a bit nervous because I said "if you find anything abnormal you have to tell me" and I was a bit nervous in case they said, in case like they found anything' (p. 1054)

Finding 4: Inner frustration due to inability to complete the scan (U)

Illustration 'I got so frustrated with myself 'cause I couldn't do it and I'd let people down which made it even worse' (p. 1055)

Finding 5: Submitting to a medicalised context (U)

Illustration 'it portrays the image of you going into hospital and going into the scan to see if something is wrong with you' (p. 1055)

'It was a little strange, it's a bit like being at the dentist when you're, you're in the same sort of, although you're lying down it's like being in a [dentist's] chair. You're just stuck there' (p. 1055)

Finding 6: Uncontrollable need to escape (U)

Illustration 'but then I just physically could not have got back into that thing. It's just I can't explain it the fact that, it's just that thing that holds your head in. I think if you didn't have that it wouldn't be so bad. Because then you've got the feeling that you can move.' (p. 1055)

Finding 7: MRI scanning as a bodily encounter (U)

Illustration 'I didn't actually know anything. I just didn't know what to expect actually being in there. That was all really. I think if I'd done it loads of times before then I wouldn't have felt that, but you know.' (p. 1056)

'Much of what participants said illustrates their difficulty in forming tangible expectations of what would happen in such a novel encounter' (p. 1056)

'This represents the embodied nature of self; participants need (as far as possible) a bodily (sensual) experience in order to understand and therefore be prepared for a physical procedure' (p. 1056)
**Paper 12: Surveillance CT scans are a source of anxiety and fear of recurrence in long-term lymphoma survivors.**

This mixed methods paper by Thompson et al. (2010) investigated the anxiety and psychological impact caused by routine CT surveillance scans for adult survivors of aggressive lymphoma. There were 30 open-ended qualitative interviews performed, although there were 70 people included in the study. Grounded theory informed the analysis of the data.

- **Finding 1: Scans are a neutral experience (U)**
  - Illustration: 'Although a few participants said that the scans "don’t phase me"' (p. 3)

- **Finding 2: Scans are a source of anxiety (U)**
  - Illustration: 'One patient referred to the experience as "scan-itis."' (p. 3)
  - 'One participant stated that they are "terroizing" and while not all used such strong words, most felt that the scans are "a big thing"' (p. 3)
  - 'the week leading up to it is very nerve-racking, and it's a lot of the thoughts that I had when I was first diagnosed start to come back...once it's over, a sense of relief' (p. 3)

- **Finding 3: Fear and anxiety whilst waiting for results (U)**
  - Illustration: 'the time between having the scan and receiving results is particularly difficult and was described as a "whole other kind of fear."' (p. 3)

- **Finding 4: Dislike of intravenous contrast (C)**
  - Illustration: 'others disliked the inconvenience and the intravenous contrast' (p. 3)

- **Finding 5: Radiation concerns (C)**
  - Illustration: 'Concern about radiation exposure was common, and this led some to feel they were overtested' (p. 3)

- **Finding 6: Scans provide reassurance of a healthy body (U)**
  - Illustration: 'I have a lease on life for one year and I can start all over again' (p. 3)

- **Finding 7: Scans are a double edged sword (U)**
  - Illustration: 'they are fine 'cause they tell the doctor if there's anything wrong with me, but as far as the experience I really hate it' (p. 3)
This study by Tischler et al. (2009) aimed to explore and gain an understanding of the perspectives of persons undergoing MRI, and compare perspectives between healthy volunteers and those with a mental health condition. Semi-structured interviews were used to collect data, and thematic analysis was used to analyse the interview information. The sample consisted of 12 health volunteers, and 5 people with depression.

Finding 1: Fear of the unknown (U)

Illustration 'I'm not really sure what is going to happen...it must just be the fear of the unknown and the fact that it's not a normal experience is it? It's not something you've ever experienced before like being stuck in a tube...I suppose you've got no other life experiences like that to draw on to prepare yourself for it' (p. 25)

Finding 2: False expectations (U)

Illustration 'I presumed there'd be lots of wires and stuff...not actually wires stuck in me but you know them sort of like shower cap things with wires coming out of them.' (p. 25)

'I thought that my head would actually be popping out the other end. But it doesn't, it just stays in the tube so I was like "oh" and at first I was a bit panicky' (p. 26)

Finding 3: Adverse effects of the scan (magnetphobia) (U)

Illustration 'I was kind of like imaging this kind of slice being taken...just wondering what one earth it was doing to the inside of my brain with this magnetism...I did get some little twinge, I don’t know what it was, it was strange just when the, I guess when the magnets turn on or just some, just a strange sensation in the fingers' (p. 26)

Finding 4: Expectations of a diagnosis (U)

Illustration 'they'll pick up any large abnormalities...tumors or stuff like that ...soon find out. I guess it's a bit erm unnerving really to think that there might be something wrong with me' (p. 26)

Finding 5: Curiosity and excitement (C)

Illustration 'Curiosity and excitement were reported by healthy volunteers only' (p. 26)

'others were curious to see images of their internal organs' (p. 26)

'a number of patients commented on how interesting it was to see a scan of their brain' (p. 26)

Finding 6: Viewing images of one's own organs (C)
Illustration 'a number of patients commented on how interesting it was to see a scan of their brain' (p. 26)

Finding 7: Overwhelming and scary (U)

Illustration 'for example, some perceived the scanner to be: "overwhelming" and "scary"' (p. 25)

Finding 8: Feelings of panic (U)

Illustration 'at first I was a bit panicky, well not panicky just a bit "wow this is close" but then, it was ok...yeah, at the beginning I felt a bit scared' (p. 26)

Finding 9: Shock and fear (U)

Illustration 'It was a real shock; I was like oh my god. I thought I was going to explode or something.' (p. 27)

Finding 10: Unexpected feelings of fear and claustrophobia (U)

Illustration 'I was more scared than I thought I would have been. When I first went in I was like...oh my god this is really close. I kind of thought to myself at that point...I started to feel a bit claustrophobic which is really silly cos I'm not claustrophobic really...I didn't like it' (p. 27)

Finding 11: Swallowed and sinking (U)

Illustration 'You just feel like you're going to be swallowed or whatever, I was very scared, I even thought that I was not going to do it at the beginning. I don't like that much, that noise. It's just like, you're sinking with the submarine, going deep, deep, deep inside the mouth of a big octopus and you're going to be swallowed. I felt like if I was going to be closed up into a box or something...I was very frightened' (p. 27)

Finding 12: Uncertainties and lack of clarity (U)

Illustration 'At the beginning it was a bit strange because I wasn't sure exactly what he meant by not being able to move, did that mean that I wasn't allowed to twitch my fingers or did it just mean big movements? I wasn't sure whether I was allowed to cough, at one point I felt like I needed to cough but I didn't just in case' (p. 27)

Finding 13: Acclimatisation (U)

Illustration 'the noise didn't bother me, it did at first when I heard it but after a while, after the test progressed, I just put it at the back of my mind' (p. 27)

Finding 14: Importance of communication (U)
Illustration 'talking to you [researcher] has actually lessened the anxiety a bit because just talking it through with someone, even though you haven't given me any additional information has helped’ (p. 27)

Finding 15: Need for further information (U)

Illustration 'I would have liked a bit more about...you know, how you actually...sit, what the machine looks like, what will happen as the machine scans you - things like that’ (p. 27)

Finding 16: Support after scanning (U)

Illustration 'for someone with medical training to scrutinise the scan to check that everything was "normal" and showing no abnormalities’ (p. 27)

**Paper 14: It's like being in another world – patients’ lived experience of magnetic resonance imaging**

This phenomenological study by Tornqvist et al. (2006) aimed to illuminate the patient experience of MRI. Conversational interviews were used to collect data, which was then analysed by hermeneutic phenomenological analysis. The sample consisted of 19 adults who had undergone MRI.

Finding 1: Being in another world (U)

Illustration 'I got a feeling, which is quite natural, that I entered a space capsule in NASA, Houston...I was lucky I have been there’ (p. 957)

Finding 2: Confined in the scanner (U)

Illustration 'You feel confined, there is no door you yourself can open if you want to go out of there’ (p. 957)

Finding 3: Entombed or in a coffin, a sense of death (U)

Illustration 'like lying almost as for cremation’ (p. 957)

'A participant experienced a feeling of going to his own execution' (p. 957)

'I felt insecure, thought about my children she is waiting for me...my husband doesn’t know if something is happening to me. I felt that maybe something is going to happen to me.' (p. 958)

Finding 4: Foreboding sound (U)

Illustration 'When you have this sound in your ears it's like listening to those who chop asphalt or concrete' (p. 957)
Finding 5: Threat to self control (U)

Illustration 'I felt pressure over my chest, it felt like I couldn't breath, panic, I had to get out of there... it went great at first, and I thought that I could make it. My husband said, you are doing great, he held my foot. I started to relax and felt that I could relax with my legs on the cushion. But then it came, it was like ppssscchh, and I thought it wasn't even me, it was nothing I could control. I was so surprised...I wanted to make it, but it wasn't me, my body took over' (p. 957)

'that hood (the visor on the head coil), the first time when they lowered it I said, I can’t do it, I’m choking, I can't breathe' (p. 957)

'You feel powerless and have no control' (p. 959)

Finding 6: Cramped in the scanner (U)

Illustration 'You just relax and lie there, and think it is cramped as hell' (p. 957)

Finding 7: Anticipatory fear and anxiety (U)

Illustration 'I felt that I was terrified, I could hardly sleep for a couple of days and I was 100% sure that I wouldn't make it' (p. 957)

'When I saw the small tunnel I thought, shall I go in there, and then I felt panic' (p. 957)

Finding 8: No improvement in experience with multiple scans (U)

Illustration 'I have done this many times, but I thought this was the worst...it doesn’t get better over time' (p. 958)

Finding 9: Strategies to cope (C)

Illustration 'Participants who felt a small threat to self-control relaxed easily by thinking about something else.' (p. 958)

'if a greater effort was needed the participants had to work harder to relax and "be somewhere else in the mind."' (p. 958)

Finding 10: Important to tolerate scan for diagnosis (U)

Illustration 'the information from this examination is very important. You have to think about that. If I terminate the scan now I'm back to square one. I thought a lot about that' (p. 958)

'Several participants, however, said that they thought of the importance of the examination and used that as a motivation to "stay in the scanner"' (p. 959)

Finding 11: Effort to handle the situation (U)
Illustration 'I was a marvel of self-control in there. I really just wanted to scream and you feel a need to concentrate the whole time, to feel that you are in reality, so to speak. I asked the girl to speak to me and tell me, the whole time, what she was doing. That helps. Between the series, she told me exactly how many series there were left and exactly how long it would take. Then I started to count and It helps you keep it together.' (p. 958)

'I tried to persuade myself to take it easy, breathe calmly and take deep breaths...it felt like it would take too long for them to come in and take me out' (p. 958)

Finding 12: Need for support (U)

Illustration 'you do want to hold it (the buzzer). It's kind of emergency exit and I can reach people...Then, I liked it when they came in after half the time and said something, "we are here, how are you?" asking how you feel! 'my wife is there with me now. I can feel her hand on my leg, and then I know there is someone, she is there. It's an enormous support' (p. 958)

'We were only going to try it, because I was worried. She (the radiological nurse) showed me how it worked and took me inside for a bit. Then she lowered the visor in front of my face. I felt panic then and thought that I can never do it. But then she said, "We'll take it in intervals and if you want you can terminate the scan, we'll try for 3 minutes." OK we would try. But then I had been out of there once and was prepared to leave the room. I thought that it's all or nothing, I just can't do it. But then I thought, OK, I'll try for 3 minutes and that went well. "Can we try now for 4 minutes?" and that was OK too. "Three minutes more and then I'll get you out of there." She was very comforting the whole time. Very good she was. You feel a bit vulnerable. I thought that if I want something and I pressed (the buzzer) will she come then? But she told me,"I'm here," she told me that she was beside me and you could hear her voice between each sequence. That's what made me feel secure, that you knew that somebody was there.' (p. 958)

'I was scared. As I understood it, I wasn't supposed to feel anything. I had fought to overcome the claustrophobia and was prepared to go on. Then something happened to my body that nobody had told me about, it felt like vibrations and she said she would come in at once, but I pressed it [the buzzer] at least 17 times before she came. If she had come straight away, maybe I could have asked what it was, maybe I could have made it then. Instead they tried to calm me down, I had to fight then, it felt dangerous and I was terrified. I wish she had come directly. I didn't trust them then. You feel powerless and you have no control. (p. 959)

Finding 13: Need for information (U)

Illustration 'it was great to know (the number and duration of the sequences), now there's one more left, she said, because I was so frightened' (p. 959)
**Paper 15: Patient experiences of colonoscopy, barium enema and CT colonography: a qualitative study.**

This study by Von Wagner et al. (2009) aimed to determine patient experiences and expectations of colonoscopy, barium enema and CT colonography in depth. Semi-structured interviews were used to collect data, which was then analysed by thematic analysis. The sample consisted of 49 symptomatic patients, 16 of which who underwent CT colonography. Only the data relating to CT scanning was extracted for inclusion in this review.

**Finding 1: Difficulties with breath holding (U)**

Illustration 'It seemed to go on and on, and once I thought I might burst in a minute.' (p. 16)

**Finding 2: Not wanting to ruin images by breathing (U)**

Illustration 'I felt a bit frightened, I thought I am going to have to breathe in a minute, I am going to ruin it all.' (p. 16)

**Finding 3: Discomfort during imaging preparation and gas introduction (U)**

Illustration 'Uncomfortable in an unbearable sort of a way' (p. 16)

**Finding 4: Anxiety plays a role in increasing discomfort (U)**

Illustration 'It was uncomfortable but I think it was made more so by the fact I was anxious'(p. 16)

**Finding 5: CT Colonography may be viewed as preferable to other tests (U)**

Illustration 'I have a friend whose mother and grandmother had bowel cancer. She can't face up to screening. I told her about this. It would be perfect, it if was not for preparation. It might save her life. I would recommend it anytime.' (p. 16)

**Finding 6: Pain during image preparation and bowel distension (U)**

Illustration 'I felt very bloated at one time and it was slightly painful. It was as comfortable as anything like that could be. I did experience some pain in the beginning.' (p. 16)

**Finding 7: Discomfort during administration of intravenous contrast (U)**

Illustration 'The dye hit my throat first and had a slightly disturbing effect. It then travelled down the toes, then came up my body again which was weird.' (p. 17)

**Finding 8: No need for privacy and no cause for embarrassment (U)**

Illustration 'There is no need [for privacy], I was in a gown there was just only the nurse, the radiographer and they go behind the screen. There was no embarrassment, whatsoever' (p. 17)
Finding 9: Embarrassment during the procedure (U)

Illustration 'Especially, the paper gown is virtually useless I mean it made me laugh, because when I had to turn over with this tunic stuck to me, erm, (laughs) they said "oh we cover up your modesty", and they put paper over my legs to cover up my modesty, and the machine's got a fan in it, which blows about anyway (laughs)' (p. 17)

Finding 10: Confusion regarding follow up (U)

Illustration 'they said they would notify the doctor, but that is the problem, which doctor?' (p. 17)

Finding 11: Anxiety following the scan regarding results (U)

Illustration 'I am just hoping they didn't find anything and there is another avenue that I might go down. I am dreading it might be cancer. Everybody dreads it.' (p. 17)

Finding 12: Coping with the experience

Illustration 'I just shut my eyes during the procedure but I don't think you would have seen much because, no I would not have because you go into this cabinet sort of machine, you would not see anything because of that' (p. 17)

Finding 13: Nervousness following the scan (U)

Illustration 'Nothing at all and I was too nervous to ask. I guess they are not allowed anyway?' (to report results following the scan) (p. 17)

Finding 14: Scan's ability to detect other organs is reassuring, whether this is a correct assumption or not (U)

Illustration 'I mean the fact that they were able to say the other organs were alright, presumably the liver and you know the lower stomach, and, well, they said that the bowel looked fairly healthy, apart from this polyp, so I suppose having the CT scan, although I had to go through it, sort of virtually a second time I think that was the right decision' (p. 17) (correct)

'A member of the medical team did say one might see more than just the bowel, and as I am concerned about my waterworks as well. Possibly, I thought that would help.' (p. 17) (incorrect assumption)

CATEGORISATION AND SYNTHESIS OF FINDINGS

Once the 127 findings detailed above were extracted from the included studies, they were collated to form user-defined categories based on identified similarities. This moves from a focus
on individual studies to consideration of all findings for all studies included in the review. A total of 33 categories (second level findings) were created on the basis of similarities in meaning.

From these 33 categories, 11 synthesised findings (meta-syntheses) were produced.

**Meta-synthesis 1:** People who are undergoing imaging may dislike certain aspects of the procedure that are necessary to produce a high quality image

This meta-synthesis derives from 13 findings formed into 4 categories. A common element of the imaging experience was a dislike or negative perception regarding certain elements of the scanning process, which in most cases is pivotal to producing a high quality image. There were issues with breath holding, radiation and magnetism concerns, intravenous contrast, and the sound produced by the scanners.
**Synthesised Findings**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concern over possible adverse effects from the scan</td>
<td>Adverse effects of the scan (magnetophobia) (U)</td>
</tr>
<tr>
<td>Radiation concerns (C)</td>
<td></td>
</tr>
<tr>
<td>Difficulties with holding breath during imaging</td>
<td>Difficulties with breath holding (U)</td>
</tr>
<tr>
<td>Not wanting to ruin images by breathing (U)</td>
<td></td>
</tr>
<tr>
<td>Invasive aspects of the scan are disliked</td>
<td>Discomfort during administration of intravenous contrast (U)</td>
</tr>
<tr>
<td>Discomfort during imaging preparation and gas introduction (U)</td>
<td></td>
</tr>
<tr>
<td>Dislike of intravenous contrast (C)</td>
<td></td>
</tr>
<tr>
<td>Pain during image preparation and bowel distension (U)</td>
<td></td>
</tr>
<tr>
<td>The sound during MRI contributes to a negative experience</td>
<td>Foreboding sound (U)</td>
</tr>
<tr>
<td>The noise is disconcerting (C)</td>
<td></td>
</tr>
<tr>
<td>The noise was a shock (C)</td>
<td></td>
</tr>
<tr>
<td>The sound contributes to a negative experience (C)</td>
<td></td>
</tr>
<tr>
<td>Unpleasant noise (U)</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 8: Meta-synthesis 1**

**Meta-synthesis 2:** People who are undergoing a scan may experience a range of negative emotions, such as a lack of control, claustrophobia, anxiety, and the need to escape, although these phenomena vary in their intensity.

This meta-synthesis derives from 28 findings grouped into 5 categories. Quite often, the imaging experience was associated with negative emotions, which adversely affected the individual’s experience of the scan. Some participants found the scan distressing, awful, strenuous and uncomfortable, which produced concern not only for themselves, but also for others who had to undergo imaging. Others felt a strong desire to escape or get out during scanning, or a lack of self-control. Commonly, participants felt some sort of claustrophobia, ranging from a slight dislike to the severity of feeling buried alive. Others spent time anxiously anticipating the scan, and this anxiety was linked to discomfort for some.
<table>
<thead>
<tr>
<th>Synthesised Findings</th>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>People who are undergoing a scan may experience a range of negative emotions, such as a lack of control, claustrophobia, anxiety, and the need to escape, although these phenomena vary in their intensity</td>
<td>A distressing, awful, uncomfortable, strenuous experience, producing concern for self and others</td>
<td>Awful experience during MRI scan (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Concern for others who need to have a scan (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fear during CT scans (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overwhelming and scary (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shock and fear (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strenuous and distressing experience (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uncomfortable temperature during the scan (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unpleasant and distressing experience (C)</td>
</tr>
<tr>
<td></td>
<td>A need to escape or get out</td>
<td>Need for escape (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uncontrollable need to escape (U)</td>
</tr>
<tr>
<td></td>
<td>Claustrophobia, to the extent of feeling buried alive.</td>
<td>A feeling of being buried alive (U)</td>
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<tr>
<td></td>
<td></td>
<td>Claustrophobia during imaging (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Claustrophobia during the scan (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confined in the scanner (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cramped in the scanner (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Entombed or in a coffin, a sense of death (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feeling trapped or buried alive (U)</td>
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<tr>
<td></td>
<td></td>
<td>Severe claustrophobia and anxiety related to spatial constriction (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slight claustrophobia and anxiety related to spatial constriction (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unexpected feelings of fear and claustrophobia (U)</td>
</tr>
<tr>
<td></td>
<td>Feeling anxious or worried and anticipating the imaging experience</td>
<td>Anticipating the MRI experience (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anticipatory fear and anxiety (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anxiety plays a role in increasing discomfort (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anxious anticipation (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative first impressions of the</td>
</tr>
</tbody>
</table>
Meta-synthesis 3: Persons undergoing imaging, after spending time in the machine or from having previous scans, may become acclimatised to the scan and their experience may improve, but not necessarily.

This meta-synthesis derives from 5 findings grouped into 2 categories. It was found that previous scans affect future scan expectations and experiences, and that after spending time in the scanner, patients would become acclimatised to the imaging process.

<table>
<thead>
<tr>
<th>Synthesised Findings</th>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons undergoing imaging, after spending time in the machine or from having previous scans, may become acclimatised to the scan and their experience may improve, but not necessarily.</td>
<td>Acclimatisation to the scanner</td>
<td>Acclimatisation (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feelings of panic (U)</td>
</tr>
<tr>
<td></td>
<td>The scan experience improves with subsequent scans, but not necessarily.</td>
<td>No improvement in experience with multiple scans (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Previous experiences affect current scan expectations (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The scan experience improves with subsequent scans (U)</td>
</tr>
</tbody>
</table>

Figure 10: Meta-synthesis 3

Meta-synthesis 4: People who are undergoing a scan may at times feel embarrassed, suffer from a lack of privacy or feel as if their masculinity is being challenged.

This meta-synthesis was derived from three findings which were grouped into 2 categories. During scanning, people may feel embarrassed or feel as if their privacy has been invaded. Also, men may feel that the scanning process poses a threat to their masculinity.
**Synthesised Findings**

People who are undergoing a scan may at times feel embarrassed, suffer from a lack of privacy or feel as if their masculinity is being challenged.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embarrassment and lack of privacy</td>
<td>Embarrassment during the procedure (U)</td>
</tr>
<tr>
<td></td>
<td>No need for privacy and no cause for embarrassment (U)</td>
</tr>
<tr>
<td>Pose a threat to masculinity</td>
<td>The need to remain masculine (U)</td>
</tr>
</tbody>
</table>

**Figure 11: Meta-synthesis 4**

**Meta-synthesis 5:** Persons undergoing imaging may consider it of great importance, which can provide an incentive to complete the scan, facilitate the use of coping strategies, or be a cause of frustration if unable to complete.

This meta-synthesis is derived from 14 findings grouped into 3 categories. It was found that participants viewed the scanning process and the resultant images of great importance, which provided an impetus for it to be completed at all costs, and led to frustration when it could not be. This view of the scanning process facilitated the use of coping strategies to get through the scan, such as visualisation or blinding.
Figure 12: Meta-synthesis 5

Meta-synthesis 6: As scanning is a unique, medically advanced and out of this world experience, it must be experienced by the person to be truly understood, and can be experienced in different ways.

This meta-synthesis derives from 7 findings forming 4 categories. Scanning was seen as a very unique experience, one which needed to be experienced to be understood, as it can be perceived in very different ways. At one end of the scale it felt very medical in nature, whilst others viewed it as being something completely alien to them.
As scanning is a unique, medically advanced out of this world experience, it must be experienced by the person to be truly understood, and can be experienced in different ways.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need to experience imaging to understand it</td>
<td>Fear of the unknown (U)</td>
</tr>
<tr>
<td>MRI scanning as a bodily encounter (U)</td>
<td></td>
</tr>
<tr>
<td>Out of this world, alien experience</td>
<td>An alien experience (U)</td>
</tr>
<tr>
<td>Being in another world (U)</td>
<td>Swallowed and sinking (U)</td>
</tr>
<tr>
<td>Pregnant women perceive the baby during imaging</td>
<td>Perception of the baby during imaging (C)</td>
</tr>
<tr>
<td>Submitting to a medicalised context</td>
<td>Submitting to a medicalised context (U)</td>
</tr>
</tbody>
</table>

Figure 13: Meta-synthesis 6

Meta-synthesis 7: Prior to a scan, many (although not all) people feel a need for information, which they may seek out from a variety of sources, which may be credible or not.

This meta-synthesis derives from 16 findings grouped together as 2 categories. People undergoing scanning commonly felt the need for information regarding the scan prior to it, and some actively sought this information out, either from credible or non-credible sources or other people. There were misunderstandings and incorrect preconceived notions regarding scanning. Sometimes, there was simply too much information to process for people being scanned, and it was seen at times to be overwhelming.
Prior to a scan, many, although not all, people feel a need for information, which they may seek out from a variety of sources, which may be credible or not.

<table>
<thead>
<tr>
<th>Synthesised Findings</th>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>A need for information, although it can be overwhelming</td>
<td>Desire not to know about the procedure (U)</td>
<td></td>
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<tr>
<td></td>
<td>Lack of information provision has a negative effect on the scan experience (C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Need for further information (U)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Need for information (C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Need for information prior to MRI (C)</td>
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<td></td>
<td>Not knowing what to expect and being unprepared for the test (U)</td>
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<tr>
<td></td>
<td>Overload of information and consent forms (U)</td>
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<td></td>
<td>Patient’s want information prior to their scan (C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provision of information is important (U)</td>
<td></td>
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<td></td>
<td>Want for information (U)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wanting to be in control (C)</td>
<td></td>
</tr>
<tr>
<td>False expectations, incorrect preconceived notions</td>
<td>Confusion differing between imaging technology (U)</td>
<td></td>
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<tr>
<td></td>
<td>False assumptions/misunderstandings about their scan (U)</td>
<td></td>
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<tr>
<td></td>
<td>False expectations (U)</td>
<td></td>
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<tr>
<td></td>
<td>Misinformation prior to the scan from friends and family (U)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preconceived expectations from other sources (family members/friends, media) (U)</td>
<td></td>
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</table>

Figure 14: Meta-synthesis 7
**Meta-synthesis 8:** People undergoing scanning often need support during scanning, and staff particularly have a large impact on the scan experience, which may be positive or negative.

This meta-synthesis is derived from 13 findings, which were grouped together as 3 categories. People who are undergoing scanning require support, which may come in the form of information, presence, communication and understanding from healthcare staff. Healthcare can be perceived in a negative or positive light, and the acts and attitudes of staff have a significant impact on the scanning experience.

<table>
<thead>
<tr>
<th>Synthesised Findings</th>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>People undergoing scanning often need support during scanning, and staff particularly have a large impact on the scan experience, which may be positive or negative.</td>
<td>Need for support and information</td>
<td>Need for information (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Need for support (U)</td>
</tr>
<tr>
<td>Staff have an impact on the scanning experience and may be friendly and helpful or cold.</td>
<td></td>
<td>Difficulties from the start (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hit and run healthcare professionals (U)</td>
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<td></td>
<td></td>
<td>Radiographic staff not providing sufficient information and rushing (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radiological staff are very supportive (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Staff are highly professional (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Staff are unhelpful (U)</td>
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<tr>
<td></td>
<td></td>
<td>Staff assistance helps during scanning (C)</td>
</tr>
<tr>
<td>The importance of communication and understanding from staff</td>
<td></td>
<td>Difficulty understanding radiographer instructions (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Importance of communication (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unspoken desire for help (U)</td>
</tr>
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<td></td>
<td></td>
<td>Uncertainties and lack of clarity (U)</td>
</tr>
</tbody>
</table>

**Figure 15: Meta-synthesis 8**

**Meta-synthesis 9:** Persons undergoing imaging may find it a positive and reassuring experience, and enjoy the opportunity to view their images.

This meta-synthesis is derived from 16 findings grouped into 4 categories. The imaging process can often be seen in a positive light, and can be seen as a comfortable or exciting experience. For individuals having follow-up surveillance scans, they can be seen as providing reassurance of a
health body. Some people may be curious about the scan, and have a desire to view their images following it. It was also noted that for those who were taking part in research, imaging may not be quite as imposing as it would be if for diagnostic medical reasons.

<table>
<thead>
<tr>
<th>Synthesised Findings</th>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons undergoing imaging may find it a positive and reassuring experience, and may enjoy the opportunity to view their images.</td>
<td>A desire can exist to view images following scanning</td>
<td>Curiosity and excitement (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eager to view images of themselves (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not wanting to see images following scanning (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Viewing images of one's own organs (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Viewing the brain (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wanting to see the images following scanning (C)</td>
</tr>
<tr>
<td></td>
<td>Imaging can be a comfortable, positive or exciting experience</td>
<td>Comfortable experience (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CT Colonography may be viewed as preferable to other tests (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Easy to tolerate (C)</td>
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<tr>
<td></td>
<td></td>
<td>Imaging is a positive experience (CT and MRI) (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not as bad as expected (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overall positive experience (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positive experience (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scans are a neutral experience (U)</td>
</tr>
<tr>
<td></td>
<td>Imaging for research is not as imposing as for medical reasons</td>
<td>Imaging for research is not as imposing as for medical reasons (U)</td>
</tr>
<tr>
<td></td>
<td>Scans provide reassurance of a healthy body</td>
<td>Scans provide reassurance of a healthy body (U)</td>
</tr>
</tbody>
</table>

Figure 16: Meta-synthesis 9
Meta-synthesis 10: People undergoing imaging often expect a health issue to be found during their scan, which can then lead to anxiety and worry.

This meta-synthesis is derived from 9 findings, which were grouped together as 2 categories. Whenever imaging takes place, there is a risk that a significant health issue will be discovered, and people undergoing imaging are acutely aware of this risk, and often expect a diagnosis. Following the scan this can lead to anxiety and uncertainty, as they wait for the results of their scan.

<table>
<thead>
<tr>
<th>Synthesised Findings</th>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>People undergoing imaging often expect a health issue to be found during their scan, which can then lead to anxiety and worry</td>
<td>People are acutely aware of the risk of a health issue being discovered and often expect a diagnosis</td>
<td>Expectations of a diagnosis (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expectations of a diagnosis/clean bill of health (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Risking the brain (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scan’s ability to detect other organs is reassuring, whether this is a correct assumption or not (U)</td>
</tr>
<tr>
<td>Waiting for results are a cause of fear and anxiety</td>
<td>Anxiety following the scan regarding results (U)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confusion regarding follow up (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fear and anxiety whilst waiting for results (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nervousness following the scan (U)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support after scanning (C)</td>
</tr>
</tbody>
</table>

Figure 17: Meta-synthesis 10

Meta-synthesis 11: People undergoing imaging may perceive it as a way to legitimise their symptoms, although it has the power to delegitimise them also.

This meta-synthesis is derived from 3 findings grouped as 2 categories. Imaging was seen to have the power to legitimise or diagnose problems, which can then make the problem seem real, particularly for symptoms experienced by patients which did not have medical proof confirming a cause for these symptoms, such as back pain. Conversely, images also have the power to delegitimise an injury, which may be a cause of frustration.
People undergoing imaging may perceive it as a way to legitimise their symptoms, although it has the power to delegitimise them also.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Images have the power to delegitimise an injury</td>
<td>De-legitimising an injury (U)</td>
</tr>
<tr>
<td>Images have the power to legitimise an injury</td>
<td>Legitimising symptoms (U)</td>
</tr>
<tr>
<td>–</td>
<td>Making the problem real (U)</td>
</tr>
</tbody>
</table>

Figure 18: Meta-synthesis 11
CHAPTER 8 – QUALITATIVE REVIEW DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

'It would have been nice to have known before I got there that I might have to have an injection, that I might have to have a cage put on my head and that my head would be pinned down...I think if I’d been more aware, then I would have been able to cope with it better' 147 Davies et al. (2004)

CHAPTER OVERVIEW
This review sought to synthesise the extant evidence on the patient experience of high technology medical imaging. During the search and inclusion process, 15 studies were found which addressed this issue using a qualitative methodology, and were deemed of suitable quality to be included in the review. The discussion, conclusions and recommendations for this review follow.

DISCUSSION
The number of studies identified in this review can be considered somewhat surprising bearing in mind the focus of medical imaging research has been largely quantitative in the past, with qualitative methodologies largely underused.26 The uptake of qualitative methods in medical imaging research over the past ten years is encouraging and there are many other qualitative studies that address other imaging modalities now in the literature, such as ultrasound40, bone densitometry41, general radiography42 and interventional radiography43. However, during the search, no qualitative studies were found investigating the experience of persons undergoing nuclear medicine procedures such as SPECT or PET, which highlights an area where future research should be directed.

The methodological quality of the included studies varied, with some being of very high quality and some being of lower quality. This was determined by the results of the critical appraisal using the JBI checklist for qualitative studies by the first and second reviewer. The studies with the highest quality were those that stated a specific qualitative study design, such as phenomenology, rather than those which did not state their specific methodological approach or only stated they were qualitative. A meta-synthesis of the data, following the approach outlined in the Joanna Briggs Institute reviewer’s manual27, was then performed. All of the studies included contributed to the meta-synthesis, despite the fact they were not all of the same stated methodology. Synthesising across primary studies of different methodologies is seen both as beneficial and as something to avoid when synthesising studies.139,151,152 However, it is the
approach of the Joanna Briggs Institute that it is acceptable to combine findings from studies of different designs, as it is a ‘synthesis of findings and not data’ (p. 36).  

The phenomenon of interest for some of the studies was not limited to only one imaging modality and they looked at a combination of imaging technologies. Therefore, the findings from CT and MRI were combined in this review, as they were in some of the studies. This was done as it was felt many of the individual findings were complementary, could be experienced in both imaging settings, and the synthesised findings were applicable to both modalities. The eventual synthesised findings appear to be general across high imaging technology and are not specific to any one modality. However, for clarity’s sake, when reporting findings from studies that explored the experiences of patients in MRI and CT scanners jointly, every effort has been made to distinguish which scan was experienced. If the findings from different modalities could not be combined into categories to form a meta-synthesis, it was planned to only combine them within their modality, but this was not the case.

It is considered that this is the first review of its type in the field of medical imaging. During searching, a systematic review on women’s views of pregnancy ultrasound by Garcia et al. (2002) did identify and summarise qualitative information, but did not perform a meta-synthesis as such as those in this review. It is hoped that further qualitative systematic reviews will be conducted in the medical imaging field to summarise the existent evidence, and to formulate implications for medical imaging practice and research.

The meta-synthesised findings of this review illuminate the nature of the MRI and CT scan experience, and many of these findings add depth to what has already been highlighted in quantitative studies. It has been shown in a plethora of studies that anxiety and claustrophobia are issues that may arise during the imaging process. By performing qualitative studies, more details pertaining to the cause and range of emotions and experiences can be identified. The qualitative studies in this review delve deeper into these issues than quantitative studies can, and it was found that although many people do experience claustrophobia, this could vary in intensity from a slight discomfort to the feeling of being buried alive. Some people felt the need to escape and a lack of self-control during the scanning process. Embarrassment was also seen as an issue that could arise during the scan.

Negative experiences during scanning were common and in many of the cases this negative experience can be linked directly back to a certain aspect of the procedure that is integral to producing the images. These included the sound during MRI, exposure to magnetism and radiation, breath holding, contrast, and bowel distension. As many of these aspects of the procedure are pivotal to creating high quality images, it may be useful to explain exactly why each occurs. For example, healthcare professionals can explain the reason behind the noise generated during MRI, or why contrast is important. Providing information to the patient has
been shown to be highly important for people who undergo a scan,\textsuperscript{50, 153} and this review highlights reasons why this is important, adding important knowledge about information provision and its meaning to patients, which provides a means for people to feel in control, in addition to acting as a support measure. Often, patients may be misinformed prior to the scan, and misconceptions regarding the imaging technology were highlighted in some of the included studies. This information can come from media, friends or family, as people who are to be scanned actively seek out information from any source, credible or not. However, information provided can also be seen as overwhelming, highlighting the importance of providing digestible, clear information pertinent to the scan they are to receive.

Despite the need for providing information, it was highlighted in this review that regardless of the amount supplied to the patient prior to the scan, since it is such a unique and out of this world, alien experience, scanning has to be undergone to be truly understood. Healthcare professionals may have become accustomed to the world they work in, but it is a very different experience for the patient undergoing scanning for the first time. It was found in the review that eventually, due to spending time in the scanner or having subsequent scans, people could become acclimatised to these procedures, although this wasn’t always the case.

The findings highlight the importance of imaging, and the lengths some people go to ensure a diagnosis. One participant in one study went so far as to lie about a previous history of working with welding equipment before his MRI, as he saw the scan as the only way to provide a diagnosis\textsuperscript{143}. The importance that people placed on their scans acted as an incentive or provided motivation for people to get through the scan, thereby facilitating the use of coping strategies. Different strategies were found in the studies, including visualisation, where the participant actively imagined themselves somewhere else, such as on a beach. This importance placed on the scans also led to a great sense of disappointment or frustration when participants could not go through with the scan. Many of the people undergoing scanning expected that there would be a diagnosis, or that there would be something wrong. This led to a particularly anxious wait for the results following the scanning process. Some people, such as those with back pain, saw imaging as a way to legitimise their symptoms. Conversely, it also presented a way to delegitimise symptoms, leading to frustration.

A finding that emerged which may previously have received little attention, is that imaging can be a positive experience, one which may excite or spark curiosity from the persons being imaged, or provide resolution to questions regarding health status. Some of those who were imaged felt relaxed or comfortable during their scans, and others expressed a desire to view their images. This finding was identified in studies both with healthy volunteers and those being scanned for medical reasons.
The importance of healthcare professionals and particularly medical imaging technologists in facilitating the imaging process is paramount, as people being scanned rely on staff to provide the support and communication required to make it through the scan. It was found that healthcare professionals had a profound impact on the scanning experience, which could be either positive or detrimental.

**Limitations of the review**

There are some potential limitations with this review. Although there was a systematic search carried out and every effort made to identify pertinent studies, it is possible that some may have been missed. Qualitative studies can be difficult to find, as they may be published in books and theses, and the level of indexing and archiving is poorer than it is for quantitative studies. Also, studies that have been conducted since the search was performed were not included in the review, and it may be necessary to perform an update of this review in the future. Another limitation of this review is that only studies published in English were included. It must also be noted that in some of the studies, the participants were volunteers, and did not have known health conditions. As mentioned in the studies, the views of these people may differ somewhat from the views of those with a pre-existing medical condition. However, it was felt that these participants still provided a unique perspective on the experience of high technology medical imaging, and were therefore included.

**CONCLUSION**

This review identified 15 studies and generated 11 synthesised findings relating to the patient experience of high technology medical imaging. The 11 synthesised findings highlight the diverse, unique and challenging ways in which people experience imaging with MRI and CT scanners. One of the hopes of this review is that it will better inform medical imaging technologists and other staff involved in the imaging process how the patient experiences and perceives imaging. As imaging is essentially a ‘hit and run’ process, the patient can sometimes be seen as just a translucent screen upon which the health professional peers to find a diagnostic entity within, and the body is perceived differently by the patient and the practitioner. It is however imperative that imaging staff remember that they meet patients at a critical time in their life, and through studies such as those included in this review, gain a better understanding of the experience of their patients, with the hope of improving practice. All health professionals involved in imaging need to be aware of the different ways each patient may experience imaging, and provide them with ongoing support and information.
QUALITATIVE REVIEW IMPLICATIONS FOR PRACTICE

These implications for practice are derived directly from the results of the meta-synthesis, and each of the 11 synthesised findings.

People who are undergoing scanning may dislike certain elements of the scan (i.e. contrast, noise, radiation, use of magnets, and need for breath holding) that are necessary to produce a high quality image. Healthcare professionals need to be aware of this, and be able to explain the cause and necessity of these aspects of the scan to the patient.

People who are undergoing scanning often experience a range of negative emotions during scanning, such as claustrophobia, anxiety, stress, discomfort, and a lack of self control. Healthcare professionals need to be aware of the full scope of emotions that patients may experience during scanning, so that they can be recognised and resolved where necessary.

People who have spent time in the scanner, or who have had previous scans, may become acclimatised to the imaging process. However, this is not always the case, and healthcare professionals should note that the experience does not always improve with subsequent scans, so each patient must be supported despite the amount of time spent previously in the scanner.

People undergoing scanning may feel embarrassed or feel a lack of privacy. Healthcare professionals need to be aware of this and put in place measures to preserve privacy and assist the patient to feel comfortable.

People undergoing scanning may view it of great importance, which can result in disappointment when it is unable to be completed. Healthcare professionals should be aware of the importance patients place on their scanning process, and suggest or facilitate coping strategies such as visualisation or blinding during the scan to assist patients through the experience.

Imaging with high technology scanners such as MRI or CT scanners is a unique, out of this world experience, that can be perceived in different ways. Healthcare professionals who may be accustomed to the process, need to take into account the novelty of the imaging process, and the patient’s possible naiveté regarding imaging.

Providing information to persons who are undergoing imaging is of great importance, as many patients are often misinformed, or feel a desire for information, and may actively seek it out. As the scanning process and information associated with it can be seen as overwhelming, care must be taken to provide correct, digestible information tailored to the patient, which clearly states the scan they are to receive.

People undergoing imaging need support from all healthcare professionals involved in the imaging process, and they need to be aware of the impact they have on the persons lived
experience of scanning. People with disabilities, such as those who are hearing impaired, may require different support than others (such as written instructions). This support can come in the form of presence, information, communication and understanding.

Healthcare professionals need to be aware that people undergoing imaging may view the procedure in a comfortable or positive light, and be curious about the scan and wish to see their images following scanning.

People undergoing scanning are aware that is has the power to detect significant health issues, which can lead to anxious waits and uncertainty after imaging. Once imaging is completed, patients should be given information regarding when they will receive their results, and what will happen now the images have been taken.

People undergoing imaging may view it as a way to legitimise their symptoms or conditions, and it can often then make the problem seem real. Healthcare professionals should be aware that a certain subset of patients may be hoping for a diagnosis to resolve any medical uncertainties.

**IMPLICATIONS FOR RESEARCH**

This review highlighted important aspects related to the patient experience in high technology medical imaging. However, there is still scope for further high methodological qualitative studies to be conducted in this field, particularly in the field of nuclear medicine imaging and Positron Emission Tomography. Further studies may be conducted in certain patient groups, and in certain age ranges. No studies were found assessing the experience of children undergoing high technology imaging. Further research should provide details on which qualitative methodology is to be used.
SECTION 3 – ACTION RESEARCH PROJECT
CHAPTER 9 – ACTION RESEARCH METHODS

“First, have a definite, clear practical ideal; a goal, an objective. Second, have the necessary means to achieve your ends; wisdom, money, materials, and methods. Third, adjust all your means to that end.”

Aristotle

CHAPTER OVERVIEW
The author planned to conduct an action research study in an MRI department to determine its feasibility in radiography, and to assess whether it has the ability to improve practice in terms of patient care. Patient care is often overlooked in radiography, and despite the fact the well being of patients is oft stated as the highest priority of radiographers, this is often truer in words than in practice. Before conducting any research study, action researchers should be aware that despite best intentions, the question is likely to change during the course of the project. This can occur as a result of the data collected, with this change becoming part of the outcome of the research and contributing to the discussion.

PHASE 1: DIAGNOSING
The first phase of action research involves identifying or defining a problem currently in the setting. This is an essential feature of action research, although this should not be misconstrued as implying that there is something wrong in the department. Rather, this process involves finding out what is currently happening in the department (the real), whilst comparing this to the ‘ideal,’ which will emerge from discussions with those involved in the project. This gap between the real and ideal is where the problem is identified. Questionnaires, observation and focus groups were conducted with staff within the department. These were conducted to elucidate the social norms and power structures within the department and to determine their impact (if any) on patient care, and to identify any problems. Focus groups aimed to understand how they view evidence based healthcare, practice improvement, patient care and the patient experience. Qualitative data was managed through the Joanna Briggs Institute’s Thematic Analysis Package (JBI-TAP), an online tool that uses a three-step process for entering data, categorising it, and building themes. Questionnaires were also available for patients to fill out. Participants were given the chance to review the transcripts of interviews/focus groups.

Quantitative data was collected to determine a baseline level of compliance with criteria relating to patient care in high technology medical imaging (based on the findings of two systematic reviews). This was performed using the JBI Practical Application of Clinical Evidence System.
(JBI PACES). Data were collected through observation and survey results. Further information on the specific methods used during this stage is located in Chapter 10.

A reflective journal with detailed notes was kept throughout the process by the researcher to keep a record of the experiences throughout the project (Chapter 11).

**PHASE 2: ACTION PLANNING**

Once the data collected throughout stage 1 was collated and analysed, it was presented back to all staff working within the department. During this process, focus groups were held to discuss the findings that emerged during stage 1, and actions planned collaboratively to be taken based on the results of the focus groups (Chapter 12).

**PHASE 3: ACTION TAKING**

As much as possible, the actions planned during phase 2 were implemented in the department (Chapter 13).

**PHASE 4: EVALUATING**

After implementing the changes, quantitative data was once again collected using JBI-PACES to determine if an improvement in compliance with the guideline had occurred. Questionnaires, observation and focus groups were once again conducted (Chapter 14).

**PHASE 5: SPECIFYING LEARNING**

The results of the data were analysed to determine the views of the participants regarding the change in their setting, the effect it has on them and their work. General findings from the project were identified and discussed (Chapter 15).
ETHICS:
In the course of this study, all attempts were made to safeguard human rights and respect for human dignity, and a number of processes and procedures were used to ensure the ethical standards of the project. Participants (both staff and patients) were guaranteed anonymity. All participants received a detailed plain language explanation in writing of what the research would involve, including: the aims and processes of the research; the identity of the researchers; the responsibilities of the researchers; possible benefits of the study; possible risks; measures to be taken to protect privacy; and were informed of the right to refuse to participate without penalty of any kind. Participants were asked to provide their informed consent without any coercion or unfair inducement. The plain language information sheet and consent form for staff and patients is attached (Appendices 10, 11 and 12).

Privacy, confidentiality and anonymity were ensured throughout the study. Strategies included the use of a code number instead of personally identifiable information. All participants were assigned pseudonyms, which were recorded in a field diary and on the digital field and the transcripts.

All digital files and transcripts were stored on the researcher’s personal computer that has the appropriate safeguards such as unique identification of authorised users, password protection, anti-virus control, firewall configuration, and scheduled and automatic backups to prevent against data loss or theft. Interview and group discussion data used in the project did not include identifiable information and all data collected was stored at the Joanna Briggs Institute where data analysis was undertaken. The field diary, demographic sheets and all paper copies of transcripts will be stored in a locked storage compartment in the Institute for five years.
CHAPTER 10 - ESTABLISHING A CLIENT SYSTEM INTERFACE AND DIAGNOSIS

‘Others cannot do the enlightening for participants, in the end, they are or are not enlightened in their own terms’

Stephen Kemmis

CHAPTER OVERVIEW
To conduct an action research project, it is imperative to find a setting filled with people who are willing to collaborate. The first phase of action research according to Susman and Evered is diagnosis, whereby the researcher and the team attempt to determine what is currently occurring in the department, and how this differs from the ideal situation. A description of the processes involved with setting up this project, and methods used during the diagnosis phase, follows.

GAINING ACCESS TO THE FIELD
The first task prior to conducting action research is gaining access to the field, or identifying a location where the research can be undertaken. This was a challenging process in and of itself. The initial attempt to secure a location in a large tertiary teaching hospital MRI department through a former colleague was not successful, so an approach was made to the manager of Radiology Services at a major metropolitan hospital in an Australian capital city. The manager of radiology services then directed my inquiries to the head of the MRI department, who was interested in the project and after preliminary meetings, agreed to take part. These meetings were held with the ‘professional gatekeepers’ as described by Morton-Cooper, key people in the department who had the necessary influence to assist in bringing people together and establishing the project. The next stage was gaining ethics approval, and a letter of support for the research project (Appendix 13). When negotiating access to the field, Morton-Cooper advises that the researcher should be modest and realistic in their requests, clear regarding resources, avoid stressful times, and offer something in return (i.e. a research bargain) for their efforts. This advice was followed as much as possible, and the benefits to the department, particularly in terms of a possible improvement in patient satisfaction, were stressed.

DEPARTMENT CHARACTERISTICS
The project took place in the MRI department of a major metropolitan hospital in an Australian capital city. The MRI department contains one Siemens Trio 3 Tesla scanner, which runs from 7am to 9.30pm weekdays, with weekend shifts and on-call also running. Each day 4-6
radiographers are rostered on, and the full staff consists of 10 MRI trained radiographers, 6 full time staff and 4 part time staff. Of the full time staff, 1 radiographer acts as the unit head, 1 as a supervisor, and one as a research senior. Between 2pm and 4pm each day there is some overlap between the morning and afternoon shifts.

In addition to radiography staff, there are 3 clerical staff within the department, with one starting at 7.30am, one at 8.30 am and one at 1pm. Each day, 2 or 3 radiology registrars are rostered to MRI. A consultant radiologist is usually present for a couple of hours in the morning and the afternoon each day. No nursing staff are present within the department, except when accompanying a severely ill inpatient. Each day approximately 18-26 patients are scanned. Weekend shifts normally scan between 8 and 11 patients and there are between 0-8 call in patients a week.

**ESTABLISHING A CLIENT SYSTEM INTERFACE**

Following ethics and departmental approval for the project (Appendix 14), the development of a client-system interface, as advocated by Pearson 1989 (cited in O'Brien 1991) and followed by O’Brien, was required prior to formally beginning the research process. This occurred over a series of preliminary meetings with departmental staff. This stage was particularly important for this project as I was coming in as an external agent to the workplace, and therefore time was required to establish myself as a member of the team. As described by Wicks and Reason, ‘action research projects that are programmatic, designed and initiated from outside and imposed on participants... will result at best in... an intermediate group.’ (p.249)

The success of action research projects can be determined by the originating discussions with co-researchers and staff and the need to open communicative space has been stressed. Before the initial processes of action research (such as cycles of action and reflection) can occur, relationships with the appropriate people need to be established. The researcher is required to obtain legitimacy and an agreement 'to engage in mutual inquiry' is required amongst all co-researchers.

Building relationships takes time and therefore, before formal data collection commenced, meetings were held with all department staff to introduce myself, the research project, and what I was trying to achieve during informal ‘afternoon tea’ type settings. Wicks and Reason highlight the following practices for opening communicative space; contracting, boundaries, participation, leadership, anxiety, chaos and order, liberatory and practical orientations. Each of these practices were addressed during this project, as outlined below:

- Contracting: A clear sense of purpose for the project was communicated early on. This was discussed and clarified in early discussions and meetings with the group.
• Boundaries: During meetings and focus groups, the use of the Chatham House rule was used, which states that ‘when a meeting is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker, nor that of any other participant, may be revealed.’ Meetings and focus groups followed a guide, but if participants wanted to have discussions tangential to the plan, this was encouraged if they felt it was important.

• Participation: The role of the action researchers, and others taking part in the project were made clear, with opportunities for these roles to be clarified.

• Leadership: The key leaders who were to be involved in the project were highlighted early on, as were their roles.

• Anxiety: Although it was clear that management were involved in the project, the main supervisor also gave time for discussions to be held when she was not present. It was continually stressed that this was not a judgmental or disciplinary inquiry.

• Chaos and order: All attempts were made to reduce impacts on workloads, and appropriate times were scheduled for meetings and focus groups, such as when additional staff were available, or the MRI machine was undergoing maintenance.

• Liberatory and practical orientations: The focus and purpose of the project was aimed to liberate and emancipate the radiographers from possible apathy regarding patient care and their work, whilst practically ensuring tasks could still be achieved, and improve the effectiveness of these tasks in terms of time management.

DIAGNOSIS METHODS
After it was felt that the client-interface had been established, and that a communicative space had been opened, the action research cycle as proposed by Susman and Evered was initiated. As mentioned above, the first phase of this cycle is diagnosis. A number of methods were used during this stage, both quantitative and qualitative in nature. Multi-method studies, incorporating both qualitative and quantitative approaches, can be useful to inform medical imaging professionals. To ensure this project would not be considered as ‘mix and match research’, for each data collection method employed was congruent with the methodological approach informing it, and only methods that supplemented each other were chosen. The methods used during this phase included a staff survey, patient survey, staff focus group, audit and a period of non-participant observation and reflective journaling. These methods were chosen to assist in triangulating the data, and were seen as complementary to each other. Each method was chosen due to their ability to answer a particular question posed by the research aims. Employing multiple approaches to data collection, allows a deeper understanding and a more full and rounded picture of the construct under investigation as it is viewed through a number of lenses and different datasets. The credibility (and therefore
trustworthiness)\textsuperscript{38} of the research can be improved by complimenting the limitations of one stated method with the strengths of another.\textsuperscript{79}

**FOCUS GROUPS**

Focus groups provide an open and non-threatening environment for the collection of detailed information pertaining to a particular topic,\textsuperscript{159} and have been widely used in action research studies.\textsuperscript{160} Focus groups are a data collection method consisting of a group discussion with a number of participants, and although various definitions exist, all of these 'centre on the use of interaction among participants as a way of accessing data that would not emerge if other methods were used.'(p. 800)\textsuperscript{161} As Kitzinger (1995)\textsuperscript{160} states, focus groups can be used not only to discover what people think, but how and why they think that way, which is ideal when examining work place cultures.\textsuperscript{160} Focus groups are a useful data collection technique when aiming for a qualitative description\textsuperscript{162} of a phenomenon, as such they were considered an ideal way to determine how the staff in the department currently viewed their role, practice, and patient care. The results of the focus group are presented in the following chapter.

The focus group was organised at a time which would allow a suitable number of radiographers to attend and was therefore scheduled when the morning and afternoon shifts crossed over. Refreshments were provided for the group. A semi-structured question guide was used, although discussions were allowed to diverge from the set questions. The sample size of the group was 7, which is regarded by Kitzinger\textsuperscript{160} (1990) and Krueger\textsuperscript{159} (1994) as an appropriate number, as with larger groups participation can be hindered. Due to time constraints, the focus groups were scheduled for one hour.

The focus group was taped using a digital recorder and then transcribed verbatim by the researcher. To ensure rigour, the transcribed results were sent to focus group participants for feedback, a process known as member checks.\textsuperscript{38, 161} Data analysis for the first focus group was conducted via a process of coding, categorising, and identifying themes, a process that has been used previously in focus group studies.\textsuperscript{161} This was facilitated via the Joanna Briggs Institute online Thematic Analysis Package (JBI-TAP).\textsuperscript{156} Acting as moderator for the focus group, transcriber, and analyst of the resultant data facilitated engagement and immersion with the data, which is considered one way to enhance the accuracy of the interpretive analysis.\textsuperscript{163}

**SURVEYS/QUESTIONNAIRES**

Surveys and questionnaires are a common data collection method used during action research projects.\textsuperscript{74, 155} To assist in the diagnosis stage, two surveys were conducted; one for the staff of the department and one for patients. Both surveys were kept short and simple in order to increase participation and completion of the surveys, and to reduce the chances of them being
seen as an inconvenience. The staff survey focused on the radiographer's role in the department and current approach to patient care (Appendix 15), whilst the patient survey focused on anxiety, satisfaction, and whether or not they had received information (Appendix 16). The results of the surveys are presented in the subsequent chapters.

Self-administered surveys or questionnaires, delivered at the service provider's site, are a common way to collect useful information regarding a patient's satisfaction with a healthcare service. When measuring satisfaction, there are a number of benefits of using self-administered surveys, including the fact that they are relatively inexpensive, there is no interviewer bias, and as respondents are anonymous they are not inhibited in their responses. Another reason this approach was chosen was because they were simple and easy to administer and did not require the presence of a researcher, which would not have been feasible for this project. The surveys incorporated both a Likert scale and a Visual Analogue Scale. The Visual Analogue Scale used to measure satisfaction was a 100mm long scale with patients asked to mark a point on the line between ‘totally dissatisfied’ and ‘extremely satisfied’. There is debate about the usefulness of a global (single item) measure for satisfaction, but it was felt that this approach would be the most feasible for this survey, particularly considering the amount of information we wanted to attain apart from satisfaction. Satisfaction has been measured in this way in other research studies, and has been found to be a reliable and valid way to measure satisfaction.

There are a number of approaches to measuring anxiety, with the three main ones being self report, observational (or behavioural) and physiological methods. For this project, a self report measure was the most feasible approach. Once again, the visual analogue scale was used to measure anxiety. This approach has been found to be a reliable and valid approach to measuring anxiety, and other studies assessing anxiety in medical imaging have also followed this approach.

**STATISTICAL ANALYSIS**

For the visual analogue scale results, the data was considered to be interval level data, and therefore a mean, mode and median were provided. The Likert scale data was considered ordinal scale data, and therefore a mean, mode and median were provided. Confidence intervals for the mean were reported. Responses to yes/no questions were reported as percentages. When testing hypotheses, although parametric tests have been used for visual analogue scale data, non-parametric tests were more appropriate in this case, as the sample was not random, ordinal or interval data was used, and the distribution was not normal. As such, the Mann Whitney U Test was chosen to determine if there was a difference when samples differed, and the Wilcoxon Signed Ranks Test for repeated measurements on the same sample.
REFLECTIVE JOURNALING

Reflection on practice is an integral part of the action research process, and action researchers often utilise research diaries or reflective journals during their projects. Throughout the diagnosis phase I spent two full days in the department (in addition to meetings and group discussions) where I acted as a participant observer. The degree of participation ranged from passive participation (observing but not taking part in any activities) to moderate participation (taking part in discussions or infrequently assisting in activities such as sliding) but never reaching active or complete participation. Field notes and observations were taken down during this time into a field diary, which was filled out by the researcher whilst in the setting. Field notes were jotted down quickly whilst in the presence of radiographers, and expanded upon in the tea room or when the radiographers were not present, so that it did not appear as if I was monitoring the radiographers every move, which may have led them to feeling uncomfortable. These notes were collated at a later date into a reflective journal, structured according to Kolb’s learning cycle, which states that reflecting is an essential element of learning (Figure 17). This learning cycle is structured such that after having an experience, a period of reflective observation is required, which incorporates reviewing the whole situation in the mind, exploring what occurred, and determining how people felt about the event. Following this, a period of abstract conceptualisation is necessary, where an understanding of what has occurred is developed by thinking abstractly about the event, seeking additional information about the experience and forming new ways for doing things in the future. The final step is active experimentation, whereby the ideas that were formed during abstract conceptualisation are tested. The process is cyclical and can thus begin again after this active experimentation of new ideas. The journal is structured in line with the first three steps of Kolb’s cycle, and provides the concrete experience, reflective observation, and abstract conceptualisation stages from my experiences during the two days spent in the MRI department. Further discussions were held with the working group to expand upon the content in the abstract conceptualisation stage prior to active experimentation.
AUDIT
A clinical audit was conducted to determine a baseline level of compliance with criteria relating to patient care in the MRI department (based on the findings of the two systematic reviews), and performed using the Joanna Briggs Institute Practical Application of Clinical Evidence System (JBI PACES). Clinical audit and feedback is an established method for the implementation of knowledge, and has been shown to result in improvements in practice. The following three criteria were measured:

1. Patient privacy measures are in place.
   - Measured by observation
2. Patients receive information prior to their scan.
   - Measured by the survey response
3. Patients who identify themselves as claustrophobic receive an intervention or additional support to assist them to undergo an MRI scan.
   - Measured by survey response
CHAPTER 11 – DIAGNOSIS RESULTS

‘You have to try to get them in and try to get the scan; the idea is to get the scan, in some way’

Radiographer

CHAPTER OVERVIEW
The results of the diagnosis phase in action research determine the direction and course of the entire project. The methods used during this phase included a staff survey, patient survey, staff focus group, audit and a period of non-participant observation and reflective journaling.

FOCUS GROUPS
The first focus group took place at 2pm on the 14th of March 2012 and lasted for one hour. There were 7 participants around an oval shaped table. All participants were female and had worked in MRI for an average of 10 years (standard deviation 8.7 years), ranging from one participant who was still in training and one participant who had worked in MRI for 25 years. The moderator began with an introduction to the focus group, including introducing the topic, the purpose of the focus group and Chatham house rules. A question/topic guide was used throughout the discussion; however, some of the questions were covered during the conversation for other questions, and were therefore not necessarily asked as individual questions but as a continuation of previous discussions. Pseudonyms were used for the participants. Data was analysed via a process of thematic analysis. There were 7 themes that emerged from 24 categories and 159 illustrations (Appendix 17). These themes and statements/quotations illustrating these are discussed in more detail below. The themes were:

- A trade off
- A wide range of patients, with a wide range of issues
- From one extreme to the other
- Getting the patient scanned
- It's not that bad
- On their side
- We are doing well, but...

A TRADE OFF
MRI is a time poor setting, which means that there is often a balancing act between difficult patients, providing patient care and completing scans in a timely fashion. As one of the radiographers said:
'We are so busy that we rush, we just do, because we are fast movers. We just rush all the time, we are swapping equipment, but at the same time the patient is just generally kind of standing there so it’s good to be able to multiskill and do all the things in the background whilst still explaining to your patient what’s going to happen to be time effective, as well as getting through the explanation, because we don’t kind of just bring them in and stand them there and talk to them for, you know, five minutes. We just don’t do that generally, but there is ways of bringing them in and getting communication across whilst still staying effective.'

Participants discussed their desire to spend more time explaining the procedure to the patients, but indicated that this was not possible due to the time pressures placed on the department, as described in the following excerpt:

‘Yvonne: We don't have 15 minutes certainly (explaining the scan)

Barbara: Not by choice but...

Yvonne: Yeah, not by choice, but yes...

Barbara: Yeah not by choice, but you can’t...the way everything runs...the bookings and...

Esther: And does that influence their experience? ... Probably, yes.’

Strategies for dealing with troublesome patients were also discussed. Participants described cases where the radiographer had to use their clinical judgement to determine if they should shorten the scan because getting some images was considered better than nothing.

‘Yvonne: It’s a good question (making the scan longer or shorter for troublesome patients)...very good question...it’s a trade off

Esther: It’s personal judgment

Louise: Yeah...sometimes they tell you ‘I’m not going to be in here for longer than a minute!’ or something, so you think, you just, you know, do a few sub second scans to get something

‘Anne: It's a trade off with MRI, if you make the scan shorter you lose some resolution or something somewhere...but then you might get an image, that the doctor can use.’

Radiographers expressed the need for more time to prepare patients who may be feeling anxious or claustrophobic:

‘Pam: Also, we have the question, are you claustrophobic or not, and if they tick yes we will pay more attention to them and ask if they have taken some medication or something like that’
'Barbara: Well I’m saying like time poor, we don’t have the time...before their appointment, to go out to the waiting room and spend that time...but if you do have a patient, you can assess instantaneously if your patients totally nervous...or going to have a problem and that’s where you then do spend the time, before you get them in the room...if you have the time then you do spend more time with that patient then you would with someone else who is quite happy and has had one before and is comfortable and knows the routine.’

A WIDE RANGE OF PATIENTS, WITH A WIDE RANGE OF ISSUES

During the focus group, the staff shared their experiences of working with a wide range of patients with varying presentations.

‘Yvonne: we get a lot of sick people, and they’re anxious, and they have weird pathology, and they are weird’

Angry patients were discussed, from those who showed simple frustration, to more confronting and aggressive behaviour, which is sometimes hard to deal with.

‘Barbara: Some get angry if they’ve just been sitting in the waiting room for a while’

‘Esther: Do you remember that man, in the wheelchair, that got really angry about having to wait...I think I was working with you, and he started yelling obscene language...he was clearly demented, because he had a memory problem, and he wasn’t waiting that long, and we went out and spoke to him once he started yelling, every 2 minutes we would go out, he’d say how much longer and we’d tell him, 7 minutes, 5 minutes, 3 minutes...’

Yvonne: I had another lady, who really yelled... sometimes they’ve got a frontal tumour, and they can’t help it’

Anxious or claustrophobic patients were often encountered, although their levels of anxiety and claustrophobia fluctuated.

‘Barbara: My worst was that anxious, that by the time I got back to the console, and by the time I was starting up the scan, I looked up and he was banging at the window, they were that terrified’

‘Pam: the funny thing about claustrophobic patients is they are very apologetic so we try hard to make them understand that it quite often happens and it is nothing to be ashamed of...because the big strong man can often be ashamed.’

‘Yvonne: We get it at a lot... (agreement)

Esther: I’ve never had severe though, ever
Yvonne: I've had some that have to hold my hand...

Esther: Sweats and heart racing types stuff but never any that have ever had to climb out...

Barbara: Panicking...thrashing, just total chaos

Yvonne: I had one guy that was a real needle-phobe, a young fella, but he had had a tattoo, and I was like how does that work?

Esther: that is a whole lot of needles!

Participants also recognised that certain cultures may struggle more with MRI than others, such as in this case:

‘Yeah I had an Aboriginal guy that did that...I think I had one sequence, I was planning my next one, and the next one they were knocking on the window...he was Aboriginal, and they often don’t like MRIs’

Other more difficult patients were spoken about with little regard, such as in the following cases:

‘Barbara: Well, who was working with me, with this fat, fat person we had to put the slip ring around

Yvonne: Me...I don’t know if I was working with you but I have done that...they slip in better

Louise: And they don’t get stuck in there

Barbara: greasing them up a bit’

FROM ONE EXTREME TO THE OTHER

Radiographers need to expect the unexpected and pick up patient signs which may indicate they are anxious, nervous, or claustrophobic.

‘Esther: We experience it all here really, don’t we?’

‘Yvonne: But in the course of one morning, like the morning you were with us, we went from one extreme to another, we had one really claustrophobic patient, and another one said they would like to stay in there longer, they were so relaxed.’

As this was the case, radiographers had to learn to pick up the signs of when a patient may turn troublesome at any moment.

‘Louise: yeah, body language is big...and they start making all excuses...oh they’re thirsty, they just try to delay it, put it off...
Sandy: Can’t breathe...

Esther: Fidget, a lot...stop listening to you.

Yvonne: Yeah they do, they actually sweat. They have a physiological reaction

Esther: You just do what Barbara said before about stopping and taking the time for them there when you notice it I suppose...and usually you can when they first look at the scanner when they first walk in they will generally say something...and even if they don’t they kind of get a bit agitated with their body language, they start to fidget a bit and they don’t really listen to you so you can sort of tell’

Patients often present differently from expected and in some cases patients who state they aren’t anxious or claustrophobic actually are.

‘Esther: Claustro patients tick yes on the form, but you know maybe 2 out of 5 times or 2 out of ten times they don’t

Yvonne: They don’t know

Louise: Yes, because they don’t actually know (they are claustrophobic) until they get here sometimes...they can go into lifts and stuff but then they come in here...

Esther: Yes, that’s right, so how do you know, that they are....?

Esther: I think the last 2 or 3 patients I’ve done that have turned into being claustrophobic didn’t say yes (to claustrophobia) on the questionnaire, so that was just a random occurrence where the radiographer picked up on it just by pure body language I suppose, so that’s important as well...because they don’t always know.’

The opposite can also happen; where a reaction is expected, but everything goes smoothly.

‘Yvonne: Do you remember (our manager) wanted us to both work through lunch last week because a patient was very aggressive? And she didn’t want us to work on our own? That’s how bad he was, and she’s never said that before and he was perfectly fine, I think you worked through lunch, and he was really fine, he was a pussycat, absolutely fine.

Yvonne: You know that man who was meant to be really anxious, that man with the leg? Was he fine when you got him? Or was he...?

Yvonne: You know that man who was meant to be really anxious, that man with the leg? Was he fine when you got him? Or was he...

Sandy: Yeah absolutely, I’d explained to him that someone had rung CT and they were all good and he went ‘okay, good’ Barbara: Was that the man who needed to pee?
Sandy: Yes’

**GETTING THE PATIENT SCANNED**

The radiographers placed significant importance on getting the patient scanned in some way and had strategies to do this.

‘Anne: If they say I don’t want to do it you can’t just say oh okay then, you have to try to get them in there, try to reassure them it’s not going to be that bad, at least they have had a go, otherwise they go away and say she didn’t even try, you have to try to get them in and try to get the scan, the idea is to get the scan, in some way’

The importance of communicating with the patients to ensure scan acquisition was stressed, and strategies discussed.

Yvonne: ‘...a clear explanation... of everything that’s going to happen to them.... I think, it’s probably vital, that way they feel comfortable in that situation, and knowing what to expect, as well’

Barbara: Taking time to communicate effectively I think, in your explanation as to what’s going to happen.

Louise: You need to tell them the machines not shut it stays open at both ends...and I say that we can actually see you ...but unless you have that little mirror on they can’t see us but that buzzer is a lifeline

Sandy: We never say enclosed space... Anne...or coffin!

Yvonne: We make a big thing about all the ends being open, and you can get out any time you like...because the thought of being trapped...is a big trigger, it will make it worse...’

At times, the patient would need to be persuaded or coaxed into the scanner.

‘Esther: Pander to them, because the angry ones have always got some kind of grudge to bear, so you just agree with them, just pander whatever they are angry about, its generally not us, but something else.

Anne: There’s a lot of coaxing... Oh well, sometimes they are a bit hesitant, ‘I don’t think I can do it’, you know, and you have to sort of coax them in, or just give it a go, go in and have a little trial run, and say we will bring you out again before we put the equipment on you, we will see how we go, just let’s get through a few scans and see how you go, lots of issues like that really...try to persuade them, yeah...’
Providing the patient with constant reassurance during the scan and a sense of being in control were deemed important.

‘Yvonne: ... sometimes I give them the control, so, its ultimately up to them if they have the scan, you know, it’s great to have the scan so the doctor can have that information, but it’s up to you if you have it, sometimes they just want you to say that,

Pam: it is also helping when they know they are in control of the situation, they can know to squeeze the ball and we will respond to it, so it’s really important to know, the explanation

Louise: I always say we’re watching you, we can’t see you, but the buzzer is, as soon as you squeeze that we’ll be on to you

Anne: we talk to them and reassure them over the speaker... Sandy: it’s important they understand they’ve got that buzzer and they can use it’

Other strategies were also required at times to get the scan.

‘Sandy: but they are more likely to be worried about being stuck in there than they are to actually be scared of the small space, so that’s when you wrap them up, put them in and bring them out and say ‘look you don’t get stuck’

Anne: (referring to anxious people, but not necessarily claustrophobic) They can have a pill prescribed by the ward or the doctors here, or the GP, and yea just talk to them like we’ve been saying really... yeah...

‘Anne: We’ve got an eye mask intervention and sometimes we use that, it’s not very popular but some people...

Louise: Some people love it

Sandy: Yea, they either love it or they hate it’

Yvonne: You’ve got various things...if they can go feet first, some can’t...you’ve got various strategies...they like the mirror to look out, or they like an eye mask... reassure them that they are actually really safe, there is no radiation and... that’s it... but if you tell them that they are completely safe....I still tell my parents that they’re really safe, there is nothing in there that can harm you, even if there not claustrophobic, I find it helps

Louise: and I always as I’m putting them in I touch them until they go in...I say are you okay before I leave because quite often if you leave them they will squeeze the buzzer...but if you touch them and see how they are going...
Esther: I think that touching point is very important, I always put my hand on them

Anne: the music is a big factor, it is really popular, I would say 9 people out 10 will want music, and that really helps them. And there is a fan, there’s lots of air, you just emphasise there is lots of air...

Sandy: make the point of the fact that the room is nice and bright and open, and there is a window and we can see them, and that they are going into a tunnel, and not a closed up space and... so yeah, you have to really tell all the good points about it, rather than saying its small and its tight...

Esther: and you’ll heat up!

Sandy: ... and that it will cook you’

IT’S NOT THAT BAD

This represents the thoughts of the radiographers that in comparison to other investigations, MRI is not that bad, and patients sometimes aren’t troubled by it, despite the misinformation surrounding MRI. The radiographer often has to combat this misinformation in their explanation to the patient.

‘Yvonne: They get horror stories from other patients in the ward and from rellies...

Barbara: From friends of friends of friends of friends!

Yvonne: they tell horror stories, and they come frightened to start off with, and then they’ll say it’s not that bad’

One radiographer told the story of how one patient wanted a thorough explanation to help dispel misinformation in his community.

‘Pam: Actually once I had a patient who was an Aboriginal, I think he was an elder or something, but what he asked us to do he asked if his family, his kids, his wife could come in and he just ...we explained to him first, then he went in and he just showed, he was lying on the table and said ‘see there’s nothing to be worried about’ but he was talking to them in his own language so I guess he was showing them there was nothing to be afraid of so they could spread the word in their community...it was very wise of him to do’

There was also a view that the examination, although fearful, was not as bad as other healthcare investigations, and that it could be worse.

‘Esther: I think more to the point is that it is in comparison to others because generally I think you are always going to get some negativeness from people who don’t enjoy the experience...but it’s not as bad as the dentist!'
Yvonne: I agree!

Sandy: That’s right, people will say that was awful, that was the worst thing that’s ever happened to me, and I went ‘I’m sure I could think of much worse things to happen to me than that!’

Anne: Lying down for half an hour!

Sandy: …we didn’t stick anything in you, or hurt you or…’

Rarely the patient’s themselves will say that experience was not that bad, or even pleasant.

‘Esther: Yeah...it’s rare, I’d say, ish, that someone would describe it as being an enjoyable experience, that they had a nice sleep or something like that...yeah, it’d be about one a day I’d say it’s kind of rare’

ON THEIR SIDE
Radiographers are on the patient’s side, and are a caring profession. Some of the experiences related during the focus group showed true concern for the patient and empathy.

‘Pam: It’s also very important to gain patient trust, as we already explain about the lot of noise, and that it can be uncomfortable for you, and at the end of the day we are sort of on their side, we are not a part of the machine we are sort of with the patient, looking after the patient talking to the patient, so it’s nice to spend some time with the patient, even just a couple of minutes before the examination’

‘Louise: Well we are thinking long term because you don’t want to just quickly get them in, give them a bad experience and then they’ll never want to come back again...

Pam: One time I was concerned about a patient who was not a very good communicator for some reason, they had Parkinson’s disease, we couldn’t understand him...I was really concerned about this patient...at the end of the day we are sort of on their side, we are not a part of the machine we are sort of with the patient, looking after the patient talking to the patient,’

The radiographers also saw patient care as a large part of their role.

‘Esther: Our role is to make it an effective examination for the patient...what we feel we need to contribute to the patient in patient care

Yvonne: So that they can complete their examination, because you really want them, at the end of the day, to be able to complete their examination with the least stress that they possibly can...and the least pain’
WE ARE DOING WELL, BUT...

There was a thought that the department was doing well, particularly in comparison to other local departments, but there were areas for improvement.

‘Louise: (referring to how their department is compared to others) A lot of them say that I’ve had one elsewhere and this has been much better

Yvonne: I think, what you find, is that they don’t have anything... they don’t get as much explanation as we give them...I think we’re good

Sandy: Yeah, I think they feel that in private there is not the same time, I mean I know we are very busy here but we still take that time to talk to our patients and get them in there, even though we’ve got queues of people.’

It wasn’t just the radiographers who had roles to play during the imaging process, and they discussed the role of doctors and administrative staff as well.

‘Sandy: And the docs I guess are a big part of it... we’ve got to get them to give injections...they have to be involved and know what’s going on

Louise: They’re not actually a big part though (referring to doctors)

Yvonne: No, because if they need informed consent, we go and tell them, what to come and say.

Louise: Exactly... that’s right

Barbara: I don’t think they are a big part

Yvonne: Small part

Louise: Tiny

Sandy: A little part then...

Yvonne: They’re not at the forefront as such

Sandy: They’ll go up and give sedation...

Esther: Yeah, here’s your tablet...woohoo

Sandy:...after you’ve done all the work first and gone up and told the radiologist
Anne: With the radiologists, they're not really into patient communication...are they? Because they sit in their room and report all day, they don’t really have much interaction, unless it is interventional work.’

The view was more positive towards the role of the reception staff.

‘Sandy: I think our front desk staff have a huge role to play, really, because they are the first person the patient sees, and also they speak to them the day before, so if they’re not overly friendly or there busy or they just don’t talk to them then that can start them off totally on the wrong foot and then we’ve got twice as much to do to try to talk them into it’

Although the radiographers agreed their staff were doing a good job, they did want to continue improving.

‘Yvonne: Except now I want to have a television on the wall in the new hospital...I think that sounds like a really good idea, I know they watch movies, and they wear 3d type of glasses...the children’s have it…’

‘Esther: Well the patient’s survey will be very interesting to find out what they’re writing...because generally people write really negative things or really positive things

Yvonne: It will be very interesting, the feedback...it will be good to know whether it is in line with what we think, because it may not be...it’ll be very interesting to know

Anne: It may not be!

Louise: That’s right, we may be patting ourselves on the back

Sandy: They’re all telling us we are awful!

Moderator: We will find out!

Yvonne: We will!’

‘Esther: It makes you want to be a better communicator, doesn’t it? Talking about it.’
**Patient Survey**

The patient survey occurred over a period of six weeks, from the 15\(^{th}\) of March until the 30\(^{th}\) of April 2012. Outpatients were phoned by the administration staff on the day before their examination to determine whether or not they were willing to take part.

On the first day of scheduled data collection, I received a call from one of the senior radiographers, who informed me that there might be a problem. The receptionist administering surveys had thought that I would be in the department to assist. Additionally, there appeared to be internal conflicts between the reception staff, with one marking the patients who needed to fill in a survey in the diary, rather than the day list. I immediately went to visit the department staff, and it was decided that the patients filling in surveys would be highlighted in the appointment book and it seemed to be fixed. At 5.30pm I visited once again to check with the evening receptionist if everything was okay and was told it was fine.

There were 121 responses to the survey, although not all surveys were complete, which resulted in a lower number of responses for some questions. All participants in the survey were outpatients. Due to an oversight, no demographic data was collected. The responses to the questions are reported below.
**SURVEY RESULTS**

1. **To your knowledge, did you take any medication or sedatives prior to your scan? (Yes/No answer)**

120 Responses

Table 6: Taken medications

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<thead>
<tr>
<th>Taken medication</th>
<th>Frequency</th>
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Figure 20: Taken medications

2. **Did you receive information explaining the procedure and what to expect prior to your scan (either written or verbal)? (Yes/No answer)**

111 Responses

Table 7: Information

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<th>Given Information</th>
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Figure 21: Information
2. (a) If yes, did you find this information useful? (4-point Likert scale used, 1-not at all, 2-barely, 3-somewhat, 4-very much so)

101 Responses

Table 8: Usefulness of information

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<th>Rating of Information</th>
<th>Mode</th>
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<th>95.0% Upper Confidence Limit</th>
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Figure 22: Usefulness of information
3. How anxious were you during your scanning experience? (visual analogue scale, where 0 indicates no anxiety, and 10 represents maximum anxiety)

120 responses

Table 9: Anxiety

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<th>Anxiety Visual Analogue Scale</th>
<th>Frequency</th>
<th>Percent</th>
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<td>3</td>
<td>2.500</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>4.167</td>
</tr>
</tbody>
</table>

Figure 23: Anxiety

Table 10: Anxiety Descriptive statistics

<table>
<thead>
<tr>
<th>Anxiety Visual Analogue Scale</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>0.000</td>
</tr>
<tr>
<td>Median</td>
<td>2.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>2.617</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>2.075</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>3.159</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.999</td>
</tr>
</tbody>
</table>
Subgroup – patients who have had a scan before.

94 responses

Table 11: Anxiety in patients scanned before

<table>
<thead>
<tr>
<th>Anxiety of those who have had a scan before</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>38</td>
<td>40.426</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>7.447</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>12.766</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>8.511</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4.255</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>7.447</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>6.383</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>6.383</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>2.128</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>4.255</td>
</tr>
</tbody>
</table>

Figure 24: Anxiety in patients scanned before

Table 12: Descriptive statistics Anxiety in patients scanned before

<table>
<thead>
<tr>
<th>Anxiety of those who have had a scan before</th>
<th>Mode</th>
<th>Median</th>
<th>Arithmetic Mean</th>
<th>95.0% Lower Confidence Limit</th>
<th>95.0% Upper Confidence Limit</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>2.000</td>
<td>2.574</td>
<td>1.968</td>
<td>3.181</td>
<td>2.960</td>
</tr>
</tbody>
</table>
Subgroup: Anxiety of those having their first scan

16 responses

Table 13: Anxiety first time scanned

<table>
<thead>
<tr>
<th>Anxiety of first time scan</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6</td>
<td>37.500</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>6.250</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>12.500</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>12.500</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>6.250</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>6.250</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>12.500</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>6.250</td>
</tr>
</tbody>
</table>

Figure 25: Anxiety first time scanned

Table 14: Descriptive statistics anxiety first time scanned

<table>
<thead>
<tr>
<th>Anxiety of first time scan</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>0.000</td>
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<tr>
<td>Median</td>
<td>2.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>2.813</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>1.125</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>4.500</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.167</td>
</tr>
</tbody>
</table>
Subgroup: patients who did not receive information

19 responses

Table 15: No information (anxiety)

<table>
<thead>
<tr>
<th>Anxiety in those who did not receive information</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>21.053</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>10.526</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>21.053</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>5.263</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>15.789</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>5.263</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>21.053</td>
</tr>
</tbody>
</table>

Figure 26: No information (anxiety)

Table 16: Descriptive statistics no information (anxiety)

<table>
<thead>
<tr>
<th></th>
<th>Anxiety in those who did not receive information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>0, 2, 10</td>
</tr>
<tr>
<td>Median</td>
<td>2.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>4.000</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>2.189</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>5.811</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.756</td>
</tr>
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</table>
Subgroup: Anxiety in those who did receive information

92 responses

Table 17: Anxiety received information

<table>
<thead>
<tr>
<th>Anxiety in those who received information</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>41</td>
<td>44.565</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>7.609</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>9.783</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>10.870</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4.348</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5.435</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>6.522</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>5.435</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>2.174</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>2.174</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>1.087</td>
</tr>
</tbody>
</table>

Figure 27: Anxiety received information

Table 18: Descriptive statistics anxiety received information

<table>
<thead>
<tr>
<th></th>
<th>Anxiety in those who received information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>0</td>
</tr>
<tr>
<td>Median</td>
<td>1.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>2.293</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>1.724</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>2.863</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.752</td>
</tr>
</tbody>
</table>
Subgroup: Anxiety in those not on medication

94 responses

Table 19: Anxiety no medication

<table>
<thead>
<tr>
<th>Anxiety with no medication</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>40</td>
<td>42.553</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>10.638</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>9.574</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>7.447</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4.255</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>9.574</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>5.319</td>
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<tr>
<td>7</td>
<td>3</td>
<td>3.191</td>
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<tr>
<td>9</td>
<td>3</td>
<td>3.191</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>4.255</td>
</tr>
</tbody>
</table>

Figure 28: Anxiety no medication

Table 20: Descriptive statistics anxiety no medication

<table>
<thead>
<tr>
<th></th>
<th>Anxiety with no medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>0</td>
</tr>
<tr>
<td>Median</td>
<td>1.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>2.426</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>1.819</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>3.032</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.960</td>
</tr>
</tbody>
</table>
**Subgroup: Anxiety in those who have taken medication**

25 responses

Table 21: Anxiety taken medication

<table>
<thead>
<tr>
<th>Anxiety in those who have taken medication</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7</td>
<td>28.000</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>20.000</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>12.000</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>4.000</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>8.000</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>4.000</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>12.000</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>8.000</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>4.000</td>
</tr>
</tbody>
</table>

Figure 29: Anxiety taken medication

Table 22: Descriptive statistics anxiety taken medication

<table>
<thead>
<tr>
<th></th>
<th>Anxiety in those who have taken medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>0.000</td>
</tr>
<tr>
<td>Median</td>
<td>3.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>3.440</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>2.167</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>4.713</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.083</td>
</tr>
</tbody>
</table>
4. How satisfied were you with your scanning experience? (visual analogue scale, where 0 indicates totally dissatisfied and 10 is extremely satisfied)

115 Responses

Table 23: Satisfaction

<table>
<thead>
<tr>
<th>Satisfaction Visual Analogue Scale</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>3.478</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0.870</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0.870</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>4.348</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>5.217</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>7.826</td>
</tr>
<tr>
<td>9</td>
<td>22</td>
<td>19.130</td>
</tr>
<tr>
<td>9.5</td>
<td>1</td>
<td>0.870</td>
</tr>
<tr>
<td>10</td>
<td>66</td>
<td>57.391</td>
</tr>
</tbody>
</table>

Figure 30: Satisfaction

Table 24: Satisfaction descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction Visual Analogue Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.857</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.459</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.254</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.150</td>
</tr>
</tbody>
</table>
Subgroup: Satisfaction of those who have received a scan before

90 responses

Table 25: Satisfaction scanned before

<table>
<thead>
<tr>
<th>Satisfaction of those who have been scanned before</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>4.444</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1.111</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>1.111</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>4.444</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>2.222</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>8.889</td>
</tr>
<tr>
<td>9</td>
<td>18</td>
<td>20.000</td>
</tr>
<tr>
<td>9.5</td>
<td>1</td>
<td>1.111</td>
</tr>
<tr>
<td>10</td>
<td>51</td>
<td>56.667</td>
</tr>
</tbody>
</table>

Figure 31: Satisfaction scanned before

Table 26: Descriptive statistics satisfaction scanned before

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction of those who have been scanned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.783</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.295</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.272</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.332</td>
</tr>
</tbody>
</table>
**Subgroup: Satisfaction of those who had not been scanned before**

16 responses

Table 27: Satisfaction (first scan)

<table>
<thead>
<tr>
<th>Satisfaction of first time scans</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1</td>
<td>6.250</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>18.750</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>25.000</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>50.000</td>
</tr>
</tbody>
</table>

Figure 32: Satisfaction (first scan)

Table 28: Descriptive statistics satisfaction (first scan)

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction of first time scans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>9.500</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.937</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.197</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.678</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.389</td>
</tr>
</tbody>
</table>
Subgroup: Satisfaction in those who did not receive information

15 responses

Table 29: Satisfaction (no information)

<table>
<thead>
<tr>
<th>Satisfaction in those who did not receive information</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>6.667</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>13.333</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>6.667</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>13.333</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>20.000</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>40.000</td>
</tr>
</tbody>
</table>

Figure 33: Satisfaction (no information)

Table 30: Descriptive statistics satisfaction (no information)

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction in those who did not receive information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>9.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.333</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>7.193</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.473</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.059</td>
</tr>
</tbody>
</table>
Subgroup: Satisfaction in those who did receive information

91 responses

Table 31: Satisfaction (received information)

<table>
<thead>
<tr>
<th>Satisfaction of patients who received information</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>4.396</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>1.099</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>2.198</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>4.396</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>7.692</td>
</tr>
<tr>
<td>9</td>
<td>18</td>
<td>19.780</td>
</tr>
<tr>
<td>9.5</td>
<td>1</td>
<td>1.099</td>
</tr>
<tr>
<td>10</td>
<td>54</td>
<td>59.341</td>
</tr>
</tbody>
</table>

Figure 34: Satisfaction (received information)

Table 32: Descriptive statistics satisfaction (received information)

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction of patients who received information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.918</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.455</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.380</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.220</td>
</tr>
</tbody>
</table>
Subgroup: Satisfaction of those who did not take medication

90 responses

Table 33: Satisfaction (no medication)

<table>
<thead>
<tr>
<th>Satisfaction in those who have not taken medication</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>3.333</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1.111</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>1.111</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>4.444</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>4.444</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10.000</td>
</tr>
<tr>
<td>9</td>
<td>17</td>
<td>18.889</td>
</tr>
<tr>
<td>9.5</td>
<td>1</td>
<td>1.111</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>55.556</td>
</tr>
</tbody>
</table>

Figure 35: Satisfaction (no medication)

Table 34: Descriptive statistics satisfaction (no medication)

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction in those who did not take medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.817</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.366</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.267</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.152</td>
</tr>
</tbody>
</table>
Subgroup: Satisfaction in those who did take medication

24 responses

Table 35: Satisfaction taken medication

<table>
<thead>
<tr>
<th>Satisfaction in those who did take medication</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>4.167</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>4.167</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>8.333</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>20.833</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>62.500</td>
</tr>
</tbody>
</table>

Figure 36: Satisfaction taken medication

Table 36: Descriptive statistics satisfaction taken medication

<table>
<thead>
<tr>
<th>Mode</th>
<th>10.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.958</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.023</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.894</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.216</td>
</tr>
</tbody>
</table>
5. If you were anxious, what would you say was the main cause of this?

1. Potential results of the scan
2. Scanning equipment and design
3. Hospital staff and environment
4. Previous claustrophobia

53 responses

Number only

Table 37: Cause of anxiety

<table>
<thead>
<tr>
<th>Cause of Anxiety</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>40.983</td>
</tr>
<tr>
<td>2</td>
<td>16</td>
<td>26.229</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1.639</td>
</tr>
<tr>
<td>4</td>
<td>19</td>
<td>31.148</td>
</tr>
</tbody>
</table>

Figure 37: Cause of anxiety

Response to question

Table 38: Cause of anxiety (multiple responses)

<table>
<thead>
<tr>
<th>Cause of Anxiety</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17</td>
<td>32.692</td>
</tr>
<tr>
<td>1,2</td>
<td>3</td>
<td>5.769</td>
</tr>
<tr>
<td>1,3,4</td>
<td>1</td>
<td>1.923</td>
</tr>
<tr>
<td>1,4</td>
<td>4</td>
<td>7.692</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>15.385</td>
</tr>
<tr>
<td>2,4</td>
<td>5</td>
<td>9.615</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>26.923</td>
</tr>
</tbody>
</table>

Figure 38: Cause of anxiety (response)
Other causes of anxiety not listed:

ID7: Closeness of the machine

ID11: A little hot in the scanner

ID13: If I would suffer claustrophobia experience

ID18: Sinus draining

ID23: Went to sleep.

ID29: Not knowing what to expect

ID35: not had claustrophobia previously but felt it this time however staff were very helpful

ID36: Just nervous

ID40: Got quite warm towards end of scan

ID44: Having had to wait such a long time

ID50: There are obviously various types of MRI, so prior explanation would be reassuring

ID54: Unable to stop muscle spasms if they occur during scans

ID56: PAIN!!

ID58: Finding the location

ID61: A little bit of claustrophobia

ID68: No information because hospital had wrong address (7 instead of 71 in street number)

ID74: My pain and being able to keep still

ID87: Painful burning feeling

ID91: Worried about moving – swallowing or coughing

ID108: Happy with staff and equipment

ID114: needle/dye
6. If you were anxious, did the actions of hospital staff within the department reassure you? (4-point Likert scale used, 1-not at all, 2-barely, 3-somewhat, 4-very much so)

66 responses

Table 39: Actions of staff

<table>
<thead>
<tr>
<th>Rating of actions performed</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>7.576</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>4.545</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>22.727</td>
</tr>
<tr>
<td>4</td>
<td>43</td>
<td>65.152</td>
</tr>
</tbody>
</table>

Figure 39: Actions of staff

Table 40: Descriptive statistics actions of staff

<table>
<thead>
<tr>
<th>Rating of actions performed</th>
<th>Mode</th>
<th>Median</th>
<th>Arithmetic Mean</th>
<th>95.0% Lower Confidence Limit</th>
<th>95.0% Upper Confidence Limit</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.000</td>
<td>4.000</td>
<td>3.455</td>
<td>3.234</td>
<td>3.675</td>
<td>0.898</td>
</tr>
</tbody>
</table>

7. Have you previously had a scan, either here or in another department? (yes/no answer)

110 responses

Table 41: Previously scanned

<table>
<thead>
<tr>
<th>Previous scan</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>16</td>
<td>14.545</td>
</tr>
<tr>
<td>y</td>
<td>94</td>
<td>85.455</td>
</tr>
</tbody>
</table>

Figure 40: Previously scanned
8. If yes, how anxious were you during your last scanning experience? (visual analogue scale, where 0 indicates no anxiety, and 10 represents maximum anxiety)

95 responses

Table 42: Previous anxiety

<table>
<thead>
<tr>
<th>Previous Anxiety VAS</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>36</td>
<td>37.895</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>9.474</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>7.368</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3.158</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4.211</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>9.474</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>4.211</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>8.421</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>9.474</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>3.158</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>3.158</td>
</tr>
</tbody>
</table>

Figure 41: Previous anxiety

Table 43: Descriptive statistics previous anxiety

<table>
<thead>
<tr>
<th></th>
<th>Previous Anxiety VAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>0</td>
</tr>
<tr>
<td>Median</td>
<td>2.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>3.179</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>2.499</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>3.859</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.339</td>
</tr>
</tbody>
</table>
9. How satisfied were you with your scanning experience? (visual analogue scale, where 0 indicates totally dissatisfied and 10 is extremely satisfied)

93 responses

Table 44: Previous satisfaction

<table>
<thead>
<tr>
<th>Previous Satisfaction VAS</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>3.226</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1.075</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2.151</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>2.151</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>4.301</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>9.677</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>11.828</td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>13.978</td>
</tr>
<tr>
<td>10</td>
<td>48</td>
<td>51.613</td>
</tr>
</tbody>
</table>

Figure 42: Previous satisfaction

Table 45: Descriptive statistics previous satisfaction

<table>
<thead>
<tr>
<th>Previous Satisfaction VAS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.527</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.081</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>8.993</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.263</td>
</tr>
</tbody>
</table>
10. Finally, do you know what type of scan you had today? (if known)

100 responses

Table 46: Scan type

<table>
<thead>
<tr>
<th>Scan Type</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain and spine</td>
<td>3</td>
<td>3.000</td>
</tr>
<tr>
<td>Brain/head</td>
<td>27</td>
<td>27.000</td>
</tr>
<tr>
<td>Left shoulder</td>
<td>1</td>
<td>1.000</td>
</tr>
<tr>
<td>Liver/ MRICP</td>
<td>1</td>
<td>1.000</td>
</tr>
<tr>
<td>MRI</td>
<td>45</td>
<td>45.000</td>
</tr>
<tr>
<td>Neuralgia scan</td>
<td>1</td>
<td>1.000</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1.000</td>
</tr>
<tr>
<td>Right wrist</td>
<td>1</td>
<td>1.000</td>
</tr>
<tr>
<td>Spine</td>
<td>8</td>
<td>8.000</td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>12.000</td>
</tr>
</tbody>
</table>

Figure 43: Scan type

Comments and feedback from patients
ID4: This was a longer MRI, as only remember having one for breast cancer before. Good luck with your PHD

ID5: All pleasant.

ID6: Pleasant staff, very helpful

ID7: Great that they explained the bed was going to get hot – if they could tell you much time is left (sic) – and keep reassuring you

ID12: Thanks for Robbie Williams music

ID13: All good thanks

ID18: A way to stop saliva in mouth causing me to swallow

ID19: All hospital staff were great, thankyou

ID23: Information between hospitals for records, should on computer for use of nurses between hospitals, and questionnaire prior to scan should be answered by patient and returned to hospital prior to scan, so as information can be (cannot read) for scan without (cannot read) to hospital or patient

ID36: All good

ID43: Found staff very obliging and helpful

ID44: I had to wait an hour for the MRI

ID48: Staff was excellent. Very happy

ID49: All good!

ID50: Mary was extremely reassuring and Susan was extremely pleasant at reception

ID52: All staff wonderful

ID54: During today’s scan, staff were more interactive, friendly, informative and reassuring than in the past, this was helpful

ID57: Am very much satisfied during my scan and the staff are very friendly. Thank you!!!

ID61: Radiographers could have explained what to expect is sounds, narrow chamber etc. Although I had been before and personally knew what to expect. The sounds in earphones were muffled and I could not understand what the were telling me – I did know to keep still.

ID64: It would be very handy to be able to hear music of noise of scanner
ID69: Well conducted

ID70: The staff are reassuring and understanding

ID75: Thanks to very kind treatment I received from MRI staff today

ID76: All ok

ID84: This was more a check-up – every 2 years or so

ID88: Very friendly and informative staff

ID89: Staff as always are lovely and professional

ID92: I had other issues to occupy my mind. Hope results will be known to me later today with oncologist.

ID103: The staff were wonderful and friendly

ID104: Well done for a good staff. Keep the good job

ID113: Very comfortable and relaxed. Thankyou to a great staff!

ID117: I could not clearly hear/understand what was being said during the procedure. I was given an injection during the procedure but do not know why

ID120: Machine is too closed in

ID 121: The ladies were very friendly. 😊
Further Analysis

A number of different questions were put to the test using statistical analysis.

As the department believed they were doing well in patient care, and to determine whether or not there was a difference in anxiety and satisfaction from previous scan anxiety and current scan anxiety, the results of various questions were compared. A difference may have been expected as the radiographers were aware of the survey and therefore a Hawthorne effect may have occurred, although they were blind to as what patients were filling out the survey. It also may have been that people had been scanned in other departments, and been less anxious or more satisfied in this department.

Is there a difference between anxiety ratings between the general anxiety of the sample and the previous rating of anxiety? (comparing results of q3 with q8)

Mann-Whitney U Test Statistic : 5,250.500
p-value : 0.305
Chi-square Approximation : 1.051
df : 1

Although the mean anxiety was higher in the previous scan, this difference was not statistically significant.

Is there a difference between current anxiety ratings of those presenting to the department for their first scan or those who have had a scan before?

Mann-Whitney U Test Statistic : 784.000
p-value : 0.779
Chi-square Approximation : 0.079
df : 1

There was no significant difference.
Is there a difference between anxiety ratings for those who have had a scan before, and previous ratings of anxiety from other scans?

Wilcoxon Signed Ranks Test Result. Two-sided Probabilities using Normal Approximation

<table>
<thead>
<tr>
<th>Previous Anxiety VAS</th>
<th>Anxiety of those who have had a scan before</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000</td>
<td>0.435</td>
</tr>
</tbody>
</table>

There was no significant difference.

Is there a difference between satisfaction ratings between the general satisfaction of the sample and the previous rating of satisfaction? (comparing results of q4 and q9)

Mann-Whitney U Test Statistic : 5,848.000

p-value : 0.203

Chi-square Approximation : 1.622

DF : 1

There was no significant difference.

Is there a difference between satisfaction ratings of those presenting to the department for their first scan or those who have had a scan before?

Mann-Whitney U Test Statistic : 673.000

p-value : 0.647

Chi-square Approximation : 0.210

DF : 1

There was no significant difference.
Is there a difference between satisfaction ratings for those who have had a scan before, and previous ratings of satisfaction from other scans?

Wilcoxon Signed Ranks Test Results Two-sided Probabilities using Normal Approximation

<table>
<thead>
<tr>
<th>Previous Satisfaction VAS</th>
<th>Satisfaction of those who have been scanned before</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000</td>
<td>0.541</td>
</tr>
</tbody>
</table>

There was no significant difference.

Is there a difference in ratings of anxiety between those who received information, and those who did not?

Mann-Whitney U Test Statistic : 1,121.000

p-value : 0.045

Chi-square Approximation : 4.022

Df : 1

There is a significant difference.

Is there a difference in ratings of satisfaction between those who received information, and those who did not?

Mann-Whitney U Test Statistic : 519.000

p-value : 0.100

Chi-square Approximation : 2.711

Df : 1

There was no significant difference.
Is there a difference in ratings of anxiety between those who took medication, and those who did not?

Mann-Whitney U Test Statistic : 929.000
p-value : 0.097
Chi-square Approximation : 2.756
Df : 1

There was no significant difference.

Is there a difference in ratings of satisfaction between those who took medication, and those who did not?

Mann-Whitney U Test Statistic : 1,070.500
p-value : 0.551
Chi-square Approximation : 0.356
Df : 1

There was no significant difference.

Is there a correlation/relationship between the rating of information and rating of anxiety?

Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Anxiety Visual Analogue Scale</th>
<th>Rating of Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety Visual Analogue Scale</td>
<td>1.000</td>
<td>0.108</td>
</tr>
<tr>
<td>Rating of Information</td>
<td>0.108</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Bartlett Chi-square Statistic : 1.139
Df : 1
p-value : 0.286

There was no significant correlation.
Is there a correlation/relationship between the rating of information and rating of satisfaction?

Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Rating of Information</th>
<th>Satisfaction Visual Analogue Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating of Information</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Satisfaction Visual Analogue Scale</td>
<td>0.167</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Bartlett Chi-square Statistic : 2.731

Df : 1

p-value : 0.098

There was no significant correlation.

Is there a correlation between anxiety and satisfaction ratings?

Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Anxiety Visual Analogue Scale</th>
<th>Satisfaction Visual Analogue Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety Visual Analogue Scale</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Satisfaction Visual Analogue Scale</td>
<td>-0.064</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Bartlett Chi-square Statistic : 0.465

df : 1

p-value : 0.495

No significant correlation.
STAFF SURVEY
The staff survey occurred over a period of one week, from the 15th of March until the 21st, 2012. Staff who attended the first focus group were provided with a survey, whilst other staff members filled out the survey when they were on duty.

There were 12 responses to the survey. All participants in the survey were staff members of the department. Due to an oversight, no demographic data was collected. The responses to the questions are reported below.

1. How do you feel your department rates currently at providing patient care? (VAS of 1-10)

12 responses

Table 47: Providing patient care

<table>
<thead>
<tr>
<th></th>
<th>VAS Score for providing patient care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>8.000</td>
</tr>
<tr>
<td>Median</td>
<td>8.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>7.750</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>7.355</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>8.145</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.622</td>
</tr>
</tbody>
</table>

Figure 44: Providing patient care
2. When patients are anxious/claustrophobic, do you take any actions to help them through the scan? (Yes/No answer)

12 responses

Table 48: Actions to assist patients

<table>
<thead>
<tr>
<th>Are actions taken to assist anxious or claustrophobic patients</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>1</td>
<td>8.333</td>
</tr>
<tr>
<td>y</td>
<td>11</td>
<td>91.667</td>
</tr>
</tbody>
</table>

Figure 45: Actions to assist patients

If yes, what are these actions? (Free text responses)

ID 1: Quiet reassurance that patient is safe in our hands. Explanation in detail about what is involved and that someone will be there for them during the whole scan i.e. have stayed in room with patient during the scan if necessary.

ID2: Explain procedure, ask if relative can come in with patient and in extreme cases stay in scan room with patient throughout the scan. Also provide music and talk to patient between sequences

ID3: Tell them what they will be expecting during the procedure. Explain we have eye patches, earphones with music, to try to relax them

ID4: Nice music, constant communication with the patient, sometimes staff member can stay inside the exam room with the patient. It is always stressed out that patient can stop the examination any minute and it is not a wrong thing to do.

ID5: Build or enhance empathy. Explain scan emphasising control they have. Personalise environment (music), discuss anxiety as an experience, and reiterate their ability to communicate and to stop the exam. Empower them (unable to distinguish last line)

ID6: Explain everything, lots of reassuring talk. See if you can get them to use a blindfold. If they have a relative or friend get them to come in and talk to them and hang on to a foot or hand so they have physical contact. Talk to them in between scans. Pick some familiar music they find
reassuring. Let them have a try first and bring out again before going in properly sometimes helps.

ID7: Talk to them – refer them to a radiographer

ID8: Caring, comfort, provide another person to be present, offer sedation or mask, offer to rebook on ours or longer scanner, offer tea or coffee.

ID9: Reassurance and clear explanation. Making sure they are ok before leaving scan room.

ID10: Yes it varies – offer sedation if suitable; eye mask/mirror, mirror. As a last resort offer to stay with during scan.

ID12: Slow down verbal instruction and explain the process thoroughly. Offer a family or friend to stay in for the scan, or radiographer stay in the room. Calm, reassuring voice and clear explanations.

3. When patients are anxious, do you think that actions you take have an effect in reducing anxiety? (Likert scale 1-4, with 1=not at all, 2=barely, 3= somewhat, 4=very much so)

12 responses

Table 49: Rating of actions

<table>
<thead>
<tr>
<th>Rating of actions taken</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>8.333</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>91.667</td>
</tr>
</tbody>
</table>

Figure 46: Rating of actions
### Table 50: Descriptive statistics ratings of actions

<table>
<thead>
<tr>
<th></th>
<th>Rating of actions taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
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</tr>
<tr>
<td>Median</td>
<td>4.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>3.917</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>3.733</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>4.100</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.289</td>
</tr>
</tbody>
</table>

**Any other comments?**

ID 1: I feel we generally have caring attitude to patients needs. Are sympathetic and most (underlined by respondent) staff have a great deal of empathy and patience.

ID 2: Can depend on the patient and their mindset. Sometimes they are determined not to go through with it. This can be frustrating and would be easier if the referrer talks to them first.

ID 3: Explain they are not the only patients worried about the procedure. It is very common.

ID 5: The worst outcomes occur when communication with the patient is poor. If you do not recognise their anxiety before it builds. Men are especially non disclosive (sic).

ID 10: Occasionally our efforts aren’t successful, then we resort to level 6 (1.5T) or larger MRI.

ID 12: Good communication skills are vital in achieving a positive outcome.
AUDIT CRITERIA

For criteria 1 and 3, the audit took place concurrently with the data collection period of the first survey, as these questions informed compliance. As criteria 2 required direct observation, this was measured during my 2 day period in the department. Results below are presented in terms of compliance.

1. Patients receive information prior to their scan.
   - No – 19 out of 111, 17%
   - Yes – 92 out of 111, 83%

2. Patient privacy measures are in place
   - No – 5 out of 14, 36%
   - Yes – 9 out of 14, 64%

3. Patients who identify themselves as claustrophobic receive an intervention or additional support to assist them to undergo an MRI scan.
   - No (Not at all / barely) – 8 out of 66, 12%
   - Yes (Somewhat / very much so) – 58 out of 66, 88%
JOURNAL/FIELD NOTES
This journal is structured in line with the first three steps of Kolb's cycle, and provides the concrete experience, reflective observation, and abstract conceptualisation stages from my experiences during the two days spent in the MRI department. Further discussions were held with the working group to expand upon the content in the abstract conceptualisation stage prior to active experimentation.

Setting Description:

The department operates from 7:30 am - 9:30 pm. Radiographers, radiologists and administration/reception staff operated in the department. No nursing staff were present.

The department is lightly decorated throughout with pleasant pictures (such as pictures of the beach). The walls are painted in nice pastel colours and appear clean. Overall the aesthetics of the whole department are very good. The scanning room was clean and appeared comforting and modern, with a green pastel colouring.

The waiting bay appears of adequate size, although it can become crowded if there are many inpatients and it doubles as a corridor. The cubicles where patients go to get changed have reading material and are checked before the patients go in. They also have a mirror, chair to sit down, but are a very small space. Only outpatients are provided with this privacy.

It is mainly a filmless department, although some departments (such as orthopaedics) still requested hard copies of images.

In the waiting room, there are potted plants, magazines, and comfy chairs, and a water fountain along with a large picture of a sandbar in the ocean. A TV is in there, although it is not turned on. There was a selection of children's books and toys. A quiet please sign was in the corridor but it was not a quiet area, as it was right next to two popular thoroughfares with loud traffic coming past, including trolleys and groups of people coming by. The reception area had a window to speak to the receptionist, and there was a locked door which required a keycode or for someone to buzz visitors in. Many patients came with a friend, parent or guardian. No clock was present. Patient information brochures about MRI scanning were present, but hidden away. Explanatory posters were present on the walls about the need to correctly identify patients. There is a warning sign regarding the large magnet.
Day 1: Morning

Concrete Experience:

Entered the department at 8.30am on the Friday morning. At this time, there were only 5 people in the department – 2 radiographers and one admin staff, and 2 doctors. The department was quiet during the morning.

Concrete Experience:

The patient explanation often occurred in a busy and sometimes crowded waiting bay, which doubled as a corridor for all staff and patients, which meant that depending on how busy the department was, there were a lot of potential distractions for the patient.

Reflective Observation

Patients may have been distracted by everything that was going on around them, and as the explanation often occurred with both the radiographer and patient standing essentially in a corridor, privacy was not maintained. When the waiting bay was crowded, with people walking in and out, is the patient really able to take in what the radiographer is explaining? It may be that they are distracted or uncomfortable in the waiting bay, due to a lack of privacy.

Abstract Conceptualisation

Is there somewhere else that the interviews can take place? Often due to time difficulties, they can't take place in the scanning room as someone is in there already, but is there anywhere else? In the waiting room perhaps?

Concrete Experience:

Patients were offered the chance to listen to music, which the radiographers could choose to play in the viewing room. Patients chose various types of music, from rock and roll to ocean sounds and Enya, even a guided imagery tape (which, according to the radiographers, some people loved, and some people couldn’t stand) based on their preference. Radiographers offered them the choice. They were also conscious of whether or not the music was too loud or too quiet, and often asked if the volume was okay.

Reflective Observation

The patients appeared to appreciate the choice of music, and as there was the option to play the music in the processing room, the radiographers also appeared to appreciate listening to the music at times.

Abstract Conceptualisation
How do we ensure this continues for each patient?

**Concrete Experience:**

Before the last scan sequence, radiographers would often say 'one more to go' and ask if the patient was okay.

**Reflective Observation**

The radiographers showed they did not just provide patient care prior to the scan, but throughout, as they inquired about the level of music or checked in on the patient.

**Abstract Conceptualisation**

How do we ensure this continues for each patient?

**Concrete Experience:**

The department became increasingly busy throughout the morning as additional patients, staff and scan requests arrived.

**Reflective Observation**

As the department got busier, radiographers could no longer relax and had to focus more on their work. They did not appear tense or overloaded.

**Abstract Conceptualisation**

What strategies can be put in place to ensure the department runs smoothly in busy periods?

**Concrete Experience:**

Explanations regarding the scanning process differed from patient to patient, with some receiving more detail than others. The tone of the explanation before the scan appeared to change for patients of different ages, and sometimes between men and women.

**Reflective Observation**

Patient explanations differed from patient to patient and between staff members, and appeared to change depending on the patient characteristics and presentation and amount of time available.

**Abstract Conceptualisation**

Can there be a minimum set of information to relay to the patient? As it is a time poor setting, and some patients (such as new patients) may require more information than others, should the
radiographers have a formal set of minimum criteria to explain? Is there some way we can spend more time with the patients before their scan?

**Concrete Experience**

Some radiographers, when explaining the procedure, ask if the patient has any questions. However, this does not happen every time. Patients seemed to rarely ask any questions.

**Reflective Observation**

Patients rarely asked questions to the radiographer, which may have been because they were out of their comfort zone, or alternatively, because they did not feel they needed further information.

**Abstract Conceptualisation**

As patients rarely asked questions, is it the duty of the radiographer to ask questions of the patient? Should they be asked if they would like to ask any questions?

**Concrete Experience:**

Once in the scanning room, an additional explanation was often given, including the use of the contact buzzer/call bell. At times, the coils were called an antennae, or a coil, or something else. Normally, the radiographer stressed that both ends of the tunnel were open. The radiographer also often stated that they can hear them if they speak and the radiographer can speak back.

**Reflective Observation**

The patient explanation in the waiting room appeared to reduce anxiety and fear in many patients as they were introducing them to the apparatus in a way designed to reduce fear. This appeared to calm most patients. Patients also appeared to be comforted by the presence of the call bell, and the ability to converse with the radiographer over the intercom.

**Abstract Conceptualisation**

Is the scanning room the best place to provide the patient explanation in more detail, or is it too difficult to waste time in their due to time pressures? Is there a better way to explain the coils to the patient? How can we ensure that patients understand the use of the call bell?

**Concrete Experience:**

As at least two staff were scheduled on at any one stage, one did the scanning and patient care, whilst the other did the processing. If one required assistance, they would call for help or ask for it, but it was often supplied without requiring them to ask. One patient was resistant to needles,
but required contrast. This required two staff– one tried to distract the patient and help them relax, by commenting on their nails, whilst the other inserted the needle.

**Reflective Observation**

The radiographers worked very well together, and appeared very efficient in their work. They assisted each other where necessary and worked well as a team, which each staff member appreciated.

**Abstract Conceptualisation**

The staff work very well together in delivering patient care – how do we ensure this continues amongst all staff partnerships?

**Concrete Experience:**

Not all patients are asked if they would like music, or what type. One older patient, who was referred to as dottery, was provided with music that the radiographers thought she would like. Another patient was asked what music they would like, but wandered off after organising the patient, and forgot to put it on until the last sequence.

**Reflective Observation**

Radiographers appeared to forget to ask what type of music the patient would like, possibly due to forgetting to ask. These patients may then be more anxious than if they would have received music. The patient who was given music who did not choose it may have disliked the chosen music by the radiographer, although in this case it did not appear so. The patient who said what music they would like to listen to, but only received it for their last scan, may have been lying in wait for sometime growing anxious or even frustrated as to when the music would start playing.

**Abstract Conceptualisation**

What strategies can be put in place to ensure the patients are always asked what music they would like, and then have this music played. Would having only one person organising the patient on the scanner and then playing the music work? Are these simple errors occurring due to being time poor, or simply a lack of communication or teamwork, or distractions in the scanning room?

**Concrete Experience:**

Interactions between radiographers and patients while they were in the scanner varied. At times, the person being scanned was told when they had reached the halfway mark, but not always. Additionally, they were told sometimes when a noisy one would begin, which was likened to the sound of a jackhammer. Once again, this did not always occur.
Reflective Observation

Every radiographer appeared to have their own unique way of dealing with patients, both during the explanation and whilst they were in the scanner. This even changed at times, possibly due to the patient, time available and surrounding staff. Patients who received midscan communication may have felt less anxious, or been comforted by the radiographer’s voice.

Abstract Conceptualisation

Can we ensure that patients are communicated to during the scan, every time? How would we go about doing this – could a checklist or reminder be placed somewhere?

Concrete Experience:

As one patient was being scanned, something was noticed on the images that required an additional scan. The radiographers then informed the patient that an additional scan was needed, without providing additional information.

Reflective Observation

Although what was seen could possibly have devastating effects on the patient, it was the role of the radiographer to pretend as if they didn’t know an anomaly had been seen. This could be due to the fact radiographers are not the ones who diagnose the images, and even if they can tell what is wrong with a patient, they need to play out the facade that they do not know. The patient, however, may have been quite nervous about being told an extra scan would be needed.

Abstract Conceptualisation

What is the best way to respond in these situations, when the patient may need further information but it is not the radiographer’s role to say anything? Is ‘playing dumb’ the best way to handle this?

Concrete Experience:

A patient arrived in the waiting bay. After 5 minutes, one of the radiographers said ‘hello, how are you going,’ and informed them they would be scanning them in ten minutes. After ten minutes, the patient was told it could be longer, apologetically. There was some confusion in the viewing room, and the radiographers needed to chase up to see if the patient actually required a scan at all. Meanwhile, the patient was left in the waiting room for an extended period of time and not offered any reading material, and only talked to directly on three occasions, despite the heavy traffic through the waiting bay. The end result was the patient did not actually require a scan.
During this waiting period, the patient may have been anxious or frustrated due to needing to wait so long (although it didn’t necessarily appear so). The radiographers themselves appeared confused and frustrated at what to do, due to being provided with inadequate information about the patient.

Abstract Conceptualisation

How can we ensure that events such as this do not occur - how can we get more information regarding the patient quickly, and educate people requesting scans when they are not necessarily needed?

Concrete Experience:

On one occasion a patient arrived in a waiting bay who was awake, sitting in a wheelchair and seemed to be functioning fine cognitively. The radiographer asked the orderly their name, and not the patient. Staff, at times, ignored the patients in the waiting bay. One outpatient waited a long time without anyone talking to them in the waiting bay, and was spoken to only just before their scan. Sometimes they are welcomed straight away with a simple ‘hello, how are you,’ but other times ignored.

Reflective Observation

The patient in the waiting bay may have felt chagrined or irked about being overlooked continuously, or for not being asked their name or greeted. The radiographers may have not been doing this due to a sinister nature, but it may be because it was easier to ask the orderly who they may have worked with previously. Similarly, it may be easier to simply ignore the patient in the waiting bay until there time to be scanned.

Abstract Conceptualisation

What strategies can be put in place to make sure inpatients are welcomed to the department?

Concrete Experience:

Patients who presented in the waiting bay often seemed to be treated differently than those in the waiting room or outpatients.

Reflective Observation

Outpatients may feel dehumanised, or that they are not being treated with respect.

Abstract Conceptualisation

Could this possibly be due to them being seen as sick or diseased as they currently resided in the hospital, and therefore did not deserve the same level of attention as outpatients? Or, is it that
since they are in the hospital already, they have already been subjected to a lack of privacy and respect and therefore do not require it from the radiographers. Alternatively, is it because they arrive in hospital attire rather than real world attire? How do we ensure that the same level of respect and privacy is afforded to both outpatients and inpatients?

**Concrete Experience:**

9.30am – 4pm radiographers now present, the manager, a senior research radiographer, and 2 scanners. The manager and research radiographer assisted if needed.

Once the patient had been brought into the waiting bay, the procedure is explained and they are placed in a cubicle (similar to a shopping mall clothes cubicle) in the waiting bay to get changed into a hospital gown with only underwear on underneath. They wait in these cubicles until they are told to come out – the period they are waiting varies. The cubicles do have reading material and are checked before the patients go in. They also have a mirror, and a chair to sit down, but are a very small space. Only outpatients are provided with this privacy

**Abstract Conceptualisation**

These cubicles are a good way to provide patient privacy, and the patients may appreciate these small rooms to prepare themselves for the scan. When waiting a long time, they may become anxious or uncomfortable however.

**Reflective Observation**

Are the cubicles a good place to put patient information pamphlets? Are we currently updating patients when they wait in the cubicles about how much longer it will be? Can inpatients be provided with more privacy in the waiting bay also by pulling the curtain closed, or partially closed?

**Concrete Experience:**

As patients cross the floor of the waiting bay into the scanning room, it is often busy, with patients or staff. Often, they hold the back of their gown to try to preserve their privacy. In the waiting bay, there is a curtain that can be pulled across inpatients that are waiting for their scan, although this rarely happened.

**Abstract Conceptualisation**

These cubicles appear as an excellent way to preserve patient privacy. However, when crossing the floor in a very public place in only a gown, privacy is lost.

**Reflective Observation**
How can we ensure that privacy is maintained during the walk from the cubicle to the scanning room? When inpatients are present, can the curtain be partially closed? Should the radiographer wait until the waiting bay is clear of staff or other patients before bringing the patient into the scanner?

**Concrete Experience:**

Every outpatient is required to wear a gown, although not every inpatient. When asking the radiographer if every outpatient needed to wear a gown, their response was yes, to reduce any chance of metal in clothing. For example, even in shirt tags there may be traces of metal. If patients are not wearing any underwear, they can be offered two gowns, and the radiographer can help to tie the gowns when needed. The radiographer elaborated ‘sometimes patients can misunderstand even simple instructions, such as take of all your clothes, they still come out with bra and trousers on etc, and still try to take in their phone etc.’ It was the view of the radiographer that it was not feasible to let them wear their own clothes. When patients wear the gown, they often clutched the back of it so it was not open.

**Reflective Observation**

Patients may not like having to change and put on a hospital gown, and may feel embarrassed or uncomfortable wearing these gowns.

**Abstract Conceptualisation**

Could you ask patients to wear loose fitting clothes? Alternatively, can all patients be offered two gowns?

**Concrete Experience:**

A discussion as held between the radiographers that 30 scans in a day was the current record, and that it was a remarkable feat to achieve and one that was to be aimed for considering the backlog of patients.

**Reflective Observation**

The radiographers appeared proud of their scanning efforts and achieving a high number of scans in one day. This even appeared to be competitive in a small way.

**Abstract Conceptualisation**

Is there a way to make scanning even more efficient? How do we make sure the focus on patient care isn’t lost with the focus on cramming in as many scans as possible? How do we juggle these differing and somewhat conflicting demands?
Concrete Experience:

The radiographers appeared understanding of patient movement, but did everything they could to reduce it. For a patient who stated they had a dry throat, they informed them and reassured them that in between sequences when they could cough/clear their throat.

Reflective Observation

The radiographers were motivated to do everything they could to reduce patient movement, and employed a number of strategies, but were also resigned to the fact that it does occur. The patient who was allowed to cough and clear their throat in between sequences may have appreciated this.

Abstract Conceptualisation

How can we identify patients who are likely to move, to put in strategies to stop this? How do we ensure we continue to provide patients who need to cough or clear their throat time to do so? Would the use of a checklist/guide once again be useful?

Concrete Experience:

A patient who identified as claustrophobic received additional attention from the radiographers, explaining breathing, the effect of the medication they had taken, the role of coils, and that the radiographer would be close by, and that they could be seen through the mirror on the head coil, through the scanning room window.

Reflective Observation

The patient appeared to appreciate this extra attention from the radiographer.

Abstract Conceptualisation

How do we ensure we keep paying special attention to the claustrophobic patients to help them through the scan? Are the current strategies of asking patients to identify themselves as claustrophobic working – are some too embarrassed or shy to do this?

Concrete Experience:

Before, during, and at the conclusion of the scan, the patients were talked to through the intercom. The patient is also able to talk back to the radiographer through the intercom. It was often used to provide constant/ continual reassurance to the patient, including phrases such as ‘you’re doing well’ and ‘keep it up.’ Some radiographers talked a lot, whilst others did not.

Reflective Observation
The intercom provided a vital link between the patient and the radiographer to assist in communication, and acted to reassure and inform the patient.

Abstract Conceptualisation

Is this due to being time poor, patient factors, or personal preference?

Concrete Experience:

A deaf patient came in for scanning who had an interpreter present. The radiographer explained the procedure to the interpreter (not the patient) who then explained it to the patient. As she was deaf, she was not offered music, and the intercom would not work. The radiographer went in the room if needing to ‘talk’ with the patient.

Reflective Observation

The radiographer was able to adapt the way they delivered patient care to a deaf patient, who was not the norm for them and appeared to reassure the patient. However, the patient may have felt as if the radiographer was not paying them due attention, as they were speaking to the interpreter rather than the patient.

Abstract Conceptualisation

Deaf patients present a particularly difficult set of patients; perhaps in the future they should be given written information? Also, should it be stressed that they should be talked to directly rather than talking to the interpreter?

Concrete Experience:

2pm: Second shift of the day starts, and two more radiographers arrive – they are scheduled to work from 2 until 930.

Concrete Experience:

For many patients, the person who provided the explanation, asked them to get changed, set the patient up and then got them off the scanner was not the same person.

Reflective Observation

Radiographers assisted each other in the scanning process, but this can result in one patient seeing many healthcare professionals. The radiographers may appreciate this help, but would the patients prefer it if they met one radiographer and built a relationship with them?

Abstract Conceptualisation
Would this be better if it was, as much as possible, the one radiographer? How can we put this into place without adding to time and workload pressures?

Concrete Experience:

In the processing room, the radiographers spoke differently about the patients than when in their presence. For example, patients were often referred to by the type of scan they were to have, for example, ‘is that the spectro waiting out there?’ Another time the patient was referred to as ‘the man with the foot.’

Reflective Observation

This may have occurred as it was easier to label patients by their scan than their name. This could have been dehumanising to the patients if they overheard it, but this wasn’t the case.

Abstract Conceptualisation

Is this because it is easier to classify patients by their scan(condition) rather than learning individual names? Does it matter if the patient doesn’t hear this? Is it dehumanising the patient?

Concrete Experience:

On one occasion, a patient was offered a magazine as they waited in the waiting bay. However, this did not always occur.

Reflective Observation

The patient may have appreciated the offer of a magazine to pass the time, and being acknowledged by the health professional.

Abstract Conceptualisation

How come this does not regularly happen – outpatients are given magazines both in the waiting room and their cubicle?

Concrete Experience:

The scanning order is run off a list for the day; however, the order patients are scanned in often needs to be changed, and additional scans added in. External pressures on the department times appeared throughout the day, in the form of doctors appearing the department requesting scans, or phone calls from different departments, such as emergency, trying to fit additional patients into a full schedule, which required change to the planned scanning order. Radiographers were flexible and adapted to these external pressures. Discussion was held with the radiographers regarding these external pressures, and one mentioned that there may be a presumption the MRI department is slack like some other areas of the hospital, although the staff disagreed with
this perception, and stated there was only so much to do. One radiographer stated that ‘we can’t fit them 2 in the tunnel at a time.’

**Reflective Observation**

Although the radiographers adapted to these external pressures and took them in their stride, additional requests did appear to cause some frustration at times.

**Abstract Conceptualisation**

What is the best way to deal with these external requests? Is there any way these can be managed better? How do we portray the MRI department as busy and ‘not slack?’

**Concrete Experience:**

For one patient who appeared quite sickly, the husband was allowed to enter the scan room with his wife to provide comfort, after completing a safety checklist.

**Reflective Observation**

The radiographers were understanding of the patients needs, and allowed family members to provide comfort by being in the scanning room when deemed necessary.

**Abstract Conceptualisation**

How do we ensure this activity continues?

**Concrete Experience:**

One patient presented who had an interesting case, which caused much discussion amongst the radiographers when the patient was not present. The radiographers appeared concerned about the patient.

**Reflective Observation**

The radiographers felt true concern regarding their patient’s condition.

**Abstract Conceptualisation**

Is it okay to feel concern for the patients?

**Concrete Experience:**

In the safety questionnaire, one question asks if you are claustrophobic. If the answer to this is yes, then sedation is often organised.

**Reflective Observation**
It appeared that radiographers though that patients who are claustrophobic automatically require sedations

Abstract Conceptualisation

Is it worth trying to do other strategies rather than provide sedation?

Concrete Experience:

The reception staff worked closely with the radiographers, and even warned them of potentially difficult patients. They do the questionnaire with the patient and if they need help, they ask the radiographers.

Reflective Observation

There was an obvious collaborative approach to patient throughput by the radiographers and receptionists, and they appeared to appreciate and respect each other’s role.

Abstract Conceptualisation

Is there any other ways to improve this relationship?

Concrete Experience:

The reception staff welcomed the patients in a friendly manner, often asking ‘how are you.’

Reflective Observation

Reception and administration staff play an important role in patient care, by comforting and making the patient feel welcome.

Abstract Conceptualisation

How can we ensure this is maintained?

Concrete Experience:

Patients don’t often receive information regarding their results, except when specifically asking for it. Patients also appeared to not necessarily know if they were having a follow up, or where.

Reflective Observation

Patients may be anxious, nervous or uncertain about the next steps required, and how they ascertain information about their results. This may be due to the radiographers themselves not being sure of the next steps.

Abstract Conceptualisation
Can this information be supplied to the patient at some stage? Can a question be posed to them ‘do you know what the next step is from here?’

**Concrete Experience:**

Patients sometimes do have to wait for long periods of time in the waiting room. One patient waited a substantial amount of time, and staff told them sorry about the wait, but there was no explanation given as to why the wait had occurred – however, once they went in for their scan, an explanation was given.

**Reflective Observation**

Patients may become frustrated when needing to wait lengthy periods of time.

**Abstract Conceptualisation**

Is there any way to avoid this? Can they get information about how long the wait will be?

**Concrete Experience:**

A patient information brochure was present in the waiting room, although not one person read it.

**Reflective Observation**

Some patients presenting to the department may appreciate written information.

**Abstract Conceptualisation**

Can we encourage the use of these booklets further? Can they be placed in more convenient locations? Should we update them?

**Concrete Experience:**

A patient who was very difficult, and slightly claustrophobic, was treated with patience and the radiographer was supportive when talking to them. When the patient was no longer present and the radiographer was discussing them with colleagues, different language was used to describe the patient, including derogatory labels. In essence, the radiographer appeared as one person to the patient but another when they were not present.

**Reflective Observation**

The radiographers may have used this different language as a form of relief of tension, or as a coping mechanism. The patient, if they had heard it (which they did not) may have been offended,
Abstract Conceptualisation

Is this an issue? Do radiographers need to be able to ‘poke fun’ to relieve some of their stress, and relax with colleagues in a stressful environment? Is this an appropriate thing to be doing?

Concrete Experience:

For difficult patients, caregivers or friends may also become upset. Radiographers appeared patient and comforted these with them as well. Radiographers provided care not only to the person being scanned, but their friends/caregivers/spouse/parents.

Reflective Observation

Caregivers may have been comforted by the attention given to them by the radiographers.

Abstract Conceptualisation

How are spouses, caregivers, friends etc treated, and can this be improved in anyway?

Concrete Experience:

A difficult patient was finally able to get in the scanner after much coaxing. For this patient, the radiographer didn’t talk to them as much during the scan, as she didn’t want the patient to jump or become agitated when they were keeping still. Discussing a tricky patient with the radiographers, they described there was ‘no hard and fast rule’ for these types of patients, and there is a need to ‘assess each one individually.’

Reflective Observation

The radiographers were relieved once the patient was put in the scanner, and the patient themself was comforted by the radiographers and given the confidence to undergo the scan.

Abstract Conceptualisation

As there is no hard and fast rule, how do we make sure we provide the adequate appropriate amount of care for each patient, whilst not dropping the ball?

Concrete Experience:

Humour was used as a strategy to calm people down or to assist with communication, and also to defuse potentially awkward situations, such as asking about weight.

Reflective Observation

Patients appeared to be relaxed and more at ease following the use of the radiographer’s humour.
Abstract Conceptualisation

Humour appears to be an effective strategy to reduce fear and relieve awkward tension – can it be employed more readily throughout the department?

Concrete Experience:

A patient presented to the department with a mental disability. This patient had brought a stuffed teddy (despite being an adult) to provide comfort during the scan. The radiographers were very nice to this patient, who was considered ‘cute’. Another patient who had mental illness was not talked about the same way by the radiographers, as she proved to be more difficult to scan. A patient who completed their scan with minimal difficulties was complimented for doing ‘a good job.’

Reflective Observation

Radiographers are accepting of people with cognitive disabilities, although they did seem to judge patients on how easy they were to scan, and acted differently when the patients were not present

Abstract Conceptualisation

Do radiographers judge, and treat patients based on how easy they are to scan? Are difficult patients treated with less respect or a caring attitude? Is there something to be done about this?

Concrete Experience:

Entered the department at 8.30 on the Monday morning. 2 radiographers were working this morning – one who was still in training, and therefore required support from senior staff.

Concrete Experience:

In the department, some of the staff wore uniforms, whilst others did not. Is this due to level of training?

Reflective Observation

It may be confusing for patients with some staff wearing uniforms and others not.

Abstract Conceptualisation

Why don’t people wear uniforms? Should everyone be wearing these, or no-one? What are the issues surrounding this?

Concrete Experience:
A claustrophobic patient presented who agreed to be scanned and lasted in the MRI for all the imaging sequences. As they were claustrophobic, the patient was removed from the machine manually, with the radiographer providing reassurance, than with the automated removal.

**Reflective Observation**

The patient may have appreciated the extra attention, and the radiographer was willing to put in an extra effort for the patient.

**Abstract Conceptualisation**

How do we ensure these strategies continue, and that other radiographers know of them?

**Concrete Experience:**

Patients often came to the department for their second scan or more, and these patients appeared easy to get in and scan. These patients received less information/a quicker explanation.

**Reflective Observation**

Patients who were coming for their second or more scan seemed sometimes comfortable in the department, and the radiographers felt they needed to not spend so much time with them

**Abstract Conceptualisation**

Not all patients were troublesome and people who had been scanned appeared to not need as much information/attention, but should this be checked with each patient by asking them if they want further information? Or if they have any questions?

**Concrete Experience:**

Some scans (such as a stealth scan) preclude the use of headphones. As the patients then have no way of hearing what the radiographer is saying to them, they receive a longer, more detailed explanation prior to their scan.

**Reflective Observation**

As they wouldn’t have been able to communicate through the intercom with the radiographer, patients may have felt reassured by this in-depth explanation.

**Abstract Conceptualisation**

Can, or should, this in-depth explanation be provided to everyone?

**Concrete Experience:**
For claustrophobic patients, the ability to use the call bell was often stressed, and the fact that the patient was then in control.

**Reflective Observation**

Patients may have been reassured by being informed of the call bell, providing them with a sense of control.

**Abstract Conceptualisation**

How do we ensure the use of the call bell is stressed to each patient?

**Concrete Experience:**

The radiographers didn’t always introduce themselves, nor did they always have name badges. Some did, but not always.

**Reflective Observation**

If the radiographer does not introduce themselves, the patient may not feel as comfortable around them or as willing to ask for help for fear of being rude by not knowing their name.

**Abstract Conceptualisation**

Why aren’t the radiographers introducing themselves? Is this because it is tiresome repeating your name many times a day? How can we ensure this is happening, or that radiographers are wearing name badges?

**Concrete Experience:**

The radiologists rarely saw the patients, except on one occasion where the radiographers had difficulty finding a vein.

**Reflective Observation**

Radiographers may feel as if the bulk of the work in running the department is on their shoulders.

**Abstract Conceptualisation**

Radiographers deliver the majority of patient care in the department – should doctors be more involved, or is the current status quo working?

**Concrete Experience:**

A radiographer stated that some patients appear to be too distracted or fearful about their upcoming MRI and the presence of the scanner and therefore don’t take in instructions correctly.
Patients can be distracted by fear and the presence of the MRI scanner to take in the explanation provided by the radiographer.

**Reflective Observation**

Patients can be distracted and fearful before their scan, meaning they don't take anything in.

**Abstract Conceptualisation**

Both the waiting bay and the scanning room may present distractions to the patient when trying to explain the scanning process— is there a quiet room or somewhere with minimal distractions that the explanation can be given? How can distractions be minimised for the patient?

**Concrete Experience:**

Rosters for the team were being worked out, and who was going to be on call was discussed. This did appear to cause some consternation amongst some of the staff regarding times they have to come in, and there seemed to be some staff that were bitter about this.

**Reflective Observation**

Radiographers became frustrated or disappointed/bitter about times required to come in.

**Abstract Conceptualisation**

Can anything be done about the current roster and being on call? Do some communications strategies need to be put in place to equitably distribute times on call?

**Concrete Experience:**

A patient who was having their knee scanned was put in so that their head was out of the scanner.

**Reflective Observation**

The patient may have appreciated the opportunity to be scanned feet first rather than head first.

**Abstract Conceptualisation**

Is this routinely offered? How do we make sure that different scanning orientations are offered when possible?
CHAPTER 12 - ACTION PLANNING

‘Action may not always bring happiness, but there is no happiness without action.’
William James

CHAPTER OVERVIEW
After collecting all the data from phase 1, I spent some time reflecting on what was occurring in the department, and how my reflections could be fed back to the staff. In many action research studies, there is a need to make significant changes to practice. However in this case, the results of phase 1 identified that practice in regards to patient care appeared to be of a high standard already, and therefore the focus was on ensuring that systems are in place to ensure this continues, and to reinforce this ‘good’ practice.

DISCUSSION
The majority of the observations reported were positive, although there were some instances where there may be room for improvement, or where there appeared to be a gap between the real and the ideal. This need for improvement has been acknowledged by staff in the previous focus group and in the survey, with the survey showing staff thought they provided an average mark of 7.8 out of 10 for patient care, and in the focus group, although they thought they were doing well, there was some scope for improvement. The data was looked over with a critical focus, inferences drawn and questions formed and fed back to the group in a focus group for further discussion. The following section outlines my reflections, which were presented to the group, followed by a series of questions presented to the group regarding each topic. Prior to asking the more pointed questions, the group was asked what their thoughts were on my reflections, and whether they were in line with their understanding of actions within the department.

REFLECTIONS AND FOCUS GROUP DISCUSSION POINTS
INFORMATION AND EXPLANATION

From the survey results, 83% of patients said they did receive information. Patients who received information mainly found it useful or very useful (95%). Patients who did not receive information were more anxious than those who did. In my observations, I found that the patient explanation often occurred in a busy and sometimes crowded waiting bay, meaning the patient may be distracted. I inferred this occurred due to the scanning room being occupied and due to time constraints. Alternatively, when the explanation occurred in the scanning room, the patient appeared to listen attentively, although after discussing with one radiographer, it was felt that in this room they can be distracted by the equipment as well.
The explanation also appeared to differ from radiographer to radiographer, and from patient to patient. I thought this was understandable, as each patient and radiographer have their own idiosyncrasies, and that sometimes explanations and time with the patient would have to be cut back due to time pressures. Sometimes, the patient was asked if they had any questions, whilst other times they were not. When sitting in the waiting room, I noticed none of the patients read the information brochure, but this may have been due to its location. However, it is unclear if there is a minimum set of information that must be relayed to the patient.

**Questions for the group:**

- What can be done about this?
- Is there somewhere else the explanation can be given, such as an interview room?
- Is the scanning room the best place for giving information?
- Should the radiographers have a formal set of minimum criteria to explain?
- Should patients be asked if they have any questions?
- Should we use written information again? Could these booklets be placed in different locations – such as in the cubicle? Or can reception staff hand them out?

**PATIENT CARE**

Patient care seemed to be a major focus of the radiographers, as emphasised by the positive responses in the survey. During my observations, I noted that at times, radiographers showed true concern for their patients, although this was not universally the case. Inpatients were often welcomed when they presented to the department in the waiting bay, but not always. On one occasion, a patient had to wait close to 5 minutes before being acknowledged by any staff. On another occasion, instead of asking the patient for their name, they were overlooked and the orderly was asked. Patients were often referred to as ‘the spectro’ or ‘the leg.’ It almost appeared as if inpatients were treated differently from outpatients. On one occasion, a patient in the waiting bay was offered a magazine, although this did not always occur. In some cases, radiographers would introduce themselves to the patient, but this was not always the case. Also, some staff members wore badges and uniform, whilst others didn’t. On one occasion, a patient who was having their knee scanned was put in so that their head was out of the scanner, which the patient may have appreciated.

**Questions for the group:**

- Do you think inpatients are treated differently from outpatients?
- If so, is this because inpatients are seen as hospitalised already, and therefore somewhat dehumanised?
- Is it okay to feel concern for the patient?
Should inpatients be offered reading material?

Why aren’t the radiographers introducing themselves? Is this because it is tiresome repeating your name many times a day?

How do we make sure that different scanning orientations are offered when possible?

CLAUSTROPHOBIC/ ANXIOUS PATIENTS

From the survey results, in patients who were anxious, one of the causes of this was claustrophobia. From my observations, I noticed that when a patient did identify themselves as claustrophobic on the safety questionnaire, they did receive extra attention which they appeared to appreciate, and sedation was common. The use of the call bell was also especially stressed when talking to the patient. In one case, as a patient was identified as claustrophobic, the radiographer manually took them out of the machine.

Questions for the group:

- Are the current strategies used to identify claustrophobic patients working?
- Could patients be embarrassed or shy to say they are claustrophobic/anxious?
- Is sedation always the best course of action - can other methods be trialled?

PATIENT PRIVACY AND GOWNS

In the audit results, 36% of the time patients walked from the cubicle to the scan room, the waiting bay was occupied and a curtain not positioned around the outpatient. I noticed that patients often held the back of their gowns during this time trying to protect their privacy. Although the cubicles appear a good way to maintain privacy, this was lost once crossing the floor. All outpatients are asked to change into gowns and, from what I understand, this is the only feasible option. However, it appears some patients do not like wearing these gowns.

Questions for the group:

- Can inpatients and outpatients be provided with more privacy in the waiting bay also by pulling the curtain closed, or partially closed?
- Could you ask patients to wear loose fitting clothes?
- Alternatively, can all patients be offered two gowns?

IN THE SCANNER

Radiographers often provided verbal support whilst the patient was in the scanner, such as saying ‘one more to go,’ asking if the patient was okay, letting them know they could cough, telling them how much longer was left, and so on. The patients appeared to appreciate this. For a patient who stated they had a dry throat, they informed them and reassured them that in
between sequences when they could cough/clear their throat. Once again, this changes between radiographers, and did not necessarily always occur.

Questions for the group:

- Can we ensure that patients are communicated to during the scan, every time?
- How would we go about doing this – could a checklist or reminder be placed somewhere?

THE DEPARTMENT AND STAFF

I noticed that at times, the department was very busy, during other times it was quieter, but there was always a focus on keeping the scanner occupied. External pressures were evident, with people dropping in to request scans, or via the phone. Everything still seemed to run smoothly (or smoothly enough). After discussing this with the radiographers, it seemed like there may be an unfounded perception of MRI being slack like some other departments in the hospital. This did not appear to be the case, and one radiographer stated that they ‘can’t fit them in 2 at a time.’ I did notice the support radiographers gave to each other to be more efficient, and with difficult patients. What I did notice was that to improve efficiency, sometimes it would be a different staff member who welcomed the patient, gave the explanation, set up the scanner, and got them out again, which would make it difficult to build a relationship with the patient (even though it is only a very short term one). I thought that patients might appreciate seeing the same face every time. There was an obvious collaborative relationship between radiographers and reception staff, with reception staff providing a ‘heads up’ when needed and welcoming the patients. Reception staff also provided a friendly welcoming to patients as they presented to the department.

Questions for the group:

- What can be done about this/ how do we ensure this continues?
- Is there a better way to handle external requests?
- How do we portray MRI as the busy unit it is?
- Would this be better if it was just the one staff member as much as possible?
- Does this collaborative relationship need further improving?

MUSIC

Patients were offered the choice of music, which they appeared to appreciate, and this was backed up by some of the comments in the survey – one person said ‘thanks for Robbie Williams’. Sometimes the patient wasn’t offered music, and on one occasion music was offered, but not turned on for the patient. Once the type of music was chosen for the patient, rather than
the patient being offered the choice. I inferred these little things occur every now and again due to conflicting demands and time pressures.

Questions for the group:

- How do we ensure music continues to be offered and played for each patient?
FOCUS GROUP 2 RESULTS
Results were dispersed throughout the department once analysed, and a focus group conducted shortly thereafter. A general discussion regarding the results took place, followed by my reflections and inferences on the data on each element identified above followed by asking the group what their thoughts were. Once their thoughts were discussed, a series of questions were asked to the group as detailed above.

There were 8 participants, all female, and the moderator around an oval shaped table. Of the 8 participants, 6 were radiographers, and 2 were reception/administration staff. One of the radiographers was currently undertaking MRI training. The average length of time working in MRI was 11.13 years, with a standard deviation of 9.3. The focus group was conducted at 2pm on a Friday afternoon to give staff the best chance to attend, and lasted slightly over an hour.

The moderator began with an introduction to the focus group, including introducing the topic, the purpose of the focus group, and Chatham house rules. The first part of the focus group centred on discussion of the results of phase 1 data collection. Following this, a description of the reflective journal and Kolb's learning cycle was provided, which outlined the four steps included in this cycle. Following this, issues were raised by the moderator from my reflections, which were shared with the group, and the group asked to comment, provide feedback, and suggest ways to improve. Pseudonyms are used for the participants.

INFORMATION/EXPLANATION
The group were surprised by the results of the survey, particularly that 17% of patients did not receive information, with one member saying that they were 'gobsmacked' at these results, and another commenting that 'it should be higher than that.'

Yvonne: …but I'm thinking in the light of these results we could bring them in a little sooner, and talk to them a little longer, especially ones who haven’t had it before. Patients who have had it before generally have a really good understanding of what will happen.

In regards to the most appropriate location to provide the explanation, the group felt that the waiting room was an inappropriate place for the explanation to take place, but they couldn't decide whether the patient cubicle (located in the waiting bay) or the scan room was the best place to provide this. After discussion amongst the group, it was resolved that some information needs to be explained in the waiting bay, and then some in the scanning room, as shown by the following extract.

Yvonne: But it's much more private than the waiting room. I think that generally there’s other outpatients in the waiting room and it's not really appropriate to have those conversations in front of other patients so taking them to the cubicle is where we do our checking of our checklist, the
safety questionnaire, which has got a lot of safety issues involved with that which is our primary concern and then you talk to the patient and find out if they’ve had one before, and then that’s where you’d give them a little more information about the machine being noisy and what sort of music you would like

Tricia: The problem is your sitting in those little cubicles someone might be next to them or someone in the barouche bay

Yvonne: You don’t really want them to be changed and waiting a really long time so once again it’s a fine line.

Rachel: There’s nothing worse than sitting in a tiny little ...as having being a patient myself in other places...sitting in a little tiny ball or cubicle for a long time, twiddling your thumbs its nice to sit...

Tricia: No, for a long time, yeah.

Yvonne: So where’s the best place to interview them...

Rachel: Well you just know you need to give them that 5 minutes before they’re due, to get them in, give your 5 minute spiel, so they’re not sitting there overly long

Sandy: We do give them a lot of information though – get changed, take this off, leave this on, this is what’s going to happen, check anything on the safety form – there is a lot

Rachel: But it’s almost the first check in a way because once you then open the doors it’s almost easier to explain once the magnet is there, its visual, because you can go ‘oh look’, here is the big magnet, there is the whole, this is what we are going to do, here’s an eyeshade if you need it, here’s the headphones, they have music, what kind of music do you like, so that kind of stuff actually...you can give them a bit but until...you know it’s one of those things once you see something

Sandy: As you walk them in the room, yes

Cindy: But if the door’s shut...

Rachel:... you can’t show it to them, that’s what I mean

Tricia: That’s what Rachel’s saying when you walk them into the room you actually start

Rachel: ...well its private, they’re completely on their own, you’ve got your visual aids, but you need to give them a little bit first, but I just find when they’re actually in the room, everything’s there.

Sandy: You explain the headphones, and the buzzer, and the noise

Tricia: When you’re actually getting them into the cubicle to get changed often they’re not even listening to you and they come out with the gown open at the front not the back because they’re a
bit stressed and don't listen, whereas once you’ve got them in the room you’ve got their undivided attention.

The radiographers felt that it was perfectly fine if the explanation length and complexity differed from patient to patient, with it mainly depending on whether the patient had been scanned previously. However, they acknowledged there was a minimum amount of information that needed to relayed to every patient.

Sandy: Different people expect different things – if they've had a scan before...

Tricia: It’s probably patient dependant a bit

Rachel: Because, um, we kind of judge people... you know, when you meet someone you judge them, how they check what you say to them, it’s the same with your patient, some patients want a lot of information, some patients...they just want to go in there and lie...’

Yvonne: And there’s a really good reason for that you don’t want to talk to somebody for 10 minutes, and chew up 10 minutes of their appointment time... if it’s not needed. But if it’s needed then...

Rachel:... then you do it

Barbara: And if they've had it done before they’re just ‘yea yea, get me on’ you know

Sandy: Yeah, and ‘where’s my headphones? Are you going to give me headphones?’

Moderator: So that’s okay then?

Tricia: There probably is a minimum amount that you need to do.

The radiographers couldn’t decide on whether they needed to ask the patient if they had any questions, other than ‘are you okay?’ despite the fact some radiographers were currently doing this. It was felt that some patients may want to delay the scan by asking questions, or that questions could lead to an interruption to their schedule.

Rachel: ...probably should (ask questions)

Cindy: In an ideal world...if everyone’s under the pump

Rachel: But maybe you’ve already asked them...

Yvonne: It doesn’t take long to ask...I guess we could standardise a bare minimum.

Tricia: Yeah, that’s probably not a bad idea
Rachel: I mean, we always also ask ‘are you okay’ I don’t think there is anyone who does not ask ‘are you okay’ and that is kind of at the spot where they can also...I don’t think any of us would put the patient in without the final thing being saying are you okay, would we?

Amy: ...Would there be some patients that are nervous, and anxious about it, and therefore if you ask them ‘are there any other questions?’ they would make up questions so they don’t go in?

Group: Yes

Barbara: Delay the inevitable

Yvonne: People do, yes, to delay it...

Rachel: And you definitely know when not to ask are there any more questions, that’s when you say ‘I’m putting you in now...and you’re just going to take a deep breath...there you go’

The radiographers shared their thoughts on the out-dated information booklet currently in the department, which were not easily accessible and were not being read by patients. The radiographers came to the conclusion it should be utilised more, and placed in more convenient spots, as well as updated.

Amy: We do have that booklet...that we’ve printed up

Tricia: Is there one in the waiting room? They can read? Do people read them?

Rachel: Is it something that would maybe, be better, sitting at the front desk? Where they can see it and pick it up.

Rachel: On the ledge, not so you can give it but they can see it sitting there so it’s more...obvious...or you have them in the middle of the...you know where the magazines are, you have it on the coffee table with the magazines rather than....

Tricia: In a holder on the coffee table

Yvonne: Where somewhere that if they’re interested and can think oh good I’ll read that while I’m waiting

Tricia: Can they actually take them?

Amy: Yeah, we want them to. It’s coming out of date so yeah

Tricia: Put a sign up, saying please take one

Tricia: That’s a good idea, while they’re sitting there.

Amy: Instead of twiddling their thumbs, have a read
Cindy: Is it being updated Yvonne? The brochure?

Yvonne: Let’s find out? So Amy said...

Amy: I think it is...

MUSIC

As reported back to the radiographers, patient’s appreciated the opportunity to listen to music during their scan. However, at times patients may request music that was not currently in the department, and it could take some time to decide on an artist to listen to. Additionally, at times the radiographers chose the music for the patient, which they may not necessarily have liked. The radiographers came up with the idea of having a music list, thus giving the patient the control to choose what they want to listen to, saving time for the radiographer, and giving the patient something to do whilst waiting for their scan in the changing cubicle.

Sandy: I had a dreadful time yesterday a woman listed about 50 things she wanted to listen to and we didn’t have any of them and she wouldn’t go in there until we decided what she was listening to.

Yvonne: ... If we had a music list, sometimes when you say what music would you like, they say well what have you got, you really don’t want to have to spend a long time even though you’d like (to play) their favourite music...

Rachel: ... but we just need a list of music again so they can say what they like...

Yvonne: ...yes I think so, because it gives them something to do while they’re waiting, it saves time, and they can have that little brochure that will explain the experience to them too...

At times the radiographers didn’t turn the music on, or forgot to turn it back after injecting contrast. When asked what could be done about this, they stressed that you needed to try and remember as much as possible.

Sandy: But I must admit I have been guilty of forgetting not to turn it on.

Tricia: I think we all have, but it doesn’t happen very often.

Rachel: But that’s just human error

Yvonne: Woops!

Barbara: And it does happen

Rachel: And it’s not intentional, and I have usually ...and when I’ve done it, I’ve gone in afterwards and apologised to them...

Barbara: Oh yeah, you just say I’m sorry I forgot to put it on for the first bit, I’ll put it on now
Rachel: And quite often what happens is if you’ve gone in to give them contrast and come out and that’s when you forget to put it back on.

Yvonne: Yep, you do, and sometimes they say afterwards ‘I didn’t get music the second time’ ‘ohhh sorry’

Moderator: Is there anything we can do to reduce that human error?

Rachel: Just try and remember

Yvonne: Yeah, just try and remember!

PATIENT CARE

The radiographers acknowledged that inpatients weren’t always welcomed to the department in a prompt manner, or told how long they would be required to wait. Once brought up in discussion, it was decided that this is an important issue, and that everyone should be more observant.

Barbara: Sometimes if we are scanning we don’t even know they are there, that they’ve arrived, or that they are there...

Sandy: Until the form comes.

Barbara: Until the form comes out, and then we don’t have time if you’re on your own scanning you don’t have time to go out.

Rachel: If there is two of you the other person does or should as soon as they realise the inpatient is there they go out and have a chat to them

Tricia: Should...I don’t think it always happens.

Sandy: Yep

Rachel: If I know there is an inpatient there, I will go out and have a quick chat to them, sometimes you’re in the middle of something, and you can’t just drop what you’re doing then.

Amy: Because you’re expecting the patient, you keep an eye out for it.

Rachel: But you’re right hat should be something that we do, that we go out straight away as soon as we can, make sure that we acknowledge them and that they’re okay, because then they know that there is someone they can look out for if there is a problem

Yvonne: And give them a rough idea – 5, 10 minutes or something like that
Barbara: Sometimes you look out there and go – ooh, there is a patient out there. When did they come?

Rachel: Yeah, it’s about being a bit more observant…more just be aware when an inpatient arrives to get out as quick as possible and talk to them I reckon

Tricia: Just be aware

As reception staff were often aware that inpatients had arrived, but the radiographers weren’t, the best way to notify them was discussed. After discussing different options (including a buzzer, which was not supported), they discussed placing the request form in the radiographers room and saying ‘inpatient’s here.’

Pam: In general rooms when out patients arrive in they have a special buzzer at the front desk, and when they press the buzzer, it goes on out the back.

Rachel: It’s just around the corner Pam, you should be able to hear when they come in.

Pam: Yeah, but sometimes you can’t hear, when they come in… so, maybe some kind of buzzer or...

Yvonne: I don’t like buzzers

Barbara: No...

Tricia: No… sounds awful, just personally, not that I’ve been up there

Amy: At this stage when inpatients have been arriving, I’ve been putting the request forms on the desk because I don’t want to disturb anybody.

Barbara: No, no, bring it straight out.

Amy: In the future should I bring it out and give it to somebody?

Tricia: Yeah, absolutely.

Yvonne: Definitely.

Rachel: You mean on our desk – bring it on our desk?

Amy: Yes, that’s what I’m talking about.

Rachel: Nah that’s okay, because we notice it as soon as it’s there.

Yvonne: That’s fine.

Sandy: Yeah.

Amy: Okay, so just continue doing...?
Sandy: Or just say ‘next patient’s here’

Cindy: As I usually put it down, I say ‘next one’s here’

Yvonne: Cindy says ‘next one’s here’

Sandy: …this is the outpatient, or the inpatient, or the...

Amy: Okay

Rachel: You can easy just put it on the desk and say ‘inpatients here’ if you realise we haven’t actually acknowledged them yet, just say inpatients here to make sure we are aware.

Whilst the patient was in the scanner, the radiographers noted the importance to talk and reassure their patients, although they did say that not all patients wanted it.

Sandy: Some of them just want to close their eyes and get it over with, they give off that vibe…you feel like actually talking to them will make it worse, will bring them back to what your actually doing, rather than just lying there listening to music, and again, I think it’s just like Rachel said… you gauge your patient and how much they want to be talked to and some of them really need it, and some of them …

Rachel: You can usually tell the ones who need to be talked to continuously, and you do chat to those, every time there’s a break.

The radiographers also noted that this didn’t necessarily always occur as much as it should.

Tricia: Mmm, I think most people appreciate it. I think it’s operator dependant a bit, also if you’re really busy you tend to forget it

Yvonne: Or if you’re really concentrating, I’ve actually said that to patients, ‘look I’m really concentrating some I’m not going to talk to you for a bit,’ and other patients I’ve actually woke them up, I’ve said ‘okay we are about halfway’ and they’ve jumped and I’ve said ‘oh I’m sorry were you asleep’ and they’ve said ‘yes’

Rachel: I mean sometimes we do get caught out with the phone, we get caught out with the phone going off and we have to answer that, obviously the doctors ring us to see when they’re patients are going to be scanned and if it’s right when you should be talking to them (the patient)... I sometimes still talk to them and tell doctors to...

Sandy: Yeah me too! You know, hang on a sec… next one’s coming!

The radiographers would often assist each other with the scanning of a patient, which meant that different radiographers would greet the patient, change them, explain the scan, set them up, talk to them during the scan, and show them out, rather than one radiographer for the entire
process. It was suggested to the radiographers that one radiographer could take care of the patient encounter for each patient, but the group deemed this as unrealistic, although it might be useful for difficult patients.

Rachel: *It’s not realistic, because it is just too hard to have one person do the whole thing when there’s...*

Yvonne: *And it takes longer...*

Rachel: *It takes longer, it really would.*

Sandy: *Although, if you’ve got a claustrophobic one it’s sometimes nice to do*

Tricia: *Sometimes it’s nice to get them out afterwards if you’ve put them in and talk to them*

Sandy: *You often get them in, talk to them, and then come out, because that’s happened a few times where someone will go ‘I’ll scan this one’ and you go ‘no actually I will because they know me now and they’ll recognise my voice and they’re probably happier to know that you’re out there*

Rachel: *I think I will because I’ve got that relationship now*

Tricia: *You do that, yep.*

This discussion led to asking the radiographers whether or not they introduced themselves to the patients. Some stated they didn’t, whilst others did, but all thought this should be improved.

Moderator: *So do you always introduce yourself?*

Tricia: *No.*

Yvonne: *We should*

Tricia: *We should, some people do, Sandy always does, Rachel always does...I don’t do it enough, I don’t know why*

Tricia: *I think it’s something we don’t all do and we should’*

Rachel: *But if Tricia’s going to scan the patient I tell the patient ‘Tricia is going to scan you’*

Sandy: *Yeah, I do that too.*

Tricia: *But I think it’s something we don’t all do and we should*

Yvonne: *I’m going to asterisks that and we’re going to do that’*

Tricia: *Good, make a concerted effort*
CLAUSTROPHOBIC AND ANXIOUS PATIENTS

When discussing claustrophobic or anxious patients, the radiographers noted the need to identify them early. The noted that the safety questionnaire was useful as it identified known claustrophobics, but that there wasn’t much that could be done to identify people who did not know they were claustrophobic. Jokingly, they discussed a mock MRI scanner, although it wasn’t a realistic option.

*Sandy:* I think they are, I don’t know that there is much else you can do

*Rachel:* Because most of these people they don’t actually know, and if they don’t know, how are you supposed to know?

*Amy:* It’s a shock to them.

*Rachel:* We could shut them in a cupboard before they walk in! But I don’t think that’s really appropriate!

*Yvonne:* Okay, test room!

*Tricia:* We’ll have a tube lying out in the waiting room! It’s a bit hard to know.

*Sandy:* I had a mother once who asked her child to go under the table and told them to lie there while she banged drum and said that’s what it’s going to be like are you okay? We could get all the patients to try that! Yea, she said to me, I made them lie under a table and I banged a drum...and he was fine!

PATIENT PRIVACY

There were conflicting views of patient privacy issues; some radiographers didn’t think it was an issue.

*Rachel:* I’d tell them to get over it

*Barbara:* I’ve had two this week who didn’t care, one came out and she’s taken her top off, and she’s got nothing on apart from her underpants.

*Yvonne:* Actually, I get patients to wait...a lot of patients, jump out of their ...if you say, wait in that cubicle, I’ll come back and get you, a lot of them don’t listen to you...

*Tricia:* Well they don’t listen...

*Yvonne:* ... and jump out of their cubicle and can be standing there staring, so when you get patient off the scanner, they have a direct view right up the patient’s gown, so I make them go back, sit...
down, they say why and I say 'pop back in there for a few minutes while I get this other patient off' so that's one thing you can do.

Others, however, talked about the importance of maintaining patient privacy, and discussed strategies that they have employed to do so.

Rachel: If a patient is a bit concerned I do tell them to put another gown on the other way...double gowning, so they are a bit covered, you know what I mean?

Barbara: Well I shut the door to the scan room

Tricia: Having to go out around the corner down the corridor...I think that's an issue, but there's nothing you can do about it right now.

Yvonne: It is, and that's when I double gown them, I say you'll have to go outside so let's put a gown on your back

Sandy: Yes, me too, yeah.

Rachel: I think it is important to have the curtain around obviously if you have the patient in the thing...we don't do that probably enough...

Tricia: When there's an inpatient you mean...

Rachel: Yeah, I think that's mostly what you're talking about because generally otherwise we have the patients sitting in the cubicle like you've just said

Tricia: In the cubicle and they just walk out

Barbara: For the outpatient to feel more comfortable or for the inpatient?

Tricia: Both

Barbara: Most of the inpatients are not really with it

Tricia: Apparently the new hospital will have an interview room

Yvonne: That would be good, having an interview room here
PLANNING PHASE/MEETINGS
Following the second focus group, a series of action planning meetings were held with a smaller team in the department, based on the results of phase 1 and the focus group. Encouragingly, when entering the department for the first of these meetings on the 27/6/2012 I noticed that changes had occurred already in the department by the staff’s own initiative, such as making the booklets more visible and accessible by placing them at the reception window and in the changing cubicles.

A number of strategies were discussed at the initial meeting, although not all of these appeared feasible. Strategies were assigned to various members of the group to investigate, and then a second meeting was held to discuss each strategy and its progress. Strategies are discussed in more detail in the following chapter.
CHAPTER 13 - ACTION TAKING

‘It’s the action, not the fruit of the action, that’s important. You have to do the right thing. It may not be in your power, may not be in your time, that there’ll be any fruit. But that doesn’t mean you stop doing the right thing. You may never know what results come from your action. But if you do nothing, there will be no result.’

Mahatma Gandhi

CHAPTER OVERVIEW
Action research involves reflecting collaboratively on what is currently occurring in a certain setting, and determining strategies to improve this. Based on the results of the action planning phase, a number of strategies were identified by the wider group to improve practice. These strategies and the steps taken to implement them are reported below.

STRATEGIES
The following strategies and actions were all discussed as ways to achieve the ‘ideal’ in patient care in the department. Not all of these strategies were considered feasible.

1. Making the patient information booklet more accessible/visible (by placing it in cubicles, with magazines, at front desk)
2. Updating the booklet
3. Spend more time with patient – bringing them in sooner
4. Ask patient if they have any questions – but be aware if they are trying to delay the scan.
5. Always ask the patient they are okay
6. Standardise a bare minimum of patient information that must at least be given.
7. Ask the patient what they would like to listen to
8. When being called prior to their scan, they can be told they can bring in a CD
9. Create a music list, which can be placed on the back of the cubicle door
10. Reception staff to state ‘next one’s here’ when putting down a request for inpatients
11. Inpatients are welcomed to the department and acknowledged, and told how long it will be
12. Provide a poster with information in the waiting room
13. Inpatients are offered a magazine whilst they wait
14. Shutting the door to the scan room when the patient is getting off
15. Double gowning patients where possible
16. Closing the curtain around inpatients in the waiting bay
17. Ensure talking to the patients in the scanner occurs
18. Ensure that the radiographer always introduces themselves to the patient
19. Purchase name badges for the staff
20. When feasible/practical, have one radiographer deliver patient care for the whole patient journey – or, introduce the person who will be taking them off.

21. Include patient care as an important discussion point in personal reviews and development with staff

22. Group discussions/meetings to discuss patient care

**Poster Development**
The radiographers were shocked that 17% of patients stated they did not receive any information prior to their scan. To address this lack of explanation, a number of strategies were posited, including the development of a poster that could be placed in the waiting room and around the department. After discussion, it was decided that the poster should be written in simple terms and include pictures of the scanner as well as a head coil so that patients knew what to expect. I drafted the paper text with some feedback from the department, whilst staff in the department assisted with taking photos. Once the text and pictures were finalised, a draft poster was made and sent to a graphic designer to develop (Appendix 18). The end result was a visually appealing and informative poster that was placed in the waiting room for patients to read, as well as smaller versions placed throughout the department, including on the back of cubicle doors and in the waiting bay where patients might view them.

**Booklet Development**
A patient information booklet did already exist in the department; however, this was remarkably out of date and had no relevant pictures of the scanner or coils. It was also in black and white. I updated the booklet myself with assistance and feedback from the radiographers, who once again supplied the pictures for the booklet (Appendix 19). Once completed and approved by the team, the draft was sent on to the consumer information board at the hospital where progress unfortunately stalled. Due to certain bureaucratic processes present in the hospital at this time, it was not possible to get the new booklet approved and printed during the timeframe of this project, although it is hoped that this booklet will be able to be used at some stage in the future.

However, not all was lost, as there was still a large amount of the old booklets printed that had not been used as yet. The team decided that these should be placed in more prominent positions throughout the department, and placed them at the reception desk, next to the reading material in the waiting room, and in the changing cubicles.

**Music List**
Music therapy has been shown to reduce anxiety in a number of health care settings, and self-selected music has been deemed useful in radiotherapy, with the authors of one study recommending patients be allowed to bring in their own music and for departments to create music libraries the patient can choose from. A music list was created for the department and
then printed, laminated and placed in the cubicles for the patients. Each artist or type of music was listed in alphabetical order with the aim of being a simple way for the patient to select music they would like to listen to during the scan (Appendix 20).

FLOWCHART DEVELOPMENT

A number of strategies and actions highlighted were more difficult to address with material solutions, such as ensuring radiographers introduce themselves and talk to patients during the scan. Most of the time, things were forgotten or overlooked due to simple human error. Although important, it was unclear how we could actually improve upon these things other than by discussing these issues frequently and making a concerted effort to improve on these. Reminders were viewed as a good way to address many of these issues, but as there were so many components to consider, it was decided it would be best to collate them all in a flowchart outlining the patient encounter process and detailing along the way what steps needed to be taken. I drafted the flowchart in collaboration with a smaller group of radiographers, which was then further developed into a visual, colour-coded flowchart. This flowchart identified a number of important actions that radiographers needed to perform during the patient encounter, including reminders for the radiographer to:

- Introduce themselves
- Bring the patient in earlier to allow time for explanation
- Explain aspects of the scanning experience
- Ask the patient if they are okay
- Talk to the patient during the scan
- Thank the patient for their time
- Inform the patient that their results will be sent to their referring Doctor
- Maintain patient privacy

A colour print out of the flowchart was then laminated and provided to each radiographer (in addition to spares for the department) and also placed in the control room.
Figure 47– The patient encounter

Introduce Yourself
Ask if they have had a scan previously

No

Bring patient in 10 minutes early for a plain scan, 15 minutes early when needing a jelco

Go through Safety Questionnaire (*contrast)

EXPLAIN
- Length of the scan
- Noise levels
- Headphones and music
- Warmth during the scan
- Contrast
- Call bell
- Intercom
- Importance to hold still
- Role of coils

Yes

Bring patient in 5 minutes before their scan

Go through Safety Questionnaire (*contrast)

Is it the same scan as previous?

No

Inform them that it is the same as last time

Yes

ASK
Any questions?

PLACE PATIENT IN SCANNER
ASK
Are you okay?

Scan the Patient
Talk with them over the intercom where required

Assist patient off the scanner
Thank them (i.e. great job!) Ask the patient to get dressed.

Inform the patient
To sign their Medicare form at the front desk and that their results will be sent to their referring Doctor.

Patient privacy
Maintain during the examination by:
- Closing the scan room door
- Pulling the curtain across where feasible
- Asking patients to wait in their cubicles
BADGES/ NAMETAGS
The staff in the department currently didn't wear any nametags or badges. Due to infection control policies, staff identification tags could not be worn on lanyards, and most badges contained some type of metal in them, which would preclude radiographers from getting close to the magnet. A search was performed to identify MRI safe name badges so that patients would be able to identify who was looking after them. During the action taking period, a set of 20 MRI safe name badges were ordered with departmental funds by the head of the unit.

MEETINGS WITH STAFF
Regular meetings and focus groups held with staff during this period aimed to ensure that issues relating to improved patient care were kept at the forefront of everyone's mind. Not only this, they also facilitated the sharing of strategies between radiographers when it came to working with patients, and acted as a portal for the staff to learn from one another. Furthermore it provided the opportunity to discuss whether inpatients were being treated with the same dignity of care that was afforded to outpatients.
RESISTANCE AND BARRIERS

Radiographers were, for the most part, supportive and enthusiastic about the changes that we wanted to put in place and what we wanted to achieve as a team. One issue did arise with the introduction of the flowchart form a minority of the radiographers, as they felt this was not necessary and that the processes outlined in the flowchart were obvious. The head of unit relayed these feelings to me and so in response, I spent time in the department to make sure that I discussed the flowchart with each radiographer either in small groups or on a one-by-one basis. The radiographers appeared to appreciate the chance to discuss the flowchart and provide their feedback, and once they had aired their issues, embraced its use as a reminder tool.

Barriers encountered during the project included those imposed by the short timeframe we had available to us. Although the name badges were ordered early in the action-taking period, they still had not arrived at the original scheduled date for the second round data collection, or at the revised later date. Similarly, although the booklet was updated, it was not possible to have this printed and disseminated in time for the second round of data collection due to the bureaucratic processes for getting it approved within the hospital administration system. Although, the radiographers would have liked to double gown, they simply weren’t able to, as due to financial pressures, the department were unable to get hold of enough clean linen at times for even a single gown for each patient.

Departmental issues were also present at this time, which may have affected the changes introduced and departmental morale. The department was currently operating from 7am until 9pm at night, and on weekends with minimal staff in an attempt to address the backlog of patients requiring a scan. To address this, the departmental head had hoped to have a second scanner in place; however, this was not approved. Both parties were at loggerheads for some time, and eventually the MRI department needed to adopt a 'slowdown' as a form of industrial action to ensure staff were working safe hours. This 'slowdown' began at the conclusion of the action-taking period and throughout the second data collection phase, and resulted in a lower number of outpatients being scanned, and a higher number of inpatients. However, it is not envisaged that this affected the results in a significant way, as it was not directly related to patient care.
CHAPTER 14 - EVALUATION

‘There are three methods to gaining wisdom. The first is reflection, which is the highest. The second is imitation, which is the easiest. The third is experience, which is the bitterest.’

Confucius

CHAPTER OVERVIEW
Once strategies have been implemented into practice, there occurs an additional phase of data collection to determine whether or not these strategies have truly resulted in an improvement in practice, or a closing of the gap between the ‘real’ and the ‘ideal.’ To evaluate whether a change had occurred, a period of observation and reflective journaling was carried out, in addition to a second staff survey and patient survey.

JOURNAL/FIELD NOTES
Two full days were spent in the MRI department during the follow-up data collection period as a non-participant observer; the first on Monday the 27/8/2012 and the second on Friday the 31/8/2012. Once again, the following reflective journal has been transcribed from notes taken in the field, and has been structured according to Kolb’s learning cycle, which states that reflecting is an essential element of learning. The process is cyclical, and can thus begin again after this active experimentation of new ideas.

The first journal was structured in line with the first three steps of Kolb’s cycle, and provided the concrete experience, reflective observation, and abstract conceptualisation stages from my experiences during the first two days spent in the MRI department. This second journal also focuses on these three stages, but in the abstract conceptualisation phase the focus is directed to whether things have changed, and why or why not this may be the case.

Concrete Experience:

Entered the department at 8.30am Monday morning. There were two radiographers on duty, plus the manager and one reception staff member and cleaning staff were present.

Concrete Experience:

A patient was brought in to the scanner who was unsure on her feet. The radiographer put her arm around the patient to help them to the scanner. The other radiographer on duty also came in to help the patient make it to the scanner, although it didn’t seem necessary.

Reflective Observation
The patient appeared to have appreciated this support and contact provided by the radiographers. The radiographers themselves seemed more than happy to assist the patient and provide human contact and the additional radiographer was keen to help out even though it may not have been strictly necessary.

*Abstract Conceptualisation*

Although this may have been occurring during the first period of data collection, it appears that providing human touch and contact has improved during the study. This may be due to it being highlighted during focus groups and discussion with the staff as important.

*Concrete Experience:*

Humour was used during encounters with some patients.

*Reflective Observation*

By making light of the situation, or putting in a joke, radiographers were able to connect better with patients, and build a better rapport with them. This also seemed to reduce the patient’s stress and anxiety.

*Abstract Conceptualisation*

This was noticed in the first round of observation, and was continued on in this second round.

*Concrete Experience:*

For a patient who appeared apprehensive, and had trouble with mobility, a family member was allowed in to keep the patient company during the scan.

*Reflective Observation*

The presence of their family member appeared to reassure and calm the patient in the scanner, and provide them with support.

*Abstract Conceptualisation*

This was noticed in the first round of observation and was continued on in this second round.

*Concrete Experience:*

Radiographers offered music to patients, and asked them to pick an artist from the music list. Music was then played for the patient. Inpatients waiting in the waiting bay were offered the music list to look at. A radiographer only forgot once to play music for one of the sequences.

*Reflective Observation*
The music list appeared to be a useful way to discuss music preferences, and give the patients something to read. The music list also appeared to prompt the radiographer to discuss music with the patient, and give them a choice.

**Abstract Conceptualisation**

Although music was offered previously, the addition of the music list saw more patients choosing their own music, and radiographers did not seem to forget to play their music as often as in the first round.

**Concrete Experience:**

All patients were talked to over the intercom, asked how they were going, told how long left for their scan, and warned of louder scans. Patients were often talked to multiple times over the course of their scan.

**Reflective Observation**

Patients appeared to appreciate being talked to over the intercom, multiple times and the radiographers appeared to be making a concerted effort to talk to the patient.

**Abstract Conceptualisation**

Although communication over the intercom occurred during the first phase, it appeared as if there was a more concerted effort of the radiographers to talk to the patient, and on multiple occasions rather than just once. This may be due to it being highlighted during focus groups and discussion with the staff as important, and being highlighted on the flowchart.

**Concrete Experience:**

New eye covers were purchased for patients, which were disposable. A large number were purchased. Before these were purchased, there were only 3 eye covers to choose from and a radiographer stated that one patient had complained of the smell of one of the covers. A number of patients accepted these eye covers.

**Reflective Observation**

Patients may appreciate the new, clean eye covers.

**Abstract Conceptualisation**

Although eye covers were offered previously, new, disposable eye covers were now offered. This issue wasn't addressed during focus groups or on the flowchart and it seems it was initiated by the radiographer’s themselves, which is encouraging.
Concrete Experience:

Attention was paid to patients following their scan in addition to their preparation. After their scan, some patients were told they done well in the scan, or done a good job during the scan. Others were informed about when they would get their results, or that results would be sent to their doctor. This did not occur for all patients however.

Reflective Observation

Patients may have appreciated this feedback after their scan, and the information regarding results.

Abstract Conceptualisation

Post-scan care was an area that seemed to improve, with more radiographers saying that their patients had done a good job or done well, and informing them that results would be sent to their doctor. This may be due to it being highlighted during focus groups and discussion with the staff as important, and included on the flowchart.

Concrete Experience:

A patient who was in the scanner had a coughing fit, and squeezed the call bell to get the radiographers attention. The radiographers quickly went into the room and reassured the patient and gave them time to recover before completing the scan.

Reflective Observation

The patient appeared uncomfortable in the scanner and had a coughing fit during the scan. The radiographers did all they could to reassure and calm the patient and gave them time to recover before continuing on with the scan. The patient may have appreciated not being rushed.

Abstract Conceptualisation

The radiographers responded quickly to the patient's needs, which is very important. During the first data collection, no patients squeezed the call bell, so the reactions here cannot be discussed in comparison to the first phase.

Concrete Experience:

A larger lady was brought in for a scan and they were only just able to fit into the machine. The radiographers discussed this lady back in the scanning room and one said that she was 'like a sardine' in there, while the other said 'a sardine doesn't come to mind, more of a whale.'

Reflective Observation
In essence, the radiographer appeared as one person to the patient but another when they were not present. The radiographers may have used this different language as a form of relief of tension, or as a coping mechanism. However, if the patient had heard it (which they did not) they may have been offended.

Abstract Conceptualisation

Examples of using jokes at the patient's expense when they are out of earshot to relieve tension was present during the first data collection period as well and may be a way radiographers relieve themselves of stresses of dealing with sick patients in a demanding environment.

Concrete Experience:

Some of the radiographers introduced themselves to the patient, although this didn't occur every time. It did seem to occur more often than in the previous phase.

Reflective Observation

If the radiographer does not introduce themselves, the patient may not feel as comfortable around them or as willing to ask for help for fear of being rude by not knowing their name.

Abstract Conceptualisation

There appeared to be a marginal improvement with radiographers introducing themselves to the patient, although there is still room for further improvement. This may be due to it being highlighted during focus groups and discussion with the staff as important and highlighted on the patient flowchart.

Concrete Experience:

Every outpatient was required to wear a gown, except in one case where an older gentleman was allowed to keep his clothes on after the radiographer checked them. A larger patient was offered two gowns, or ‘double gowning,’ to preserve their privacy. Patients often clutched the back of their gown when crossing the floor from the cubicle to the scanner room.

Reflective Observation

Patients may not like having to change and put on a hospital gown and may feel embarrassed or uncomfortable wearing these gowns. Patients may appreciate being offered the opportunity to double gown or stay in their own clothes.

Abstract Conceptualisation
Although radiographers stated they offered double gowning, no examples of this were seen during the first phase. This may be due to it being highlighted during focus groups and discussion with the staff as important and highlighted on the flowchart.

**Concrete Experience:**

As outpatients cross the floor of the waiting bay from the cubicle into the scanning room, it is often busy, with inpatients or staff. Often, they hold the back of their gown to try to preserve their privacy. In the waiting bay, there is a curtain that can be pulled across inpatients that are waiting for their scan, as a way to preserve privacy for both the inpatient in the waiting bay and for the inpatient crossing the floor, although this did not happen often. When there was a major risk for lack of privacy, such as looking for and taking off ECG dots, the curtain was pulled across.

**Reflective Observation**

Patients who need to change into a gown may feel as if they have a lack of privacy as they cross the floor. Inpatients sitting or lying in their bed in the waiting bay may also suffer from a lack of privacy.

**Abstract Conceptualisation**

This appeared to be an area that still required more work, although marginal improvements were seen in attempts to increase patient privacy. This may be due to it being highlighted during focus groups and discussion with the staff as important and being highlighted on the flowchart.

**Concrete Experience:**

Inpatients, when presenting to the department after being brought down by an orderly, were welcomed to the department by radiographer staff and addressed in person, rather than the radiographer deferring to the orderly. They were often told how long it would be until their scan, and kept updated if anything changed. Rarely, they were offered reading materials. On one occasion, where an orderly was taking a long time to pick the inpatient up after the completion of their scan, the inpatient was given the option of waiting in the waiting room.

**Reflective Observation**

Inpatients may have appreciated being welcomed to the department and acknowledged early on their arrival, and being told how long it would be until their scan.

**Abstract Conceptualisation**

This was an area that appeared to improve since the first round of data collection. This may be due to it being highlighted during focus groups and discussion with the staff as important.
Concrete Experience:

An inpatient came in to the department who was quite sick. They required a slide to the scanning table. The patient was treated very nicely, spoken to a lot and every attempt was made to increase their comfort.

Reflective Observation

Radiographers did everything they could to try to put a sick inpatient at comfort and to connect with them.

Abstract Conceptualisation

Once again, it appears as if the radiographers are treating the inpatients with much more respect and as people rather than issues or problems. This may be due to it being highlighted during focus groups and discussion with the staff as important.

Concrete Experience:

A claustrophobic patient came in for a scan who was very nervous, even though they had taken a mild sedative. The radiographer introduced herself and then spent a lot of time talking and explaining the scan and answering questionings. The radiographer spent a lot of time in the scan room with the patient, explaining the scan, asking the patient if they had any questions and doing a test run. The patient was eventually scanned and the radiographer provided support throughout the scan over the intercom.

Reflective Observation

The radiographer tried their best to get the patient scanned, and the patient seemed reassured by this extra attention and support. The scan may not have been able to go ahead had the radiographer not been as attentive to the patients needs.

Abstract Conceptualisation

As seen previously, when it comes to dealing with patients who are claustrophobic, the radiographers provided significant care and reassurance to the patient.

Concrete Experience:

An inpatient arrived to the department in a bed and was immediately welcomed by the radiographer. The radiographer introduced herself and then talked to the patient, even leaning on the bed and joking with them and answering their questions. A lot of time was spent with the patient pre-scan and the curtain pulled across to maintain their privacy.

Reflective Observation
The patient may have appreciated the dedicated time that the radiographer spent with them.

*Abstract Conceptualisation*

Once again, it appears as if inpatients are being treated more as people rather than issues or problems, and it was hard to distinguish between outpatients and inpatients in terms of how they were being treated by the radiographer. This may be due to it being highlighted during focus groups and discussion with the staff as important.

*Concrete Experience:*

Radiographers showed true concern for some of their patients who were sick and, if they had a dire condition or prognosis, were emotionally affected by this. Alternatively, if scan results showed that the outlook was positive or not as bad as expected, the radiographers were pleased for the patient. For one patient, who was very sick, one of the radiographer’s made the comment ‘he’s dying anyway,’ but treated them with respect and felt sorry for them.

*Reflective Observation*

Despite seeing various patients ranging from healthy to critical, radiographers still showed genuine concern for the patients they looked after and at times were still emotionally invested in their results.

*Abstract Conceptualisation*

Showing concern and being emotionally invested with some patients was evident in the first stage of data collection as well. It may be that due to the increased focus on patient care that this project was trying to achieve, a greater emotional investment in patients resulted.
Observations
Based on the two journals, a table based on major observations during the project was created to summarise whether there were any differences over time.

Table 51: Observations during field work

<table>
<thead>
<tr>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connecting with patients</strong></td>
<td><strong>Connecting with patients</strong></td>
</tr>
<tr>
<td>Rarely, radiographers introduced themselves to patients.</td>
<td>Although it did still not always occur, radiographers did appear to introduce themselves more often to the patient.</td>
</tr>
<tr>
<td>Radiographers used humour to help break down barriers and connect with patients</td>
<td>Radiographers still used humour with the patients</td>
</tr>
<tr>
<td>Radiographers avoided contact except where necessary with inpatients</td>
<td>Radiographers appeared happy to assist both inpatients and outpatients to the scanning table, such as putting their arms around patients, and touching them to reassure them.</td>
</tr>
<tr>
<td>Radiographers rarely welcomed inpatients to the department, and at times, deferred to the orderly bringing the patient down. Inpatients were not offered reading material.</td>
<td>Radiographers welcomed inpatients to the department, and let them know how long it would be until their scan. Sometimes, inpatients were offered reading material.</td>
</tr>
<tr>
<td><strong>Staff Support</strong></td>
<td><strong>Staff support</strong></td>
</tr>
<tr>
<td>Radiographers assist each other</td>
<td>Radiographers continued to assist and help each other out</td>
</tr>
<tr>
<td><strong>Providing support</strong></td>
<td><strong>Providing support</strong></td>
</tr>
<tr>
<td>Radiographers allowed family members into the scan room</td>
<td>Radiographers still allowed family members into the scan room</td>
</tr>
<tr>
<td>Radiographers often talked to patients over the intercom, often once at the start of the scan and once at the end. Some radiographers talked a lot over the scan, some not as much. For a cognitively impaired</td>
<td>All radiographers made a concerted effort to talk to patients during their scan, including mentioning how long scans would take, when a long one or noisy one was coming up, checking on them to see if they were okay, telling them they were doing well, and talking to them on</td>
</tr>
<tr>
<td>Patient, they told them they were doing well.</td>
<td>multiple occasions.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>For claustrophobic patients, radiographers provided additional patient care.</td>
<td>For claustrophobic patients, radiographers still provided additional patient care.</td>
</tr>
</tbody>
</table>

**Music**
- Radiographers almost always told patients they could listen to music, and often offered them a choice.
- Radiographers often chose the music for the patient.
- On occasion, music was forgotten to be played.

**Music**
- Radiographers informed patients of the music list, and always told them they would be able to listen to music of their choice during the scan.
- The music list provided the patient with something to do.
- Very rarely, the music was forgotten to be put on.
- Inpatients were offered the music list as something to look at.

**Reducing Anxiety/ Increasing Comfort**
- Three eye shades existed for patients. A patient had complained of the smell of one of these eye shades, which were reusable.

**Reducing Anxiety/ Increasing Comfort**
- New eye shades were purchased, which could be disposable or patients could take them if they wished.

**Post-scan**
- If patients asked about their results, the radiographer would inform them of what the next step in the process was.

**Post-scan**
- A number of patients were thanked for doing a ‘good job’ or for ‘doing well’ in the scanner.
- Radiographers often offered voluntarily information regarding the process for results, although not always.

**Discussing the patient**
- When patients were out of earshot, derogatory terms (light-hearted) or jokes at the patient’s expense were sometimes employed by the radiographers.
- Radiographers showed true concern for some of their patients, and were emotionally invested in their results.

**Discussing the patient**
- As seen previously, when patients were out of earshot, derogatory terms (light-hearted) or jokes at the patient’s expense were sometimes employed by the radiographers.
- Radiographers still showed true concern for some of their patients, and were emotionally invested in their results.
<table>
<thead>
<tr>
<th>Privacy</th>
<th>Privacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatients were required to change into gowns with what looked like no exceptions.</td>
<td>Outpatients were required to change into gown, although one gentleman was allowed to stay in his clothes after checking and another larger lady was double gowned.</td>
</tr>
<tr>
<td>Patients often crossed the waiting bay floor to the scanner clutching the back of their gown.</td>
<td>Patients often crossed the waiting bay floor to the scanner clutching the back of their gown.</td>
</tr>
<tr>
<td>The curtain in the waiting bay could be pulled across inpatients when located in the waiting bay, to preserve their and the outpatient’s privacy, but this rarely happened.</td>
<td>The curtain once again was only rarely pulled across, but it did seem to be utilised more often.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Department Changes</th>
<th>Department Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>An old out-dated patient information booklet is available on the corner table of the waiting room.</td>
<td>An old out-dated patient information booklet is available on the corner table of the waiting room, but also available at the reception desk, and in the patient cubicles.</td>
</tr>
<tr>
<td>A large A0 poster explain MRI in simple terms is located in the waiting room.</td>
<td>A large A0 poster explain MRI in simple terms is located in the waiting room.</td>
</tr>
<tr>
<td>MRI posters are on the back of the patient cubicle doors.</td>
<td>MRI posters are on the back of the patient cubicle doors.</td>
</tr>
<tr>
<td>MRI poster is located in the waiting bay.</td>
<td>MRI poster is located in the waiting bay.</td>
</tr>
<tr>
<td>Music lists are available in the patient’s cubicles and at reception.</td>
<td>Music lists are available in the patient’s cubicles and at reception.</td>
</tr>
<tr>
<td>A patient care flowchart is present in the scanning room.</td>
<td>A patient care flowchart is present in the scanning room.</td>
</tr>
</tbody>
</table>
AUDIT CRITERIA

**CRITERIA 1: PATIENTS RECEIVE INFORMATION PRIOR TO THEIR SCAN.**
Baseline:

- No – 19 out of 111, 17%
- Yes – 92 out of 111, 83%

Follow-up:

- No – 12 out of 117, 10%
- Yes – 105 out of 117, 90%

**CRITERIA 2: PATIENT PRIVACY MEASURES ARE IN PLACE**
Baseline:

- No – 5 out of 14, 36%
- Yes – 9 out of 14, 64%

Follow-up:

- No – 11 out of 34, 32%
- Yes – 23 out of 34, 68%

**CRITERIA 3: PATIENTS WHO IDENTIFY THEMSELVES AS CLAUSTROPHOBIC RECEIVE AN INTERVENTION OR ADDITIONAL SUPPORT TO ASSIST THEM TO UNDERGO AN MRI SCAN,**
Baseline:

- Not at all/ barely – 8 out of 66, 12%
- Somewhat/ very much so – 58 out of 66, 88%

Follow-up:

- Not at all/ barely – 2 out of 73, 3%
- Somewhat/ very much so – 71 out of 73, 97%
Comparison improved across all three criteria; however, there were no statistically significant differences between information, and no statistically significant difference between privacy measures. However, there was a statistically significant difference between criteria 3, favouring the second audit (Odds ratio 0.20, 95% CI 0.0417 to 0.9993, P = 0.0499).
SURVEY RESULTS (SECOND)
The patient survey occurred over a period of six weeks, from the 10th of August until the 30th of September 2012. Outpatients were phoned by the administration staff on the day before their examination to determine whether or not they were willing to take part.

There were 121 responses to the survey, although not all surveys were complete, which resulted in a lower number of responses for some questions. All participants in the survey were outpatients. There were 72 females and 33 males taking part in the survey.

1. **To your knowledge, did you take any medication or sedatives prior to your scan? (Yes/No answer)**

   Table 52: Taken medication
   
<table>
<thead>
<tr>
<th>Values for Taken Medication</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>yes</td>
<td>Total</td>
</tr>
<tr>
<td>100</td>
<td>21</td>
<td>121</td>
</tr>
</tbody>
</table>

   Figure 49: Taken medication

2. **Did you receive information explaining the procedure and what to expect prior to your scan (either written or verbal)? (yes/no answer)**

   Table 53: Received information
   
<table>
<thead>
<tr>
<th>Values for Received Information</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>yes</td>
<td>Total</td>
</tr>
<tr>
<td>12</td>
<td>105</td>
<td>117</td>
</tr>
</tbody>
</table>

   Figure 50: Received information
2.(a) If yes, did you find this information useful? (4-point Likert scale used, 1-not at all, 2-barely, 3-somewhat, 4-very much so)

Table 54: Rating of information (descriptive statistics)

<table>
<thead>
<tr>
<th>N of Cases</th>
<th>Rating of information</th>
</tr>
</thead>
<tbody>
<tr>
<td>112</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>2.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>4.000</td>
</tr>
<tr>
<td>Median</td>
<td>4.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>3.750</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>3.661</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>3.839</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.475</td>
</tr>
</tbody>
</table>

Figure 51: Rating of information

3. How anxious were you during your scanning experience? (visual analogue scale, where 0 indicates no anxiety, and 10 represents maximum anxiety)

Table 55: Anxiety

<table>
<thead>
<tr>
<th>Anxiety</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>49</td>
<td>40.833</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>6.667</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>10.000</td>
</tr>
<tr>
<td>2.5</td>
<td>2</td>
<td>1.667</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>10.833</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>6.667</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>10.000</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>4.167</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>3.333</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>1.667</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>4.167</td>
</tr>
</tbody>
</table>

Figure 52: Anxiety

Table 56: Anxiety descriptive statistics

| Anxiety | 
|---------|-----------|
| N of Cases | 120        |
| Minimum    | 0.000     |
| Maximum    | 9.000     |
| Median     | 2.000     |
| Arithmetic Mean | 2.392     |
| 95.0% Lower Confidence Limit | 1.113     |
| 95.0% Upper Confidence Limit | 2.871     |
| Standard Deviation | 2.651     |
**Subgroup: Anxiety of those having their first scan**

Table 57: Anxiety first scan descriptive statistics

<table>
<thead>
<tr>
<th>Anxiety First Scan</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N of Cases</strong></td>
<td>14</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>6.000</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>1.500</td>
</tr>
<tr>
<td><strong>Arithmetic Mean</strong></td>
<td>1.786</td>
</tr>
<tr>
<td><strong>95.0% Lower Confidence Limit</strong></td>
<td>0.672</td>
</tr>
<tr>
<td><strong>95.0% Upper Confidence Limit</strong></td>
<td>2.899</td>
</tr>
<tr>
<td><strong>Standard Deviation</strong></td>
<td>1.929</td>
</tr>
</tbody>
</table>

Figure 53: Anxiety first scan

Table 58: Anxiety first scan

<table>
<thead>
<tr>
<th>Anxiety First Scan</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5</td>
<td>35.714</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>14.286</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>21.429</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>14.286</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>7.143</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>7.143</td>
</tr>
</tbody>
</table>

**Subgroup: patients who have had a scan before**

Table 59: Anxiety have had a scan

<table>
<thead>
<tr>
<th>Anxiety have had previous scan</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N of Cases</strong></td>
<td>98</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>9.000</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>2.000</td>
</tr>
<tr>
<td><strong>Arithmetic Mean</strong></td>
<td>2.510</td>
</tr>
<tr>
<td><strong>95.0% Lower Confidence Limit</strong></td>
<td>1.962</td>
</tr>
<tr>
<td><strong>95.0% Upper Confidence Limit</strong></td>
<td>3.059</td>
</tr>
<tr>
<td><strong>Standard Deviation</strong></td>
<td>2.736</td>
</tr>
</tbody>
</table>

Figure 54: Anxiety have had a scan
**Subgroup: patients who did not receive information**

Table 60: Descriptive statistics anxiety no information

<table>
<thead>
<tr>
<th>Anxiety No Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>12</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>8.000</td>
</tr>
<tr>
<td>Median</td>
<td>3.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>3.167</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>1.414</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>4.919</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.758</td>
</tr>
</tbody>
</table>

Figure 55: Anxiety no information

Table 61: Anxiety no information

<table>
<thead>
<tr>
<th>Anxiety No Information</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>25.000</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>8.333</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>8.333</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>16.667</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>16.667</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>8.333</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>8.333</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>8.333</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>8.333</td>
</tr>
</tbody>
</table>

**Subgroup: Anxiety in those who did receive information**

Table 62 Anxiety received information descriptive statistics

<table>
<thead>
<tr>
<th>Anxiety</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>104</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>9.000</td>
</tr>
<tr>
<td>Median</td>
<td>2.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>2.375</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>1.858</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>2.892</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.658</td>
</tr>
</tbody>
</table>

Figure 56: Anxiety received information
Subgroup: Anxiety in those not on medication

Table 63: Anxiety no medication descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>99</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>9.000</td>
</tr>
<tr>
<td>Median</td>
<td>1.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>2.268</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>1.746</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>2.790</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.617</td>
</tr>
</tbody>
</table>

Figure 57: Anxiety no medication

Subgroup: Anxiety in those who have taken medication

Table 64: Anxiety taken medication descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Anxiety taken medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>21</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>9.000</td>
</tr>
<tr>
<td>Median</td>
<td>2.500</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>2.976</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>1.704</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>4.248</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.795</td>
</tr>
</tbody>
</table>

Figure 58: Anxiety taken medication
4. How satisfied were you with your scanning experience? (visual analogue scale, where 0 indicates totally dissatisfied and 10 is extremely satisfied)

Table 65: Satisfaction

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0.826</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1.653</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>2.479</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>1.653</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>2.479</td>
</tr>
<tr>
<td>6.5</td>
<td>1</td>
<td>0.826</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>3.306</td>
</tr>
<tr>
<td>7.5</td>
<td>1</td>
<td>0.826</td>
</tr>
<tr>
<td>8</td>
<td>17</td>
<td>14.050</td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>10.744</td>
</tr>
<tr>
<td>10</td>
<td>74</td>
<td>61.157</td>
</tr>
</tbody>
</table>

Figure 59: Satisfaction

Table 66: Satisfaction descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>121</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.934</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.604</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.263</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.830</td>
</tr>
</tbody>
</table>

Subgroup: Satisfaction of those who have received a scan before

Table 67: Satisfaction had a scan

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction had scan before</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>100</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.930</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.564</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.296</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.845</td>
</tr>
</tbody>
</table>

Figure 60: Satisfaction had a scan
Subgroup: Satisfaction of those who had not been scanned before

Table 68: Satisfaction first scan descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction first scan</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>14</td>
</tr>
<tr>
<td>Minimum</td>
<td>6.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>9.071</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.272</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.871</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.385</td>
</tr>
</tbody>
</table>

Figure 61: Satisfaction first scan

Subgroup: Satisfaction in those who did not receive information

Table 69: Satisfaction no information descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction no information</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>12</td>
</tr>
<tr>
<td>Minimum</td>
<td>4.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>9.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.167</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>6.960</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.373</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.899</td>
</tr>
</tbody>
</table>

Figure 62: Satisfaction no information
Subgroup: Satisfaction in those who did receive information

Table 70: Satisfaction received information descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>105</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>9.019</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.668</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.370</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.815</td>
</tr>
</tbody>
</table>

Figure 63: Satisfaction received information

Subgroup: Satisfaction of those who did not take medication

Table 71: Satisfaction no medication descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>100</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.880</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.512</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.248</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.856</td>
</tr>
</tbody>
</table>

Figure 64: Satisfaction no medication

Subgroup: Satisfaction in those who did take medication

Table 72: Satisfaction taken medication descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction taken medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>21</td>
</tr>
<tr>
<td>Minimum</td>
<td>4.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>10.000</td>
</tr>
<tr>
<td>Median</td>
<td>10.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>9.190</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>8.407</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.974</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.721</td>
</tr>
</tbody>
</table>
5. If you were anxious, what would you say was the main cause of this?

1. Potential results of the scan
2. Scanning equipment and design
3. Hospital staff and environment
4. Previous claustrophobia

Table 73: Cause of anxiety (response)

<table>
<thead>
<tr>
<th>Cause of Anxiety</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>37.500</td>
</tr>
<tr>
<td>1,2</td>
<td>4</td>
<td>6.250</td>
</tr>
<tr>
<td>1,2,3,4</td>
<td>1</td>
<td>1.563</td>
</tr>
<tr>
<td>1,2,4</td>
<td>2</td>
<td>3.125</td>
</tr>
<tr>
<td>1,4</td>
<td>3</td>
<td>4.688</td>
</tr>
<tr>
<td>1,4</td>
<td>3</td>
<td>4.688</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>21.875</td>
</tr>
<tr>
<td>2,4</td>
<td>5</td>
<td>7.813</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>3.125</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>14.063</td>
</tr>
</tbody>
</table>

Table 74: Cause of anxiety (cause only)

<table>
<thead>
<tr>
<th>Cause of Anxiety</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34</td>
<td>40.964</td>
</tr>
<tr>
<td>2</td>
<td>26</td>
<td>31.325</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3.614</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>24.096</td>
</tr>
</tbody>
</table>
Other causes of anxiety not listed:

ID17: be great to have a light inside

ID 20: Very hot and not allowed to get up during contrast interval

ID 31: Pre show nerves

ID 49: Time waiting and getting results to doctor in time for appointment

ID60: Little cold

ID 66: I was anxious about keeping still for a long period (45 mins) but it was over quickly

ID73: Pre-existing anxiety

ID84: Somewhat claustrophobic – both machine and guard over face

ID111: Partial – work related stresses adding!

ID117: Other – fear of injection

ID 121: Just a bit anxious about being in for so long.
6. If you were anxious, did the actions of hospital staff within the department reassure you? (4-point Likert scale used, 1-not at all, 2-barely, 3-somewhat, 4–very much so)

Table 75: Actions of staff to reduce anxiety

<table>
<thead>
<tr>
<th>Actions of Staff to Reduce Anxiety</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1.370</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1.370</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
<td>21.918</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>75.342</td>
</tr>
</tbody>
</table>

Figure 68: Actions of staff to reduce anxiety

Table 76: Actions of staff to reduce anxiety descriptive statistics

<table>
<thead>
<tr>
<th>N of Cases</th>
<th>Actions of Staff to Reduce Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>73</td>
<td></td>
</tr>
</tbody>
</table>

| Minimum | 1.000 |
| Maximum | 4.000 |
| Median  | 4.000 |
| Arithmetic Mean | 3.712 |
| 95.0% Lower Confidence Limit | 3.581 |
| 95.0% Upper Confidence Limit  | 3.844 |
| Standard Deviation  | 0.565 |

7. Have you previously had a scan, either here or in another department? (yes/no answer)

Table 77: Previous scan

<table>
<thead>
<tr>
<th>Previous Scan</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>14</td>
<td>12.281</td>
</tr>
<tr>
<td>y</td>
<td>100</td>
<td>87.719</td>
</tr>
</tbody>
</table>

Figure 69: Previous scan
8. If yes, how anxious were you during your last scanning experience? (visual analogue scale, where 0 indicates no anxiety, and 10 represents maximum anxiety)

Table 78: Previous anxiety

<table>
<thead>
<tr>
<th>Previous Anxiety</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>26</td>
<td>26.531</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>8.163</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>6.122</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>9.184</td>
</tr>
<tr>
<td>3.5</td>
<td>1</td>
<td>1.020</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>8.163</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>10.204</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>6.122</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>7.143</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>2.041</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>10.204</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>5.102</td>
</tr>
</tbody>
</table>

Figure 70: Previous anxiety

Table 79: Previous anxiety descriptive statistics

<table>
<thead>
<tr>
<th>Previous Anxiety</th>
<th>N of Cases</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Arithmetic Mean</th>
<th>95.0% Lower Confidence Limit</th>
<th>95.0% Upper Confidence Limit</th>
<th>Standard Deviation</th>
</tr>
</thead>
</table>
9. How satisfied were you with your previous scanning experience? (visual analogue scale, where 0 indicates totally dissatisfied and 10 is extremely satisfied)

Table 80: Previous satisfaction

<table>
<thead>
<tr>
<th>Previous Satisfaction</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>2.020</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2.020</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1.010</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>2.020</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2.020</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>8.081</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>5.051</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>10.101</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>12.121</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>8.081</td>
</tr>
<tr>
<td>10</td>
<td>47</td>
<td>47.475</td>
</tr>
</tbody>
</table>

Figure 71: Previous satisfaction

Table 81: Previous satisfaction descriptive statistics

<table>
<thead>
<tr>
<th>Previous Satisfaction</th>
<th>N of Cases</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Arithmetic Mean</th>
<th>95.0% Lower Confidence Limit</th>
<th>95.0% Upper Confidence Limit</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>0.000</td>
<td>10.000</td>
<td>9.000</td>
<td>8.040</td>
<td>7.530</td>
<td>8.551</td>
<td>2.559</td>
</tr>
</tbody>
</table>

10. Finally, do you know what type of scan you had today? (if known)

Table 82: Scan type

<table>
<thead>
<tr>
<th>Scan type</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal</td>
<td>4</td>
<td>5.000</td>
</tr>
<tr>
<td>abdominal scan</td>
<td>1</td>
<td>1.250</td>
</tr>
<tr>
<td>c spine</td>
<td>1</td>
<td>1.250</td>
</tr>
<tr>
<td>digital imaging</td>
<td>1</td>
<td>1.250</td>
</tr>
<tr>
<td>head/brain</td>
<td>43</td>
<td>53.750</td>
</tr>
<tr>
<td>it was a magnetic experience</td>
<td>1</td>
<td>1.250</td>
</tr>
<tr>
<td>leg</td>
<td>1</td>
<td>1.250</td>
</tr>
<tr>
<td>mri</td>
<td>1</td>
<td>1.250</td>
</tr>
<tr>
<td>no</td>
<td>7</td>
<td>8.750</td>
</tr>
<tr>
<td>pelvic hip</td>
<td>1</td>
<td>1.250</td>
</tr>
<tr>
<td>skeletal thighs and arte</td>
<td>1</td>
<td>1.250</td>
</tr>
<tr>
<td>spinal</td>
<td>7</td>
<td>8.750</td>
</tr>
<tr>
<td>yes</td>
<td>11</td>
<td>13.750</td>
</tr>
</tbody>
</table>
Comments and feedback from patients

ID 1: Very professional staff very friendly and also assuring. Excellent!

ID 2: More info should be posted or given a little earlier

ID 4: Staff were excellent. Machines could be bigger for larger patients

ID 10: Today I felt the staff went out of their way to make me more at ease and comfortable. I sincerely mean this.

ID 13: Thank you very friendly

ID 15: Glad when it was over!

ID 16: The staff was fantastic. Thank you

ID 17: Very friendly reassuring staff and great to have choice of music.

ID 20: 1. Fan at both ends, 2. Before contrast injection, allow patient to stand up because laying on hard surface for prolonged periods causes pain

ID 23: The staff were very friendly and explained everything that was happening

ID 24: Maybe staff could introduce themselves.

ID 26: The ladies voice was helpful. We are very fortunate to have this facility

ID 27: Helpful that my friend was able to stay with me

ID 28: Staff were wonderful (great music to listen to also)

ID 29: Nowhere near as bad as I expected.

ID 31: Staff were lovely. Experience always mentally painful

ID 39: Couldn’t hear the music most of the time

ID 40: Wouldn’t want another one.

ID 42: Last time I had a scan hearing protection was accidentally overlooked after I said I did not want music. This resulted in damaging my right ear drum. The staff today were excellent and provided me with what I needed and reassured me that it was procedure for hearing protection to be worn at all time.

ID 43: Staff have always been helpful and caring, when I have had MRIs.
ID44: The hole could be bigger

ID 49: hope dye used is ok with kidney transplant

ID 51: Minimal and efficient interaction with staff – slightly impersonal

ID 57: Disappointed with a 2hr wait due to the request form having disappeared

ID64: Pleasant staff calming surroundings

ID79: Quicker than I imagined

ID80: Music good!

ID81: Staff helpful and professional thanks

ID 84: Very friendly and efficient staff. Don’t remember having music with CT or MRI previously – certainly helped. All staff welcoming and professional. Very short wait at reception. Positive experience.

ID85: Caring service

ID87: Music really helps.

ID94: Staff and music were nice

ID96: Staff are all great and efficient.

ID101: Due to back and neck problem was a bit anxious about staying still for extended time

ID102: Staff were fantastic! The lady at the front desk was very patient and even gave me directions to the carpark!

ID 104: Staff excellent. Reception and technician talked through process advising when different noise levels would be occurring and enquired to my comfort during.

ID105: I like the way the nurse speaks to you through the head phones during the scan to reassure and explain what comes next.

ID 107: The staff were really good and helped one in a calm state

ID110: Staff all wonderful!! Thanks for my music

ID111: 3rd scan – the staff are great and do everything possible to make the experience as comfortable as possible – thank you to all concerned!!

ID112: Good luck
ID113: Staff were brilliant, and caring always doing the best that they can for you

ID 118: Was asked to come at 1245 did not have any others waiting and yet I did not get in until 1.30
FURTHER ANALYSIS

A number of different hypothesis were put to the test using statistical analysis, similar to the first survey analysis.

Is there a difference between anxiety ratings between the general anxiety of the sample and the previous rating of anxiety?

Current mean = 2.392

Previous mean = 3.811

Mann-Whitney U Test Statistic : 4,436.500

p-value : 0.001

Chi-square Approximation : 10.163

df : 1

There is a significant difference.

Is there a difference between current anxiety ratings of those presenting to the department for their first scan or those who have had a scan before?

Mann-Whitney U Test Statistic : 753.000

p-value : 0.587

Chi-square Approximation : 0.294

df : 1

There is no significant difference

Is there a difference between anxiety ratings for those who have had a scan before, and previous ratings of anxiety from other scans?

Current mean (scanned before) = 2.51

Previous (scanned before) = 3.81

Wilcoxon Signed Ranks Test

There is a significant difference (p<0.0005)
**Is there a difference between satisfaction ratings between the general satisfaction of the sample and the previous rating of satisfaction? (comparing results of q4 and q9)**

Previous mean: 8.04

Current mean: 8.934

Mann-Whitney U Test Statistic: 7,140.500

p-value: 0.007

Chi-square Approximation: 7.235

df: 1

There is a significant difference

**Is there a difference between satisfaction ratings of those presenting to the department for their first scan or those who have had a scan before?**

Mann-Whitney U Test Statistic: 708.000

p-value: 0.937

Chi-square Approximation: 0.006

df: 1

There is no significant difference

**Is there a difference between satisfaction ratings for those who have had a scan before, and previous ratings of satisfaction from other scans?**

Previous mean: 8.04

Current mean: 8.93

Wilcoxon Signed Ranks Test Results

There is a significant difference (p<0.0005)
Is there a difference in ratings of anxiety between those who received information, and those who did not?

Mann-Whitney U Test Statistic : 741.000
p-value : 0.272
Chi-square Approximation : 1.205
df : 1

No significant difference: low numbers of patients who received information

Is there a difference in ratings of satisfaction between those who received information, and those who did not?

Received information mean: 9.1019
No information mean: 8.167
Mann-Whitney U Test Statistic : 883.000
p-value : 0.010
Chi-square Approximation : 6.691
df : 1

There is a significant difference – low numbers however for this group.

Is there a difference in ratings of anxiety between those who took medication, and those who did not?

Mann-Whitney U Test Statistic : 903.500
p-value : 0.331
Chi-square Approximation : 0.947
df : 1

No significant difference

*Is there a difference in ratings of satisfaction between those who took medication, and those who did not?*

Mann-Whitney U Test Statistic : 886.000

p-value : 0.271

Chi-square Approximation : 1.211
df : 1

No significant difference

*Is there a correlation/relationship between the rating of information and rating of anxiety?*

Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Rating of information</th>
<th>Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating of information</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>-0.109</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Bartlett Chi-square Statistic : 1.307
df : 1

p-value : 0.253

No significant correlation
Is there a correlation/relationship between the rating of information and rating of satisfaction?

Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Rating of information</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating of information</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>0.502</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Bartlett Chi-square Statistic : 31.856  

df : 1 

p-value : 0.000 

There is a significant medium to large positive correlation.
Is there a correlation between anxiety and satisfaction ratings?

Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction</th>
<th>Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>1.000</td>
<td>-0.197</td>
</tr>
<tr>
<td>Anxiety</td>
<td>-0.197</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Scatter Plot Matrix

Figure 73: Satisfaction and anxiety scatter plot

Bartlett Chi-square Statistic : 4.312

df : 1

p-value : 0.038

There is a significant small negative correlation.
**COMPARING SURVEY RESULTS PRE AND POST**

*Question 1: Is there a difference in the number of patients who received information in survey 1 compared to survey 2?*

<table>
<thead>
<tr>
<th>Yes Information</th>
<th>No information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre 92</td>
<td>19</td>
</tr>
<tr>
<td>Post 105</td>
<td>12</td>
</tr>
</tbody>
</table>

| Odds ratio      | 0.5534         |
| 95% CI          | 0.2549 to 1.2012 |
| z statistic     | 1.496          |
| Significance level | P = 0.1346    |

**No significant difference.**

Percentage of patients who did not receive information:

Survey 1: 17.117%
Survey 2: 10.256%

Difference 6.8610%

95% CI -2.6625% to 16.4843%

Chi-square 1.736

DF 1

Significance level P = 0.1877

**No significant difference**
**Question 2:** is there a difference in ratings of anxiety between all patients in survey 1 compared to all patients in survey 2?

First survey mean: 2.617

Second survey mean: 2.392

Mann-Whitney U Test Statistic: 7,366.500

p-value: 0.748

Chi-square Approximation: 0.103

df: 1

No significant difference.

Figure 74: Anxiety survey 1 compared to Anxiety survey 2
**Question 3:** Is there a difference in ratings of satisfaction between all patients in survey 1 compared to all patients in survey 2?

First survey mean: 8.857

Second survey mean: 8.934

Mann-Whitney U Test Statistic: 6,851.500

p-value: 0.820

Chi-square Approximation: 0.052

df: 1

No significant difference

**Question 4:** Is there a difference in ratings of the usefulness of information between the 1st and 2nd survey?

First survey mean: 3.535

Second survey mean: 3.75

Mann-Whitney U Test Statistic: 4,702.000

p-value: 0.008

Chi-square Approximation: 6.940

df: 1

There is a significant difference.
Question 4: Is there a difference in ratings of the actions performed to reduce anxiety between the 1\textsuperscript{st} and 2\textsuperscript{nd} survey?

First survey mean: 3.455

Second survey mean: 3.712

Mann-Whitney U Test Statistic : 2,113.500

\textbf{p-value} : 0.119

Chi-square Approximation : 2.433

\textbf{df} : 1

No significant difference.
1. How do you feel your department rates currently at providing patient care? [VAS of 1-10]

Table 83: Providing patient care

<table>
<thead>
<tr>
<th></th>
<th>VAS Score for Providing Patient Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>8.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>8.500</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>7.903</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>9.097</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.645</td>
</tr>
</tbody>
</table>

Figure 75: Providing patient care
2. *When patients are anxious/claustrophobic, do you take any actions to help them through the scan? (Yes/No answer)*

6 responses, all yes

Are actions taken to help claustrophobic/anxious patients?

**Figure 76: Actions to help claustro/anxious patients**

*If yes, what are these actions?*

ID 2: Offer of sedation, music, eyemask, check on them during scan

ID4: Explanation – offer eye mask or mirror. Music

ID5: Kindness, patience and assurance. Bringing in support people/relatives. Giving options – eyeshades, sedation etc

ID6: Plenty offer reassurance, more explanation, more information. Offer eye mask, different music

ID7: Explanation: choice of music, reassurance buzzer to alert us, eyeshades, speak to them between scans, more reassurance
3. When patients are anxious, do you think that actions you take have an effect in reducing anxiety? (Likert scale 1-4, with 1=not at all, 2=barely, 3=somewhat, 4=very much so)

Table 84: Effect of actions

<table>
<thead>
<tr>
<th></th>
<th>Rating of Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>4.000</td>
</tr>
<tr>
<td>Arithmetic Mean</td>
<td>3.833</td>
</tr>
<tr>
<td>95.0% Lower Confidence Limit</td>
<td>3.405</td>
</tr>
<tr>
<td>95.0% Upper Confidence Limit</td>
<td>4.262</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.408</td>
</tr>
</tbody>
</table>

Figure 77: Rating of actions

Any other comments?

ID 2: Continued to use introduction, great ward patients, use music lists; all improved our patient interaction. Pleased with positive results

ID4: Good study – now everyone else introduces themselves (not just me 😊)

ID 6: Some improvements regarding patient privacy are hard to improve on considering time restrictions and space restrictions in our department
ID7: We take pride in our ability to reassure anxious patients during their exam, and it is good to know that we can still improve.

COMPARING STAFF SURVEYS

*Was there a difference between the ratings of patient care delivered in the department between the first and second staff surveys?*

**Kruskal-Wallis One-way Analysis of Variance for 23 Cases**
The categorical values encountered during processing are

- Mann-Whitney U Test Statistic: 19.000
- p-value: 0.029
- Chi-square Approximation: 4.754
- df: 1

There is a significant difference.
CHAPTER 15 – SPECIFYING LEARNING

‘Tell me and I forget, teach me and I may remember, involve me and I learn.’
Benjamin Franklin

CHAPTER OVERVIEW
Specifying learning is the final stage of the cyclical action research process, where general findings from the project are identified. To identify what has been learnt throughout the action research process, a final focus group was conducted with the departmental staff, and a follow up staff survey conducted.

FINAL FOCUS GROUP
The final focus group took place on the 21st of November 2012 at 2pm and lasted for one and a half hours. Refreshments were supplied and the session was well attended, with 7 radiographers and 3 reception staff present. The second focus group was focused on providing feedback from phase 1 of the project and then analysing the results with a critical focus in mind in order to look at how to maintain these results and improve on them. This third and final focus group was focused on providing feedback from phase 2 of the project and discussing the results. The aim was to discuss what did and did not work, how the team felt about the project, and to make recommendations for what could be changed next time. An interview guide was used to facilitate the focus group, although it was not strictly adhered to as to allow flexibility in the discussions. A handout with the results of the second phase of data collection were also provided prior to the meeting to assist in the discussions.

FOCUS GROUP RESULTS

REACTION TO THE RESULTS:
After going through the results of the second phase of data collection, the group were asked what their initial impressions were of the findings. The group overwhelmingly thought that the findings were positive and some members were pleasantly surprised by these findings. On reflecting, it is interesting to note that they thought that their standard of patient care prior to the project was superb and this study had reinforced that there was room for improvement. Participants made statements such as:

‘That’s really positive’

‘Pleasantly surprised’

‘I think it’s interesting that it shows...let’s be honest, we think we are pretty good and it shows there’s always room for improvement... now we’re even better!’
‘Even though we thought we were really, really good, it just shows there is still room for improvement’

‘I think our standard is quite high, we do spend a lot of time talking to the patients, so it has been a bit of a pat on the back I think’

The group were also asked whether they felt that there actually had been a change in practice, and it was felt by the group that there had been changes in regards to patient care.

‘Yes, definitely’

‘I never used to mention my name and now I do’

‘Yes, me too’

‘I think we do get up and greet the inpatient more quickly’

‘It’s been of benefit to the department as a whole’

Privacy/Linen
The group also discussed particular aspects of patient care. Privacy was something that improved marginally according to the audit results and the difficulties/challenges faced to improve in this area were discussed. These were mainly related to the inability to provide double gowning and the inability for the department to get hold of enough clean linen at times for even a single gown for each patient. Although the radiographers would have liked to double gown they simply weren’t able to.

‘I always try to’ referring to double gowning for some patients

‘Increase to a 100 gowns so we can give patients a gown at all...but we are pressured to cut back on linen supplies’

‘It would be nice, you’re right’

‘There’s no financial way we can offer them anything else...you can offer them two, but then it is up to the patient’

Patient Booklets
Despite not being able to disseminate the updated information booklet, there was improvement in the uptake of the old booklets due to their repositioning. As one radiographer stated:

‘We’ve had people pick them up...and take them home’

However, the patient booklets were identified as one area to improve on.
‘Making the information booklets not out dated’

‘It’s on the way...I’ve got to find some money first but it’s on its way’

MUSIC LIST
Providing a music list was something the radiographers were very positive about, and some members of the team declared that this simple list had the biggest change in the department. The music list gave the patient something to do, saved time for the radiographers and ensured the patient would have their preferred music playing, rather than the radiographer choosing for them.

‘One thing I really liked was the music list’

‘Having the music list...it gives them something to do’

‘That’s probably the number 1 thing’

There were suggestions for improvement with the music list, and the staff thought it was necessary to update the list, particularly as patients had often requested artists who were not on the list.

‘People go “oh I wanted this last time and I’ve come back and you still don’t have it”’

‘The music list, I think perhaps what we could do with that is jot down occasionally if someone asks for something...see if we can continue to improve’

As the music list was in alphabetical order, one radiographer jokingly wished that ABBA wasn't at the top, as there had been more requests for ABBA than previously.

‘I wish ABBA wasn’t at the top though’

INTRODUCING YOURSELF
The flowchart emphasised the need for radiographers to introduce themselves to the patients, which was one thing that was not occurring universally prior to the project, with only one radiographer seemingly doing it.

‘I introduced myself to my patients this morning and they were dears they remembered and were calling me by name’

‘The couple of things I think we have carried on with is introducing the radiographer by name and that’s continued on even though the survey has finished and I really like that’

‘I never used to mention my name and now I do’
Unfortunately, the nametags had still not been able to be implemented into the department, but the head of the department was ‘working on’ getting these sorted.

POSTERS
The new information posters around the department were received positively and patients had commented on their usefulness. The radiographers even went to lengths to rearrange the waiting room to ensure that the main large poster was in the most visible position for the patients.

‘People have commented on them haven’t they? The posters in the waiting room’

‘I think the posters worked really well’

‘We rearranged the waiting room so your posters got pride of place’

FLOWCHART
Despite some initial resistance when first implementing the flowchart of the patient encounter, this was quickly overcome and staff could see its use by the end of the study. It had gained acceptance amongst the staff to such an extent that it had become a part of the orientation process for new staff member’s entering the department. Pleasingly, other departments, upon hearing of the flowchart, had also requested a copy.

‘The flow study (sic) is part of (new staff member’s) introduction to the MRI department’

‘Flinders have taken a copy of our flowchart and our poster’

MAINTAINING THE CHANGES
The staff asserted that they had achieved changes and we discussed how we could ensure that these changes were maintained. The team were positive that changes had occurred, could be maintained, and that they wanted to keep improving in this area.

‘We have to make sure that we maintain this’

‘The couple of things I think we have carried on with is introducing the radiographer by name, and that’s continued on, even though the survey has finished, and I really like that’

(When asked if the change can be maintained) ‘Absolutely, the sky’s the limit’

‘We should go for 100% really’

They also mentioned how there were current limitations in their department, which might be affecting their delivery of patient care. They felt optimistic that with the move to a new hospital in the near future, patient care would once again increase, as the new facilities would provide interview rooms, among other things.
**MY PRESENCE**
I asked the team how they felt about my presence in the department, particularly during the periods where I acted as a participant observer. They said that my presence was helpful with slides, but that it was disconcerting at times having someone watching what they did, although it didn't necessarily change how they acted.

‘You were helpful with slides, yes (laughs)’

‘Having someone watch with a note pad it is hard to forget that someone is there’

‘I don’t think it changes what you do, particularly’

**WHERE TO FROM HERE**
At the conclusion of the focus group we discussed as a group what the next steps were. Some staff members wanted to make sure that patients having their first scan were brought in a little earlier, so they could be provided with more information. However, other staff were hesitant to do this as they didn’t want the scanner to be empty; therefore, another strategy was identified, where patients could be identified in the phone call the night previously and identified on the day running sheet so that they could be brought in earlier.

‘I think for people who haven’t had an MRI before, we can get them in a little earlier, and talk to them a little longer’

‘I just don’t want staff to be talking to the patients when the scanners empty...impacts on time’

‘I guess that is about identifying that (that it is the patient’s first time) a little earlier’

‘Could we write on the radiography day sheet new or first scan?’

‘Definitely worth thinking about’

Some of the staff also felt that it would be hard to achieve any more improvements, without sacrificing some of their or the scanner’s time, which was already limited.

‘I can’t see many more areas where we can go very much further without spending more time’

Finally, the staff wanted to make sure these changes were maintained, and although they didn’t feel another cycle was necessary given the positive results, they discussed conducting another survey on an annual basis, to ensure the results were maintained. They also discussed conducting the survey once moving to their new location.

‘Maybe having an annual check...patient survey once a year’
STAFF SURVEY
The follow up second survey also reflected the attitudes of the radiographers that a change in practice had occurred. Indicative of this was the statistically significant difference the VAS ratings of how their department currently performs in regards to patient care (Initial mean = 7.75, SD=0.622; Post mean = 8.5, SD = 0.645; p=0.029).

The change in practice was again reflected in the comments received from some staff members.

ID 2: Continued to use introduction, great ward patients, use music lists; all improved our patient interaction. Pleased with positive results

ID4: Good study – now everyone else introduces themselves (not just me 😊)

ID 6: Some improvements regarding patient privacy are hard to improve on considering time restrictions and space restrictions in our department

ID7: We take pride in our ability to reassure anxious patients during their exam, and it is good to know that we can still improve.
OVERVIEW
An important feature of specifying learning is to determine what has been learnt throughout the project. The following section reports an overview of the action research process, and what was learnt and achieved.

Patients presenting to medical imaging departments experience a wide range of emotions relating to their scan, including anxiety, fear and claustrophobia. Patients need information and support prior to and during their scan and their interaction with the radiographer has a significant impact on the experience of the patient, whether positive or negative. Strategies have been shown to be effective at reducing anxiety, fear, claustrophobia and the need for sedation for people undergoing imaging. These strategies include providing information, audio-visual systems, in team training and anxiety reduction protocols.

It has been reported that medical imaging is a stagnant profession, which suffers from a lack of a clear mission/visions or priorities, a lack of professionalism and widespread apathy. The findings of the first focus group found that radiographers were time poor, and although in many cases they would like to focus on providing patient care and spend more time with the patient, they often got caught up in focusing on the technological side of practice to ensure scans were completed in a timely manner due to external pressures.

To address the patient experience, shift the focus of the radiographer from technology onto the person, and introduce strategies and changes to a department, a process of action research can be carried out. The results of this action research project led to the following:

- Patients: Improved satisfaction, lower anxiety, and higher ratings of information that was provided to them.
- Staff: A renewed focus on the patient in MRI including changes in their actions (such as use of touch, improved communication, maintaining privacy) and the creation of a reflective cohort of practitioners who learnt from each other, and were energised and empowered to make changes and do better in their department. The focus of the staff prior and following the action research is displayed graphically below (Figure 78, 79), displaying how the focus has changed, with patient care becoming the primary concern.
- Departmental: Changes in practice, new processes introduced changes in appearance (posters, flowchart).
Figure 78: Radiographer's concerns at the initial stages of the study.

Figure 79: Radiographer's concerns at the conclusion of the study.
The following visual model attempts to display how the three areas of patient, radiographer and departmental practice can be brought together and improved by action research. Radiographers can be ‘shaken’ from their disinterest, or ‘emancipated,’ by a process of critical reflection, engagement and involvement. This leads to more empowered radiographers, enlightened in their work and free from apathy. The top three boxes reflect where the opportunities for practice improvement were, and the bottom three boxes show how action research led to a change and improved integration between patient, department, and radiographer factors.

Figure 80: The action research process
CHAPTER 16 - DISCUSSION, CONCLUSION AND RECOMMENDATIONS

‘It is good to have an end to journey toward; but it is the journey that matters, in the end.’

Ursula K. Le Guin

CHAPTER OVERVIEW
The results of this action research project indicated that a number of changes took place in the department during the stages of diagnosis, action planning, action taking and evaluating. Following is a discussion regarding the major findings of the project, followed by a new model for the patient experience in medical imaging and for practice change in an imaging department.

HOW DID THE PROJECT CHANGE FROM INITIALLY PLANNED?
As Morton-Cooper states, ‘action researchers can take comfort that whatever your question started out as, it is unlikely to remain so for the duration of your project.’ (p.34) As a novice action researcher, the project initially was focused on implementing findings from my systematic reviews, which could be viewed as a technical approach to action research, as defined by Carr and Kemmis. Although this was done, to a certain extent, it achieved much more as well. From the initial stages of the project I placed a large focus on engaging with the staff of the department and over time realized that although there was room to implement findings from the systematic reviews, there were other concerns, brought up by the radiographers, which needed to be addressed. In this way, the action research project was a learning experience for me throughout the project, and the aims shifted during the research. Rather than focusing on implementing evidence-based approaches, the research was broader than this and addressed cultural and personal practices, rather than simple technical changes.

SURVEY AND AUDIT MAJOR FINDINGS
This action research project was initiated with a first meeting on the 22nd December 2011, with ongoing meetings taking place before formal data collection activities commenced on the 2nd of March 2012, concluded on the 23rd of November 2012. Over this time, a number of data collection methods were utilised to analyse the process of change within the department, and determine whether there had been changes in practice and outcomes.
Similar to the findings of some of the studies included in the systematic review, the first survey showed that anxiety was linked to information, as the mean anxiety levels were statistically significantly higher in those who did not receive information compared to those who did (no information mean= 4, received information mean= 2.293, p = 0.073). After hearing these results, the radiographers placed more emphasis on ensuring patients received information prior to their scan, either in the form of posters, booklets, or with an explanation. This resulted in an increased percentage of patients receiving information prior to their scan in the second survey (1st survey 83% received information, 2nd survey 90% received information, OR 0.5534, 95% CI 0.2549 to 1.2012, p=0.1346), although this was not a statistically significant difference. Despite this percentage not reaching statistical significance, the rating of information provided as judged by the patient did improve significantly (1st survey mean=3.535, 2nd survey mean = 3.75, p = 0.008).

For the audit, compliance with all of the criteria improved, although only one of these reached statistical significance (patients who identify themselves as claustrophobic receive an intervention or additional support, OR 0.204, 95% CI 0.0417 to 0.9993, p = 0.0499). However, with audit, it is generally noted that results may have clinical significance even when not reaching statistical significance.

There was an improvement in the rating of actions performed by the radiographer to reduce anxiety (1st survey mean 3.455, 2nd survey 3.712, p = 0.119) although it did not reach statistical significance. However, radiographers rated themselves better in their delivery of care in the second survey compared to the first, a finding that did reach statistical significance (1st survey mean= 7.75, 2nd survey mean= 8.5, p=0.029).

Anxiety (1st survey mean 2.617, 2nd survey 2.392, p=0.748) and satisfaction (1st survey 8.857, 2nd survey 8.934, p= 0.82) improved, but not significantly. Although they didn't improve significantly between the two surveys, there was significantly higher satisfaction (current scan mean 8.93, previous scan mean 8.04, p=0.011) and lower anxiety (current scan mean 2.51, previous 3.811, p=0.004) in the second survey compared to their previous scan for those who had been scanned more than once. In their study evaluating the psychometric properties of the visual analogue scale for anxiety, Williams et al. reported a preliminary minimally important difference for clinical significance approximately ranged from 12mm(1.2cm) or 13mm(1.3cm) points on the 100mm(10cm) visual analogue scale. The findings for anxiety can thus be considered both statistically and clinically significant.

**CHANGE AND BARRIERS TO CHANGE**

The aim of action research, at its basis, is to achieve some sort of change, whether it be in practice, culture, or the organisation. During this project, change did occur at both organisational, practice, personal and culture changes. Organisationally, new processes were
introduced (i.e. the flowchart); in practice, patients were treated differently; personally, participants changed the way they behaved, and culturally, there was a slight shift in focus towards patient centred care rather than occupancy of the machine.

There were barriers to some of the changes; these included resource barriers (such as lack of gowns for double gowning), organisational barriers (bureaucratic process required for updating an information booklet, and personal barriers (resistance to change). Some of these barriers could not be addressed during the course of the project; however, all efforts were made to ensure staff were interested in the project and engaged. The one time where resistance to change was most evident was during the introduction of the new flowchart, where after discussions with some staff members I determined that other staff members saw the flowchart and its steps as superfluous and obvious. To address this, I made sure to talk to all the radiographers informally regarding the flowchart and hand them each their own copy, and outline clearly the justification for this type of document. Following on from this, staff seemed to realise the worth of such a document, understand that it was to be used as a reminder and a guide rather than a strict process that had to be adhered to, and at the final focus group the feedback regarding the flowchart was positive.

Another issue that threatened the project was the tension that existed between some of the staff members, which was particularly present with the reception staff. Although the reception staff cooperated with the radiographers and I during the project, initially there were some difficulties in having them work well together to administer the survey. When initiating the patient survey, the reception staff member who worked the late afternoon/night shift was placing notes on the work of the reception staff member who worked the morning/early afternoon shift. To address this I made time to talk to both reception staff one on one and we were able to develop a process both parties were happy with and the survey was able to go on.

Approximately halfway through the MRI department needed to adopt a 'slowdown' as a form of industrial action to ensure staff were working safe hours. This 'slowdown' began at the conclusion of the action-taking period and throughout the second data collection phase and resulted in a lower number of outpatients being scanned and a higher number of inpatients. Although it was possible this slowdown affected staff morale, it was not envisaged that this affected the results in a significant way, as it was not directly related to patient care.

**Engagement**

Radiography has been described as a profession characterised as clinically competent but unreflective practitioners, where there is a poor attitude to research, a resistance to change, and low-self-esteem and general apathy. Although this makes the field an appropriate culture to conduct practical and empowering action research, it can also dissuade any type of research from being conducted. Prior to the project, I had fears that the project would not be embraced.
by the practitioners and that the apathy associated with the profession would result in its failure.

Fortunately, all of the staff engaged in the project, although not all were as enthusiastic as others. I did get the sense that at times some of the group were more focused on efficiency, which inhibited the engagement of all staff in the project. Morton-Cooper wrote about efficiency orientations and stated that these came about ‘as a result of wanting to ‘get on with the job’ rather than being willing to spend time on reflection, team building and group discussion, it is an interest in short-term results in minimum time, rather than long-term effectiveness.’ (p.57)

This was evident throughout the project and is characteristic of the radiography profession, where there is a focus on getting people scanned and always having the scanner occupied, which can lead to a lack of time attending to the patient. This findings is similar to the findings of Lewis et al., who found in their study that ‘the foundations of the patient-radiographer relationship being eroded by situations where quality time spent with the patient was superseded by the demands to work quickly’ (p.94). As one of the radiographers stated in the final focus group, ‘I can’t see many more areas where we can go very much further without spending more time.’

However; overall, the radiography and reception staff all engaged in the project to some extent. Subjectively, those who appeared to engage more were those who were in senior positions, and those worked in the department full time compared to part time staff. This may have been due to the some of the part time staff missing focus groups or be due to my lack of time spent with them in comparison to other staff.

The group formed over time and it helped that it was a small unit with a small number of staff. I made sure to make the time to learn everyone’s name and meet with everyone on a one to one basis at least once during the project, particularly if they had missed group meetings due to staffing.

**PATIENT CENTRED CARE**

The findings of the first focus group show that radiographers do place an emphasis on patient care, but that due to issues (such as time pressures), it can be difficult to spend as much time with the patient as they would like. In one study, radiographers were described as ‘hit and run’ healthcare professionals, as ‘they greet you, you get ready, you go into the room and they are gone’ (p. 37). The findings of the first focus group show that the radiographers would rather not be viewed like this and would rather spend time with the patient, but in many cases this is impossible. This is congruent with the work of Lewis et al. (2008), who found in their study that ‘the foundations of the patient-radiographer relationship (was) being eroded by situations where quality time spent with the patient was superseded by the demands to work quickly’ (p.94).
In the focus group, at times it appeared as if patients were dehumanised, (i.e. referring to the patient as ‘the leg’) and derogatory terms were sometimes used to describe patients (such as patients are ‘weird,’ ‘fat, fat person...greasing them up’). This type of behaviour is characteristic of what Murphy described as radiographers being ‘backstage,’ where behaviour and language is significantly different than when on ‘frontstage’ (i.e. with the patient). However, there was also true concern shown for some patients, and the radiographers stated that they were ‘on the patient’s side.’

Throughout the project, I noticed a change in how the radiographers interacted with patients. They started to introduce themselves more, addressed inpatients personally, increased communication during the scan, and used touch to reassure the patient more often. A simple change such as being on a first name basis with the patient has been shown to be important to the patient, and staff made a concerted effort to improve in this area.

A NEW MODEL FOR CHANGING PRACTICE IN A RADIOGRAPHY DEPARTMENT
Change can be difficult to introduce in healthcare, particularly in settings where there may be an unengaged workforce, such as that described in radiography. A visual model can be useful to facilitate this change in medical imaging departments. From the results of this research, it is now possible to posit a new model for practice change in a radiography department which departments worldwide can consider when implementing new practices.

This project followed the Susman and Evered model of action research and was successful in achieving a change. The steps that led to change in this department, and which may be considered by others attempting to produce change, were reflection, discussion, measurement, and strategising approaches to change.

Staff involved in the project were asked to reflect on what their role was in terms of patient care, and how this could be improved. These reflections were shared in-group discussions, and as these discussions occurred, it led to the creation of a reflective cohort of practitioners who learnt from each other, and were energised and empowered to make changes and do better in their department. Measurement of baseline and follow up practice provided objective feedback to staff, which was an important mechanism to encourage staff to take part in the project, and additionally provided assurance that their efforts were not in vain. Finally, the group took time to strategise how to approach and reinforce change, and developed items such as flowcharts, which acted as reminders to change.

The below model posits that by a process of critical reflection, group discussion, measurement, and strategising approaches to change (such as flowcharts), radiographers can change their practice.
Figure 81: Model for radiographer practice change
A NEW MODEL FOR THE PATIENT EXPERIENCE IN MEDICAL IMAGING

From the findings contained in this dissertation based on the two systematic reviews and the action research project, it is now possible to posit a new model for the patient experience in medical imaging. This model can be used by health professionals worldwide when addressing the patient experience in medical imaging.

The patient experience, which is located at the centre of the model, can be affected positively or adversely by a number of factors. These factors are, in no particular order of importance; interventions, radiographer, information, environment, and patient factors. Each of these elements impact upon the experience of the patient undergoing imaging.

THE PATIENT EXPERIENCE

In the systematic reviews and throughout the action research project, we have been able to shed some light on what actually is the patient experience of undergoing medical imaging. These findings highlight the diverse, unique and challenging ways in which people experience medical imaging. The patients who are to undergo diagnostic imaging procedures may experience a wide range of emotions, and it has been shown in a plethora of studies that anxiety and claustrophobia are issues that may arise during the imaging process. Whilst many people do experience claustrophobia, this varies in intensity from a slight discomfort to the feeling of being buried alive, a need to escape and a lack of self-control during the scanning process. Such negative experiences during scanning are common, and can be linked directly back to a certain aspect of the procedure that is integral to producing the images, such as the enclosed nature of certain imaging, sound during MRI, exposure to magnetism and radiation, breath holding, contrast, and bowel distension. Alternatively, the experience of imaging for some people can also be considered as ambivalent or ‘not that bad,’ with people feeling comfortable in the scanner, viewing imaging as a chance to legitimise symptoms, and appreciating the opportunity to view their images. The radiographer, interventions, information, patient factors, and the environment all impact on the patient experience.

THE RADIOGRAPHER

The importance of healthcare professionals and particularly radiographers in facilitating the imaging process is paramount, as people being scanned rely on staff to provide the support and communication required to make it through the scan. It was found that healthcare professionals had a profound impact on the scanning experience, which could be either positive or detrimental. By being brusque, cold, or not providing support, the radiographer adversely impacts on the scan experience. Conversely, the radiographer, by providing information, introducing themselves and connecting with the patient, following an anxiety reduction protocol and providing reassurance can improve the patient experience and patient care.
**INTERVENTIONS:**
The provision of interventions appears to have an effect on the patient experience. In the quantitative systematic review, mock MRI, team training, AV systems, cognitive behavioural therapies, fragrance administration, guided imagery, patient positioning devices and paediatric preparation booklets were all found to have some positive effect on at least one outcome. Throughout the action research study, patients appreciated the chance to listen to music, and particularly the ability to self-select their type of music. A number of other interventions are also available during scanning, such as eye shades. However, not all patients will necessarily want to receive these interventions; therefore the use of these should be discussed with the patient, as it is possible forcing interventions upon the patient could negatively impact the patient experience.

**PATIENT FACTORS:**
Every person is different, and therefore the characteristics of the patient also impact on the experience. It may be that patients can be predisposed to a negative experience, particularly those who have pre-existing claustrophobia. Patients are often scanned when they are sick and vulnerable, worrying about their results of the scan. Others may have had bad experiences previously; some may not be able to deal with stresses as much. The indication for scanning can affect their experience; for example, some conditions may lead to shorter scans, prone scanning, or scans in less occlusive modalities.

**ENVIRONMENT:**
The environment and aesthetics of the department can have an impact on the scan experience. Structural issues, such as scanner types (newer scanners, open MRI, shorter bore scanners, quieter scanners etc) can all impact on anxiety, claustrophobia and the need for sedation. Environmental design and manipulation can have an impact, particularly in paediatrics. The environment can be structured in a way as to provide privacy, such as having change rooms and interview rooms in the department.

**INFORMATION:**
Prior to a scan, many (although not all) people feel a need for information, which they may seek out from a variety of sources, which may be credible or not. Information has been linked to anxiety in a number of studies. By explaining aspects of the procedure that are pivotal to creating high quality images, negative feelings associated with these can be negated. For example, healthcare professionals can explain the reason behind the noise generated during MRI, or why contrast is important. Providing information to the patient provides a means for people to feel in control, in addition to acting as a support measure. Often, patients may be misinformed prior to imaging, and misconceptions regarding the imaging technology were
highlighted in some of the included studies in the qualitative review. As people who are to be scanned actively seek out information from any source, credible or not, they may have misconceptions gleaned from the media, friends or family. However, information provided can also be seen as overwhelming, highlighting the importance of providing digestible, clear information pertinent to the scan they are to receive.

Figure 82: Model for the patient experience in medical imaging
CONCLUSION
In conclusion, through the process of systematic reviews to develop informed evidence for practice, and an action research cycle, practice change was achieved in a magnetic resonance imaging department. The patient experience in medical imaging was found to be related to a number of elements, which once addressed could have a negative or positive impact upon this experience. Over the course of the project, improvements were made to the department, and radiographers changed the way they acted and interacted with patients. This change was achieved through reflection, discussion, measurement of outcomes and feedback, and strategising approaches to change. Action research has been shown to be viable with radiographers, and result in improved practice and empowered practitioners. From this project, a model for practice change in imaging departments and a model informing the patient experience in medical imaging have been posited, which can be used to inform radiography practice internationally.

RECOMMENDATIONS
Action research, which includes reflection, discussion, measurement and strategising, is a viable option for clinical, academic, or managerial radiographers to investigate their workplace, and introduce changes in practice.

When addressing the patient experience of medical imaging, a holistic and multifactor approach is recommended. This approach should consider the following; interventions, radiographer actions, information provision, the scanning environment, and individual patient factors.
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APPENDICES

Appendix 1: Quantitative Review Search strategy

The identifiers will be combined with the outcomes and design with ‘and.’

Identifiers (combine with ‘or’)

“Magnetic Resonance Imaging”

“Nuclear Magnetic Resonance Imaging”

“Functional Magnetic Resonance Imaging”

“Magnetic Resonance Tomography”

“Radionuclide imaging”

“Radionuclide”

“Nuclear medicine”

“Molecular Imaging”

“Computerised Tomography”

“Computerized Tomography”

“Computed Tomography”

“Tomography”

“Molecular imaging”

“Single Photon Emission Computed Tomography”

“Positron Emission tomography”

“PET”

“Computed Axial Tomography”

‘CT”

“CAT scan”

“MRI”

“SPECT”

Outcome (combine with ‘or’)
“Fear”
“Anxiety”
“Claustrophobia”
“anxious”
“claustrophobic”
“sedation”
“Satisfaction”
“Panic”
“throughput”
“Scared”
“scary”

Design (combine with ‘or’)

“Randomised controlled trial”
“RCT”
“Randomized controlled trial”
“Controlled trial”
“Clinical controlled trial”
“Trial”
“Case control study”
“Cohort study”
“Experiment”
“Case series”
“Case study”
“Cross-sectional studies”
“Survey”
“Questionnaire”
Appendix 2: Quantitative Appraisal instruments

MAStARI Appraisal instrument

NOTE:
This appendix is included on pages 300-302 of the print copy of the thesis held in the University of Adelaide Library.
Appendix 3: Data extraction instruments

MAStARI data extraction instrument

NOTE:
This appendix is included on pages 303-304 of the print copy of the thesis held in the University of Adelaide Library.
Appendix 4: Quantitative Excluded studies

Brand KP. How well is your patient prepared for an MRI?

Reason for exclusion: Poorly reported. It was unclear the details of case study


Reason for exclusion: low quality, not truly qualitative despite stating it analysed data qualitatively

Peteet JR, Stomper PC, Ross DM, Cotton V, Truesdell P, Moczynski W. Emotional support for patients with cancer who are undergoing CT: semi-structured interviews of patients at a cancer institute

Reason for exclusion: Poor quality study.

Spouse E, Gedryc W. MRI of the claustrophobic patient: interventionally configured magnets.

Reason for exclusion: Not a qualitative study
## Appendix 5: Quantitative Included studies

### MASTARI

<table>
<thead>
<tr>
<th>Study</th>
<th>Methods</th>
<th>Setting</th>
<th>Participants</th>
<th>Control/Intervention A</th>
<th>Comparison Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argue 1995</td>
<td>Randomised controlled trial</td>
<td>MRI Imaging Department, California, USA</td>
<td>Adult outpatients undergoing MRI (aged 18-82 years)</td>
<td>Group A: Control group</td>
<td>Group B: Standard plus progressive muscle relaxation, guided imagery (deep slow breathing)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Group C: Standard plus skills training in cognitive coping strategies</td>
<td>Group D: Progressive muscle relaxation and cognitive coping strategies</td>
</tr>
<tr>
<td>Bangard 2007</td>
<td>Quasi-experimental before and after study with a control group</td>
<td>MRI Imaging Department, Germany</td>
<td>Adult patients (18-75 years of age), some of whom had reported claustrophobia</td>
<td>Scheduled in a closed bore magnet MRI in the past</td>
<td>Open MRI system (1.0 Tesla Panorama, Phillips, with a patient aperture of 160cm and a horizontal magnetic field)</td>
</tr>
<tr>
<td>Brechtel 2007</td>
<td>Quasi-experimental study with a prospective control group</td>
<td>Nuclear Medicine Imaging department, Germany</td>
<td>Adult patients (mean age 55.7 years) undergoing whole body PET/CT</td>
<td>Whole body PET/CT no device (control)</td>
<td>Whole body PET/CT with a vacuum positioning device</td>
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<tr>
<td>Carter 2010</td>
<td>Quasi-experimental study, before and after</td>
<td>MRI Imaging department, Brisbane, Australia</td>
<td>Children undergoing MRI (3-14 years of age)</td>
<td>Pre-mock scan period of time</td>
<td>The period following the introduction of a mock scan</td>
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<tr>
<td>Caruso 2006</td>
<td>Randomised controlled trial</td>
<td>MRI Imaging department, Rome, Italy</td>
<td>Adult women with either suspect or manifest breast cancer</td>
<td>MRI after receiving routine information</td>
<td>MRI after receiving routine information and psychological support</td>
</tr>
<tr>
<td>Cooper</td>
<td>Cross over randomised</td>
<td>Nuclear Medicine Imaging</td>
<td>Adult patients (32-92 years of age)</td>
<td>No device</td>
<td>Patient support device</td>
</tr>
<tr>
<td>Year</td>
<td>Type of Study</td>
<td>Department, Location</td>
<td>Age Group</td>
<td>Intervention Details</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1995</td>
<td>Controlled trial</td>
<td>Department, New York, USA</td>
<td>Age undergoing stress/redistribution myocardial perfusion SPECT</td>
<td></td>
<td></td>
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<tr>
<td>Dewey 2007</td>
<td>Quasi-experimental study with a historical control group</td>
<td>MRI Imaging Department, Germany</td>
<td>Adults undergoing MRI</td>
<td>Conventional MRI scanner (older)</td>
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<tr>
<td>Eshed 2007</td>
<td>Comparable cohort study</td>
<td>MRI Imaging Department, Germany</td>
<td>Patients (age range 5-99 years) undergoing MRI</td>
<td>Prone (breast imaging)</td>
<td></td>
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<tr>
<td>Garcia 2007</td>
<td>Quasi-experimental, prospectively controlled study</td>
<td>Nuclear Medicine Imaging Department, Brisbane, Australia</td>
<td>Children (between the ages of 2 and 8 years) undergoing nuclear medicine</td>
<td>Standard booking information in addition to a paediatric preparation booklet</td>
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<tr>
<td>Grey 2000</td>
<td>A pseudo-randomised controlled trial</td>
<td>MRI Imaging Department, London, England</td>
<td>Neurology and neuropsychiatry patients (over 16 years of age) undergoing brain or spinal MRI scans</td>
<td>Standard information in addition to booklet, cognitive strategies, demonstration of MRI noise, a visit to the control room, a device to signal for music volume, timings of the scan, and a visible clock.</td>
<td></td>
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<tr>
<td>Harned 2001</td>
<td>Quasi-experimental study with a historical control group</td>
<td>MRI Imaging Department, USA</td>
<td>Paediatric patients undergoing MRI (age range 0 to greater than 10 years)</td>
<td>Standard practice</td>
<td></td>
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<tr>
<td>Hartman 2009</td>
<td>Randomised controlled trial</td>
<td>Paediatric MRI Imaging Department, USA</td>
<td>School aged (between 7 and 12 years) children and their parents</td>
<td>Standard information plus a photo diary</td>
<td></td>
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<tr>
<td>Hunt 2011</td>
<td>Quasi-experimental before and after</td>
<td>MRI Imaging Department, USA</td>
<td>Claustrophobic patients (age 7–88 years) unable</td>
<td>Standard, machine, bore of 60cm</td>
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Bore of 70cm, 1.25m long
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<th>Study</th>
<th>Design</th>
<th>Setting</th>
<th>Participants</th>
<th>Intervention</th>
<th>Control Group</th>
<th>Additional Information</th>
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</thead>
<tbody>
<tr>
<td>Kaya 2010</td>
<td>Quasi-experimental, prospectively controlled study</td>
<td>Two nuclear medicine imaging departments, Turkey</td>
<td>Adult patients (18-78 years) who had at least graduated from primary school</td>
<td>Standard information</td>
<td>Detailed information</td>
<td></td>
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<td>Lang 2010</td>
<td>Quasi-experimental study with a historical control group</td>
<td>MRI Imaging department, USA</td>
<td>Patients attending for an MRI scan</td>
<td>Standard care pre-training</td>
<td>Clerical personnel and nonlicensed health care professionals received training in advanced rapport skills only (8 hours); licensed health care professionals were trained in advanced rapport skills plus rapid hypnotic techniques (17 hours).</td>
<td></td>
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<tr>
<td>Leckie 1994</td>
<td>Randomised Controlled Trial</td>
<td>Nuclear medicine imaging department, London, England</td>
<td>Adult patients (18-70 years) new to the nuclear medicine department</td>
<td>Standard information</td>
<td>Two intervention groups: 1. Standard information plus a written information leaflet 2. Standard information plus verbal information</td>
<td></td>
</tr>
<tr>
<td>Lemaire 2009</td>
<td>Quasi-experimental study with a historical control group</td>
<td>Paediatric MRI Imaging department, Canada</td>
<td>Paediatric patients (aged 0-18 years)</td>
<td>Control group</td>
<td>Cinemavision AV system</td>
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<tr>
<td>Lledo 1995</td>
<td>Randomised controlled trial</td>
<td>Nuclear medicine imaging department, Barcelona, Spain</td>
<td>Outpatients (mean age 49.4 years) attending a nuclear medicine service</td>
<td>Control group</td>
<td>Additional information</td>
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<td>Lukins 1997</td>
<td>Randomised controlled trial</td>
<td>MRI imaging department, Perth, Australia</td>
<td>Outpatients (between the ages of 17 and 76 years) undergoing MRI for the first time</td>
<td>Control group</td>
<td>Two intervention groups: 1. Relaxation techniques (guided imagery) taught before the scan 2. Relaxation techniques (guided imagery) taught before and during the scan</td>
<td></td>
</tr>
<tr>
<td>Author</td>
<td>Study Type</td>
<td>Location</td>
<td>Participants</td>
<td>Procedure</td>
<td>Description</td>
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<tr>
<td>McCauley 1992</td>
<td>Randomised controlled trial</td>
<td>MRI Imaging department, USA</td>
<td>Women undergoing pelvic MRI</td>
<td>Supine</td>
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<td>McNulty 2009</td>
<td>Quasi-experimental, prospectively controlled study</td>
<td>MRI Imaging department, Ireland</td>
<td>Patients undergoing brain or lumbar MRI scans</td>
<td>System A (older, louder)</td>
<td>System B (newer, quieter)</td>
<td></td>
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<tr>
<td>Merrill 1986</td>
<td>Quasi-experimental, prospectively controlled study</td>
<td>Computed Tomography Scanner, England</td>
<td>Adults (over 18 years) undergoing CT</td>
<td>Control (no leaflet)</td>
<td>Information leaflet</td>
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<tr>
<td>Michel 2002</td>
<td>A crossover trial</td>
<td>MRI Imaging department, Switzerland</td>
<td>Women (25-35 years of age) undergoing pelvimetry</td>
<td>Closed MRI</td>
<td>Open MRI</td>
<td></td>
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<td>O’Halloran 1993</td>
<td>Randomised Controlled Trial</td>
<td>MRI Imaging department, USA</td>
<td>Adults (over 18) undergoing head MRI</td>
<td>Control group</td>
<td>Two intervention groups</td>
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<td></td>
<td></td>
<td>1. Cognitive coping treatment group</td>
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<td>Combats the patients negative thoughts with positive coping statements, recognise anxiety</td>
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<td>provoking or non constructive thoughts, and replace them with statements that indicated</td>
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<td>successful coping and control. Encouraged to use technique during the scan.</td>
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<td>2. A relaxation treatment group</td>
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<tr>
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<td>Emphasised the release of tension from the body through concentrated focus on particular</td>
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<tr>
<td></td>
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<td></td>
<td>parts of the anatomy. Taught to recognise tension and then let the tension flow out of the body</td>
<td></td>
</tr>
<tr>
<td>Quirk 1989</td>
<td>Randomised Controlled Trial</td>
<td>MRI Imaging department, USA</td>
<td>Patients who had not had an MRI before (ages not stated)</td>
<td>Standard information</td>
<td>Two intervention groups</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1. Standard information plus counselling</td>
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<td></td>
<td></td>
<td>2. Standard information and a</td>
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<tr>
<td>Study</td>
<td>Design/Study Type</td>
<td>Department/Location</td>
<td>Population/Conditions</td>
<td>Intervention/Procedure</td>
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<tr>
<td>Redd 1994</td>
<td>Randomised controlled trial</td>
<td>MRI Imaging department, USA</td>
<td>Adult (21-65 years) outpatients undergoing MRI</td>
<td>Humidified air via nasal cannula</td>
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<td>Rosenberg 1997</td>
<td>Quasi-experimental case-control study with additional no intervention control group</td>
<td>Pediatric MRI Imaging department, USA</td>
<td>Healthy children (6-17 years) and children with obsessive compulsive disorder</td>
<td>Mock MRI</td>
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<td>Rupprecht 2000</td>
<td>Quasi-experimental study with a historical control group</td>
<td>MRI Imaging department, Germany</td>
<td>Children (over 2 years) undergoing MRI</td>
<td>Closed MRI</td>
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<td>Selim 2001</td>
<td>Randomised controlled trial</td>
<td>MRI Imaging department, Egypt</td>
<td>Patients (aged 20-69 years of age) with no previous history of MRI</td>
<td>Standard care</td>
<td></td>
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<td>Smart 1997</td>
<td>Randomised controlled trial</td>
<td>MRI Imaging department, USA</td>
<td>Children between 4 and 8 years old undergoing MRI</td>
<td>Control group</td>
<td></td>
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<tr>
<td>Spouse 2000</td>
<td>Quasi-experimental before and after study</td>
<td>MRI Imaging department, London, England</td>
<td>Claustrophobic (25-71 years) patients undergoing MRI</td>
<td>Past experience of closed MRI</td>
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<td>Thompson 1994</td>
<td>Randomised controlled trial</td>
<td>MRI Imaging department, USA</td>
<td>Adults (18-80 years of age) undergoing MRI</td>
<td>Control group</td>
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<td></td>
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<tr>
<td>Tornqvist 2006</td>
<td>A non-randomised controlled trial</td>
<td>MRI Imaging department, Sweden</td>
<td>Adult outpatients (over 18 years) undergoing MRI</td>
<td>Control (routine information)</td>
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<td>Study (Year)</td>
<td>Design</td>
<td>Imaging Centre</td>
<td>Participants</td>
<td>Intervention</td>
<td>Control Group</td>
<td>Additional Information</td>
</tr>
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<td>Train 2006</td>
<td>Quasi-Experimental</td>
<td>Paediatric Nuclear Medicine Imaging department, London, England</td>
<td>Young children (range 0-17 years) undergoing Nuclear Medicine imaging</td>
<td>Control (retrospective)</td>
<td>Nuclear medicine department made more child friendly, with distraction offered. In addition, 20 participants received a photo booklet.</td>
<td></td>
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<tr>
<td>Tyc 1997</td>
<td>Randomised controlled trial</td>
<td>MRI Imaging department, USA</td>
<td>Children aged 6-18 years with a central nervous system cancer who had received an MRI in the last 12 months</td>
<td>Standard control group</td>
<td>Cognitive Behavioural Therapy</td>
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<td>Verhoek 1998</td>
<td>Controlled crossover trial</td>
<td>MRI Imaging department, Switzerland</td>
<td>Adults (19-74 years of age) referred for MRI of the foot and ankle</td>
<td>1.0T Whole body scanner</td>
<td>.2T Dedicated MR system</td>
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<td>Westerman 2004</td>
<td>Randomised controlled trial</td>
<td>Nuclear Medicine Imaging department, Canada</td>
<td>Patients (mean age 55 years) who had not undergone a PET scan previously</td>
<td>Standard control group</td>
<td>Mailed information pamphlet</td>
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<td>Youssefzadeh 1997</td>
<td>Randomised controlled trial</td>
<td>MRI Imaging department, Austria</td>
<td>Patients undergoing standard MRI and breast MRI</td>
<td>Standard information, and a control group who did not undergo breast imaging</td>
<td>Detailed information</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 6: Qualitative review detailed search strategy

The following search was used where able throughout the online databases. Key terms were used as both keywords and linked to the databases' thesaurus/subject headings where applicable.

The identifiers were combined with the phenomenon and design with 'and.'

Identifiers (combine with 'or')

Radiography
Nuclear Medicine
Magnetic Resonance Imaging
Radiology
Diagnostic Imaging
Medical Imaging
Radionuclide imaging
Molecular Imaging
Computerized Tomography
Computed Tomography
Single Photon Emission Computed Tomography
Positron Emission tomography
PET
Computed Axial Tomography
CT
CAT
Ultrasound
Sonograph
Sonography
MRI
x-ray
Ultrasonography
Scan
Angiography
Fluoroscopy
Phenomenon (combine with 'or')

Patient experience
Understanding
Meaningfulness
Experience
Journey
Perception
Fear
Anxiety
Claustrophobia
Enlightenment
Apprehension

Design (combine with 'or')

Qualitative
Qualitative study
Qualitative studies
Qualitative research
Qualitative research methods
Phenomenology
Ethnography
Grounded theory
Qualitative description
Interview
Appendix 7: JBI QARI Critical Appraisal Checklist

NOTE:
This appendix is included on page 314 of the print copy of the thesis held in the University of Adelaide Library.
Appendix 8: JBI QARI Data Extraction Form for Interpretive and Critical Research

NOTE:
This appendix is included on page 315 of the print copy of the thesis held in the University of Adelaide Library.
Appendix 9: Qualitative Excluded studies

Brand KP. How well is your patient prepared for an MRI?
  *Reason for exclusion*: Poorly reported. It was unclear the details of case study

  *Reason for exclusion*: low quality, not truly qualitative despite stating it analysed data qualitatively

Peteet JR, Stomper PC, Ross DM, Cotton V, Truesdell P, Moczynski W. Emotional support for patients with cancer who are undergoing CT: semi-structured interviews of patients at a cancer institute
  *Reason for exclusion*: Poor quality study.

Spouse E, Gedroyc W. MRI of the claustrophobic patient: interventionally configured magnets.
  *Reason for exclusion*: Not a qualitative study
Appendix 10: Plain Language Statement for Staff

Investigators:

Zachary Munn (BMed Rad, GradDip HlthSc)

My name is Zac Munn and I am a research fellow at the Joanna Briggs Institute, a school in the faculty of health sciences at the University of Adelaide. I am currently conducting a research study as part of my Doctor of Philosophy (PhD), entitled ‘Implementing evidence based guidance into a high technology medical imaging unit: An action research study.’

You are being invited to take part in this research study. Participation in the study is voluntary, however, before you decide it is important for you to understand why the research is being done and what it will involve. Please do not hesitate to ask me if there is anything that is not clear or if you would like more information.

The aim of the research is to see how patients undergoing Magnetic Resonance Imaging are treated in your medical imaging department, and to find out if this experience can be improved through the methods of action research. I would like to invite you to take part in some focus groups and possibly interviews, and to fill out questionnaires as part of the research. These will be conducted to determine what your unique perceptions are on the patient experience of high technology imaging, and ways in which you think it can be improved in your department. During the project, an evidence based audit will also be conducted, in order to determine compliance with evidence based guidelines. Some of the potential benefits of the study include improved care for patients, and increased compliance with evidence based practice. The project may also foster and promote relationships and collaborative team work amongst the staff involved.

The interviews and the focus groups will be recorded and transcribed, and the results of the questionnaire collated, but all information you provide will be confidential and anonymity is assured, with responses only associated with a study number. You are free to withdraw from the study at any time. Your time and participation would be highly appreciated. If you agree to participate you are required to sign a consent form. Participants will be provided with the opportunity to review their transcript. Should you have any questions then please contact me on (+61 8) 8303 4770. Alternatively you may contact my supervisor Professor Alan Pearson, Executive Director of the Joanna Briggs Institute, on 8303 5157. The research will be conducted according to the NHMRC National Statement on Ethical Conduct in Human Research, 2007.

If you wish to speak to someone not directly involved in the study about your rights as a volunteer, or about the conduct of the study, you may also contact the Chairperson, Research Ethics Committee, [Contact Information]

Thank you for taking the time to read this.

Zachary Munn

Research Fellow Evidence Review
Appendix 11: Plain Language Statement for Patients

Investigators:

Zachary Munn (BMed Rad, GradDip HlthSc)

My name is Zac Munn and I am a research fellow at the Joanna Briggs Institute, a school in the faculty of health sciences at the University of Adelaide. I am currently conducting a research study as part of my Doctor of Philosophy (PhD), entitled ‘Implementing evidence based guidance into a high technology medical imaging unit: An action research study.’

You are being invited to take part in this research study. Participation in the study is voluntary, however, before you decide it is important for you to understand why the research is being done and what it will involve. Please do not hesitate to ask me if there is anything that is not clear or if you would like more information.

The aim of the research is to see how patients undergoing Magnetic Resonance Imaging are treated in this medical imaging department, and to find out if this experience can be improved through research. This research will not adversely affect your scan or take up any additional time for you, but data regarding your experience may be collected, and you may be observed by a researcher during your time in the medical imaging department. If you would like, there will also be a questionnaire that you can fill out. The study will also check to see if your care is being based on the best available research evidence. Some of the potential benefits of the study include improved care for patients, and increased compliance with evidence based practice for the medical imaging department.

The questionnaire responses will be collated, but all information you provide will be confidential and anonymity is assured. You are free to withdraw from the study at any time. Your time and participation would be highly appreciated. If you agree to participate you are required to sign a consent form. Should you have any questions then please contact me on (+61 8) 8303 4770. Alternatively you may contact my supervisor Professor Alan Pearson, Executive Director of the Joanna Briggs Institute, on 8303 5157. The research will be conducted according to the NHMRC National Statement on Ethical Conduct in Human Research, 2007.

If you wish to speak to someone not directly involved in the study about your rights as a volunteer, or about the conduct of the study, you may also contact the Chairperson, Research Ethics Committee, [Contact Details].

Thank you for taking the time to read this.

Zachary Munn

Research Fellow Evidence Review
NOTE:
This appendix is included on page 319 of the print copy of the thesis held in the University of Adelaide Library.
Appendix 13: Letter of support

13/07/2011

To Whom It May Concern,

I am writing to state our support for Zachary Munn from the Joanna Briggs Institute, University of Adelaide to conduct an action research study within our Magnetic Resonance Imaging Department subject to gaining ethics approval. The title of the study is ‘Implementing evidence based guidance into a high technology medical imaging unit: an action research study.’

We are committed to practising evidence-based healthcare within our department and providing a high quality service to our patients, and are therefore pleased to be able to collaborate with Zachary on this project. We look forward to the expected positive outcomes for our MRI department and our patients. During this project, Zachary will be collaborating with [redacted], Head MRI Radiographer at the [redacted].

If you have questions about our department, please contact me at [redacted] or on [redacted]. For questions pertaining to the research project itself, please contact Zac at Zachary.Munn@adelaide.edu.au, or on 0883034770.

Yours sincerely,

[redacted]
Manager
Department Radiology
Appendix 14: Ethics Approval

19 July 2011

Mr Zachary Munn
Research Fellow
Translation Science
Joanna Briggs Institute
University of Adelaide

Dear Mr Munn,

Re: “Implementing evidence based guidance into a high technology medical imaging unit: An action research study.”

I am pleased to advise that Research Ethics Committee APPROVAL is granted to the above project on the above date. The following have been reviewed and approved:

- Protocol, Version 2 (12 July 2011)
- Plain Language Statement for Staff
- Plain Language Statement for Patients
- Consent Form

Please quote the [redacted] allocated to your study on all future correspondence. Research Ethics Committee deliberations are guided by the NHMRC National Statement on Ethical Conduct in Human Research 2007.

GENERAL TERMS AND CONDITIONS OF ETHICAL APPROVAL:

- Adequate record-keeping is important. If the project involves signed consent, you should retain the completed consent forms which relate to this project and a list of all those participating in the project, to enable contact with them in the future if necessary. The duration of record retention for all clinical research data is 15 years.
- You must notify the Research Ethics Committee of any events which might warrant review of the approval or which warrant new information being presented to research participants, including:
  (a) serious or unexpected adverse events which warrant protocol change or notification to research participants,
  (b) changes to the protocol,
  (c) premature termination of the study,
  (d) a study completion report within 3 months of the project completion.
- The Committee must be notified within 72 hours of any serious adverse event occurring at this site.
- Approval is ongoing, subject to satisfactory annual review. Investigators are responsible for providing an annual review to the [redacted] each anniversary of the final approval date using the Annual Review Form available at [redacted]. The REC must be advised with a report or in writing when this study is complete so that the file can be closed.

Yours sincerely,

[Redacted]

CHAIRMAN
RESEARCH ETHICS COMMITTEE
Appendix 15: MRI Department Staff Survey

Date:

1. How do you feel your department rates currently at providing patient care? *Please make your mark on the line below, where 0 indicates horribly, 5 indicates average, and 10 is the best possible.*

   
   0 1 2 3 4 5 6 7 8 9 10

2. When patients are anxious/claustrophobic, do you take any actions to help them through the scan?

   Yes/No

   • If yes, what are these actions?

3. When patients are anxious, do you think that actions you take have an effect in reducing anxiety?

   1 2 3 4

   Not at all  Barely  Somewhat  Very much so

Any other comments?

Thank you for taking the time to fill this questionnaire out, please return to Zac once complete.
Appendix 16: MRI Department Outpatient survey

Date:

Age:

Sex: Male or Female

1. To your knowledge, did you take any medication or sedatives prior to your scan?
   Yes/No

2. Did you receive information explaining the procedure and what to expect prior to your scan (either written or verbal)?
   Yes/No
   - If yes, did you find this information useful?
     1 2 3 4
     Not at all  Barely  Somewhat  Very much so

3. How anxious were you during your scanning experience today?
   Please mark your level on the line below, where 0 indicates no anxiety, and 10 is maximum anxiety.

   0 1 2 3 4 5 6 7 8 9 10

4. How satisfied were you with your scanning experience today?
   Please mark your level on the line below, where 0 indicates totally dissatisfied and 10 is extremely satisfied.

   0 1 2 3 4 5 6 7 8 9 10

5. If you were anxious, what would you say was the main cause of this?
   o Potential results of the scan Yes/No
6. If you were anxious, did the actions of hospital staff within the department reassure you?

1 2 3 4
Not at all Barely Somewhat Very much so

Have you previously had a scan, either here or in another department?

Yes/No

If yes,

How anxious were you during your previous scanning experience?

0 1 2 3 4 5 6 7 8 9 10

How satisfied were you with your previous scanning experience?

0 1 2 3 4 5 6 7 8 9 10

Finally, do you know what type of MRI scan you had today? (if known)

Any other comments?

Thank you for taking the time to fill this questionnaire out, please return to the reception desk on your way out.
## Theme: A trade off

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<td>MRI is a time poor setting, which means that there is often a balancing act between difficult patients, providing patient care and completing scans in a timely fashion.</td>
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**A balancing act/ trade off/ a fine line**

18. **ILLUSTRATION:** we are so busy, that we rush, we just do, because we are fast movers, we just rush all the time, we are swapping equipment, but at the same time the patient is just generally kind of standing there so it’s good to be able to multiskill and do all the things in the background whilst still explaining to your patient what’s going to happen to be time effective as well as getting through the explanation, because we don’t kind of just bring them in and stand them there and talk to them for, you know, five minutes we just don’t do that generally, but there is ways of bringing them in and getting communication across whilst still staying effective.

20. **ILLUSTRATION:** Yvonne: Mmm, that’s a really good point I think getting that extra 5 or 10 minutes before the examination and talk to them when they’re getting changed so that you’ve already explained to them what to expect, so that when they walk in the room, they can just lie down and think about what music they want...so you’re not rushing them, so your explaining before, getting them in ahead of time. 

22. **ILLUSTRATION:** Yvonne: We don’t have 15 minutes certainly Barbara: Not by choice but... Yvonne: Yea, not by choice, but yes... Barbara: Yea not by choice, but you can’t...the way everything runs...the bookings and... Esther: And does that influence their experience... probably, yes

56. **ILLUSTRATION:** Yvonne: It’s a good question (making the scan longer or shorter for troublesome patients)...very good question...it’s a trade off. Esther: Its personal judgement. Louise: Yea...sometimes they tell you ‘I’m not going to be in here for longer than a minute!’ or something, so you think, you just, you know, do a few sub second scans to get something.

58. **ILLUSTRATION:** Esther: I think it is, if you think, it’s the difference between if you feel really lucky to have even got them in there, and then, before you even start maybe I’m not sure. You know, the fast ones aren’t really Yvonne: they’re not as good Esther:...it’s a fine line.
59. ILLUSTRATION: Louise: then that’s the decision between when you’re not going to get anything at all, or you are going to get something

60. ILLUSTRATION: Anne: it’s a trade off with MRI, if you make the scan shorter you lose some resolution or something somewhere...but then you might get an image, that the doctor can use. Sandy: Yea...You don’t get it for free

19. ILLUSTRATION: we are so busy, that we rush, we just do, because we are fast movers, we just rush all the time,

21. ILLUSTRATION: Barbara: Do you think we are a little time poor, though? We don’t have 15 minutes to explain the whole thing perfectly...

26. ILLUSTRATION: Well I’m saying like time poor, we don’t have the time...before their appointment, to go out to the waiting room and spend that time...

25. ILLUSTRATION: Barbara: Well I’m saying like time poor, we don’t have the time...before their appointment, to go out to the waiting room and spend that time...but if you do have a patient, you can assess instantaneously if your patients totally nervous...or going to have a problem and that’s where you then do spend the time, before you get them in the room...if you have the time then you do spend more time with that patient then you would with someone else who is quite happy and has had one before and is comfortable and knows the routine...

27. ILLUSTRATION: ...if you have the time then you do spend more time with that patient then you would with someone else who is quite happy and has had one before and is comfortable and knows the routine...

28. ILLUSTRATION: Pam: Also, we have the question, are you claustrophobic or not, and if they tick yes we will pay more attention to them and ask if they have taken some medication or something like that

45. ILLUSTRATION: Yvonne: I do too (touch the patient) but
until you verbalised it I didn’t think of it but I always do that especially their very first time as you say

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**A wide range of patients, with a wide range of issues**
Radiographers experience a wide range of patients and presentations

**Angry patients**

110. ILLUSTRATION: Esther: (referring to angry or disgruntled patients) They just want someone to listen to them.

112. ILLUSTRATION: Esther: They’re often just having an argument with themselves...to have one, really.

113. ILLUSTRATION: Anne: or it’s the whole admin system of the hospital, and what they’ve been through, and they just get annoyed

114. ILLUSTRATION: Barbara: Some get angry if they’ve just been sitting in the waiting room for a while

115. ILLUSTRATION: Esther: Do you remember that man, in the wheelchair, that got really angry about having to wait...I think I was working with you, and he started yelling obscene language...he was clearly demented, because he had a memory problem, and he wasn’t waiting that long, and we went out and spoke to him once he started yelling, every 2 minutes we would go out, he’d say how much longer and we’d tell him, 7 minutes, 5 minutes, 3 minutes.

123. ILLUSTRATION: Barbara: But the really, really aggro ones, if they are that aggro in the waiting room, they will just go, just walk out Sandy: often they don’t even make it into their scan...

125. ILLUSTRATION: Sandy: I had that women scream at me in the waiting room... Louise: oh, I’m missing out, I haven’t had anyone scream at me!

127. ILLUSTRATION: Yvonne: Ultimately that’s the safe...last ditch, you’ve got to keep the patient safe, your environment safe, your staff safe, you’ve got security if you’ve got to that point
153. ILLUSTRATION: Sandy: Except some of them don’t like to get changed

1. ILLUSTRATION: My worst was that anxious, that by the time I got back to the console, and by the time I was starting up the scan, I looked up and he was banging at the window, they were that terrified

102. ILLUSTRATION: Esther: But they aren’t claustro, if they were claustro, nup

129. ILLUSTRATION: Barbara: I think we get more claustros than aggros

154. ILLUSTRATION: Anne: needle Phobics, Sandy: yes, difficult jelcos Anne: Some people are really phobic, they just cry at the thought Yvonne: and scream and wriggle

155. ILLUSTRATION: Esther: and when we’re doing it, they can’t move at all, because we’ve already done some scans, and they are already lined up for other scans, and the first thing we tell them is ‘don’t move at all!’ and then they’re expecting the needle, which is going to be the worst thing ever, and it’s quite hard for them, if they are scared, because they still have got the thing on their head and whatever else over them

156. ILLUSTRATION: Yvonne: I had one guy that was a real needle phobe, a young fella, but he had had a tattoo, and I was like how does that work! Esther: that is a whole lot of needles!

8. ILLUSTRATION: Yvonne: We get it at a lot… (agreement) Esther: I’ve never had severe though, ever Yvonne: I’ve had some that have to hold my hand… Esther: Sweats and heart racing types stuff but never any that have ever had to climb out… Barbara: Panicking…thrashing, just total chaos Esther: Nope, none at all… Moderator: Buy you have experienced this Barbara? Barbara: mmm, yep, I’ve worked a lot longer in the unit though

84. ILLUSTRATION: Pam: the funny thing about claustrophobic patients is they are very apologetic so we try hard to make them understand that it quite often happens and it is nothing to be ashamed of…because the big strong man can often be ashamed.
85. ILLUSTRATION: Yvonne: they (claustrophobic patients) sometimes get cranky too...

100. ILLUSTRATION: Esther: if they’re bigger, and they’re claustro, there is now way they will go in our scanner, usually they just...just don’t go

101. ILLUSTRATION: Louise: it’s amazing how many big people just persevere and squeeze in

103. ILLUSTRATION: Barbara: the thing is you bring them in and show them and they get really stressed Sandy: if they are too big Anne: Some are too embarrassed to say...im too big, the scanners too small

104. ILLUSTRATION: Sandy: we don’t have nearly as many problems with big people as we do with the rest of the population though Louise: We don’t, actually

122. ILLUSTRATION: Yvonne: I had another lady, who really yelled... sometimes they’ve got a frontal tumour, and they can’t help it

128. ILLUSTRATION: Yvonne: I had a patient that was in a wheelchair that yelled at me, but she had a frontal tumour, so you know, she couldn’t help it, so I just rang the orderlies and told them to come straight away! And they did! Orderlies came to take her back... and she yelled, she upset our receptionist, I was on my own, no other radiographers, so I said orderlies, you must come immediately to take this patient back, and they did! And she’s...probably allowed to I guess...not allowed to but, probably can’t even remember it! Louise: She’s got an excuse for it

130. ILLUSTRATION: Yvonne: yea but we get a lot of sick people, and they’re anxious, and they have weird pathology, and they are weird

2. ILLUSTRATION: Yea I had an aboriginal guy that did that... I think I had one sequence, I was planning my next one, and the next one they were knocking on the window...he was aboriginal, and they often don’t like MRIs

5. ILLUSTRATION: One time I was concerned about a patient...
who was not a very good communicator for some reason, they had Parkinson’s disease, we couldn’t understand him, he came out of the machine all red and much weaker than when he went in. Even if the [call] ball was in lying in between his arm and body, he would not have been able to squeeze it. I was really concerned about this patient.

95. ILLUSTRATION: Yvonne: it’s harder for bigger patients as well because they have a lot less room

96. ILLUSTRATION: Sandy: but you often find that the really big ones aren’t claustro Yvonne: No they’re sometimes not...we squish them don’t we Sandy: You squeeze them in there and they don’t really mind what you’re doing

98. ILLUSTRATION: Louise: it’s good because the indigenous population struggle with their scans, so to spread the word, that’s good

99. ILLUSTRATION: Barbara: Well, who was working with me, with this fat, fat person we had to put the slip ring around Yvonne: Me...I don’t know if I was working with you but I have done that...they slip in better Louise: And they don’t get stuck in there Barbara: greasing them up a bit

From one extreme to the other
Radiographers need to expect the unexpecte d, and pick up patient signs which may indicate they are anxious, nervous, or claustroph

10. ILLUSTRATION: Esther: We experience it all here really, don’t we? Barbara, Pam, Yvonne: mmm (nodding agreement)

126. ILLUSTRATION: Barbara: I got security down for the husband of the woman that I was scanning who came in with a hunting jacket with all the knives, and he wasn’t going to take them off! And Im thinking...we’ve got security down, one in the room with us, one hiding in another room Esther: She was claustro, and asked him to be in the room with her Sandy: he was duck hunting Barbara: So we asked him to take his jacket off and his knives..we’re going like....Jacket fine, knives not so fine! Barbara: he did worry me!

9. ILLUSTRATION: Yvonne: But in the course of one morning, like the morning you were with us, we went from one extreme to another, we
had one really claustrophobic patient, and another one said they would like to stay in there longer, they were so relaxed..

136. ILLUSTRATION: Sandy: yeah, you can tell, because they burst out in sweat, and start hyperventilating, you can tell really..

137. ILLUSTRATION: Louise: yeah, body language is big...and they start making all excuses...oh they’re thirsty, they just try to delay it, put it off... Sandy: Can’t breathe... Esther: Fidget, a lot...stop listening to you. Yvonne: yea they do, they actually sweat. They have a physiological reaction

30. ILLUSTRATION: Yvonne: they just don’t know...they don’t! Esther: because it’s not a basic experience... Barbara: They’ve never had an experience like it Yvonne: it surprises them Esther: So that’s quite...I don’t know if common is quite the right word...but it happens Yvonne: They’re usually frequent...but they don’t know Esther: So you have to pick up the signs...if they happen

31. ILLUSTRATION: Moderator: So how do you do deal with those patients....pick up the signs? Esther: You just do what Barbara said before about stopping and taking the time for them there when you notice it I suppose...and usually you can when they first look at the scanner when they first walk in they will generally say something...and even if they don’t they kind of get a bit agitated with their body language, they start to fidget a bit and they don’t really listen to you so you can sort of tell...you’re going through the monotone language about what’s going to happen and they are sort of off with the fairies a little bit because they’ve just gone for it... Yvonne: A common question is does my head go in there? (group laughs) That’s always a give away...as soon as they ask you that, you know their claustrophobic, don’t you?

32. ILLUSTRATION: Moderator: And then do you need to rethink your strategy? Barbara: Oh Definitely Yvonne, Pam. Esther: Yes Esther: You almost want to take them out and start again...but...

118. ILLUSTRATION: Yvonne: do you remember (our manager) wanted us to both work through lunch last week because a patient was very aggressive? And she didn’t want us to work on our own? That’s how bad he was, and she’s never said that before and he was perfectly fine, I think you worked through lunch, and he was really fine, he was a pussycat, absolutely fine. An outpatient. Fine,
perfect. Yvonne: he must’ve just vented it and then once it was out of his system he was fine, she was worried enough to make us both be there, she didn’t want one person in the room over lunch, she wanted a witness. Sandy: She didn’t want one person alone in the room with him

121. ILLUSTRATION: Anne: ...and then he was alright? On the Saturday I think. Do you remember? I can’t remember what it was about. He was... Sandy: Patients just sometimes get aggressive for some reason or another.

133. ILLUSTRATION: Yvonne: you know that man who was meant to be really anxious, that man with the leg? Was he fine when you got him? Or was he...? Sandy: Yea absolutely, I’d explained to him that someone had rung CT and they were all good and he went ‘okay, good’ Barbara: Was that the man who needed to pee? Sandy: yes

134. ILLUSTRATION: Esther: Claustro patients tick yes on the form, but you know maybe 2 out of 5 times or 2 out of ten times they don’t Yvonne: they don’t know

135. ILLUSTRATION: Louise: yes, because they don’t actually know until they get here sometimes...they can go into lifts and stuff but then they come in here... Esther: Yes, that’s right, so how do you know, that they are....?

29. ILLUSTRATION: Esther: I think the last 2 or 3 patients I’ve done that have turned into being claustrophobic didn’t say yes (to claustrophobia) on the questionnaire, so that was just a random occurrence where the radiographer picked up on it just by pure body language I suppose, so that’s important as well...because they don’t always know..

3. ILLUSTRATION: Esther: Did he tell you Barbara, your patient? Did he give you any warning? a. Barbara: nah I don’t think so, no. Esther: Okay, then all of a sudden they’re not ...okay

4. ILLUSTRATION: Yvonne: they don’t always know they don’t like it until they get in a. Esther: That’s right, yep
Getting the patient scanned

The radiographers placed significant importance to getting the patient scanned in some way, and had strategies to do this.

Getting the scan in some way

49. ILLUSTRATION: Anne: if they say I don’t want to do it you can’t just say oh okay then, you have to try to get them in there, try to reassure them it’s not going to be that bad, at least they have had a go, otherwise they go away and say she didn’t even try, you have to try to get them in and try to get the scan, the idea is to get the scan, in some way

50. ILLUSTRATION: Louise: You can say ‘you’ve come a long way today and the Doctor really needs this scan’

61. ILLUSTRATION: Yvonne: Sometimes it happens towards the end..., and you’ve got three quarters of your study and then their either in pain, had enough, got hot, and they want to stop, and if you can make the last one that is really important quicker, you can tell them that this might stop you from having to come back, if you can put up with 1 and a half minutes, usually you can talk them into it

62. ILLUSTRATION: Anne: ...Or you can do the most important ones first sometimes, you can get them out of the way, and then anything else is a bit of a bonus Yvonne: We do that as well we did that today, didn’t we?

Importance of communication

108. ILLUSTRATION: Esther: Pander to them, because the angry ones have always got some kind of grudge to bear, so you just agree with them, just pander whatever they are angry about, it’s generally not us, but something else.

12. ILLUSTRATION: Moderator: is that what you see as patient centred care in MRI? Esther: Yea, that’s how I interpreted it....Offering them choices, to better their experiences, like having a family member stay in the room with them or, longer explanations of what’s going to happen, or sort of...the whole thing... Barbara: communicate...

139. ILLUSTRATION: Louise: Sometimes you can talk them around.... but yea Yvonne: Once it’s a physiological reaction they are very claustrophobic... Sandy: Once they’ve burst into sweat that’s it

15. ILLUSTRATION: ..a clear explanation... of everything that’s going to happen to them.... I think, it’s probably vital, that way they feel comfortable in that situation, and knowing what to expect, as well

16. ILLUSTRATION: Yvonne: Communication Moderator: Would you like to elaborate... Esther: it’s vital, it’s the sole thing...
17. ILLUSTRATION: Barbara: taking time to communicate effectively I think, in your explanation as to what's going to happen.

35. ILLUSTRATION: Moderator: so you don't think that people are afraid of radiation or magnetism? Yvonne: Some people are. Not so much... Barbara: I tell them that it’s not radiation....it’s not radiation, this is a magnet

37. ILLUSTRATION: make sure they understand what’s happening Anne: Especially in an MR setting Sandy: Make sure they understand it’s going to be noisy so they don’t ‘jump’ in the middle of the scan

40. ILLUSTRATION: Louise: You need to tell them the machines not shut it stays open at both ends...and I say that we can actually see you ...but unless you have that little mirror on they can’t see us but that buzzer is a lifeline

6. ILLUSTRATION: Yvonne: is that one of your patients – you didn’t test that he could squeeze the ball first? a. Pam: He was able at the start, but not at the end b. Yvonne: that’s where you need to talk to them... c. Pam: I tried to, Anne tried to as well but she wasn’t able to understand him at all d. Yvonne: That would be the most difficult of all, because normally you can get through some way

73. ILLUSTRATION: Sandy: We never say enclosed space... Anne...or coffin!

74. ILLUSTRATION: Yvonne: We make a big thing about all the ends being open, and you can get out any time you like..because the thought of being trapped...is a big trigger, it will make it worse...

86. ILLUSTRATION: Esther: Explaining that it is common as well, that it happens a lot, that 80% of people experience this, we deal with this all the time, it’s very common, really helps them to know that ... Sandy:.... that they’re not the only one... Esther: Yea, they are more of the common side than the uncommon side

39. ILLUSTRATION: Anne: There’s a lot of coaxing...

48. ILLUSTRATION: Anne: Oh well, sometimes they are a bit
hesitant, ‘I don’t think I can do it’; you know, and you have to sort of coax them in, or just give it a go, go in and have a little trial run, and say we will bring you out again before we put the equipment on you, we will see how we go, just let’s get through a few scans and see how you go, lots of issues like that really...try to persuade them, yea.

52. ILLUSTRATION: Anne: Well, you know you can say the doctors need it, or you’ll have to come back or you can try to get it all done now...try and persuade them to stay in there and get through it...do faster scans, make the scan shorter, to you know, to get it done, in a shorter space of time

53. ILLUSTRATION: Esther: persuade is a good word Anne: force...haha

109. ILLUSTRATION: Yvonne: yea, agreeing with them, and sometimes I give them the control, so, its ultimately up to them if they have the scan, you know, it’s great to have the scan so the doctor can have that information, but it’s up to you if you have it, sometimes they just want you to say that.

111. ILLUSTRATION: Yvonne: and you say well if you really don’t want the scan, I won’t make you, and then they’ll say ‘no I need it’ and then off they go

14. ILLUSTRATION: Pam: it is also helping when they know they are in control of the situation, they can know to squeeze the ball and we will respond to it, so it’s really important to know, the explanation

34. ILLUSTRATION: Louise: I always say we’re watching you, we can’t see you, but the buzzer is, as soon as you squeeze that we’ll be on to you

38. ILLUSTRATION: Sandy: Information! Anne: Make the patient comfortable... Sandy: Reassurance...yep, reassurance...

41. ILLUSTRATION: Anne: we talk to them and reassure them over the speaker... Sandy: it’s important they understand they’ve got that buzzer and they can use it

54. ILLUSTRATION: Sandy: and often that put them in and bring them out again before you put the equipment on makes a big...
difference they really respond to that, the fact they know they're not going to be stuck in there, that they will come out, and you tell them that you can do that as soon as they squeeze that buzzer, the table is going to come out, it's going to come out at that speed

106. ILLUSTRATION: Anne: You can put their arms up, sometimes Sandy: Spread them out, take some pressure off.. Yvonne: Actually yeah, or one arm up or one down, I've done that before, and then ultimately... Sandy: or you get them lying, or sitting on their bottom, and then wrap a sheet around them... Barbara: take the spine array off to lower it... Anne: Take them upstairs, it's a bit roomier up there Yvonne: yea, take them upstairs, and if that still fails, it's off to the bigger scanner

107. ILLUSTRATION: Sandy: but they are more likely to be worried about being stuck in there than they are to actually be scared of the small space, so that's when you wrap them up, put them in and bring them out and say 'look you don't get stuck'

131. ILLUSTRATION: Anne: (referring to anxious people, but not necessarily claustrophobic) They can have a pill prescribed by the ward or the doctors here, or the GP, and yea just talk to them like we've been saying really... yeah... Sandy: mmm, it's the same thing Yvonne: it's very similar coping mechanisms really

132. ILLUSTRATION: Anne: We've got an eye mask intervention and sometimes we use that, its not very popular but some people... Louise: Some people love it Sandy: Yea, they either love it or they hate it

138. ILLUSTRATION: Sandy: And actually if they get to that stage there's no point in trying to do anything except getting them out and rebooking them with sedation...

157. ILLUSTRATION: Barbara: The kids put emla, but I don't know how much emla we've got, and you need to have that on like 45 minutes before. So I guess if someone knows... Sandy: but we still occasionally get one that needs emla, they turn up, as an adult Yvonne: yea we keep it just in case

23. ILLUSTRATION: Pam: it's also very important to gain patient trust, as we already explain about the lot of noise, and that it can be uncomfortable for you, and at the end of the day we are sort of on their side, we are not a part of the machine we are sort of with

Strategies to get the scan
the patient, looking after the patient talking to the patient, so it’s nice to spend some time with the patient, even just a couple of minutes before the examination

33. ILLUSTRATION: Yvonne: You’ve got various things...if they can go feet first, some can’t...you’ve got various strategies...they like the mirror to look out, or they like an eye mask...reassure them that they are actually really safe, there is no radiation and...that’s it... but if you tell them that they are completely safe...I still tell my parents that they’re really safe, there is nothing in there that can harm you, even if there not claustrophobic, I find it helps

42. ILLUSTRATION: Louise: and I always as I’m putting them in I touch them until they go in...I say are you okay before I leave because quite often if you leave them they will squeeze the buzzer...but if you touch them and see how they are going...

43. ILLUSTRATION: Anne: Especially their first one I always make sure they’re in, they’re okay, before I walk out

44. ILLUSTRATION: Esther: I think that touching point is very important, I always put my hand on them

46. ILLUSTRATION: Esther: and you put them in slow, not fast

47. ILLUSTRATION: Barbara: and if they’ve got the mirror (when they are in the scanner) you can actually touch them and say see me

57. ILLUSTRATION: Barbara: So you say 'look, I’ll try to make the sequences shorter, do you think you can hang on for 2 minutes’

75. ILLUSTRATION: Louise: and I always invite them if they’ve got someone with them to come in

77. ILLUSTRATION: Anne: the music is a big factor, it is really popular, I would say 9 people out 10 will want music, and that really helps them. And there is a fan, there’s lots of air, you just emphasise there is lots of air...

78. ILLUSTRATION: Sandy: And the mirror has made a huge difference too

81. ILLUSTRATION: Yvonne: There’s one last ditch thing because
there was a patient on the phone that told me he was so claustrophobic he needed a GA who was making a booking, and um, that's so time consuming we ended up booking him (on another scanner), which has got a larger...shorter magnet...its shorter so there head is out, and a little larger...so we've actually ..in extreme circumstances referred patients there

82. ILLUSTRATION: Louise: sometimes the ones that don't go in here we take upstairs (open scanner), for the really claustrophobic and that does work too

83. ILLUSTRATION: Anne: Or put them in feet first if you can..you can’t always.

87. ILLUSTRATION: Moderator: it was mentioned that you don’t try to use negative language, such as 'enclosed space, or a coffin,.' so do you try to use positive language? Sandy: yes, very much, we say bright lights, lights are always on, that its open at both ends, that nothing closes

88. ILLUSTRATION: Sandy:...about going in, and getting shut in, so we always make the point of the fact that the room is nice and bright and open, and there is a window and we can see them, and that they are going into a tunnel, and not a closed up space and...so yea, you have to really tell all the good points about it, rather than saying its small and its tight... Esther: and you’ll heat up! Sandy:...and that it will cook you!

94. ILLUSTRATION: Louise: yeah that’s good, because when the table is down, it looks like a big, big tunnel, but little do they know that when the table gets raised up there is less room and they are really close to the machine

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<thead>
<tr>
<th>Theme</th>
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<tr>
<td>It's not that bad</td>
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<td>This represents the thoughts of the radiograph</td>
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<tr>
<td>Combating misinformation</td>
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89. ILLUSTRATION: Sandy:...because they get told all sorts of stories.. Yvonne: yes, true, they do

90. ILLUSTRATION: Yvonne: They get horror stories from other patients in the ward and from rellies... Barbara: From friends of friends of friends of friends! Yvonne: they tell horror stories, and they come frightened to start off.
ers that in comparison to other investigations, MRI is not that bad, and patients sometimes aren’t troubled by it, despite the misinformation surrounding MRI.

93. ILLUSTRATION: Moderator: How do you combat misinformation? Sandy: I guess just the whole show them, take them in, show them, because we have people turn up to have a look, I think if someone talks to them in the phone, (our manager) will say, ‘well look, if you’re coming past, come in and have a look’ I’m sure it will be okay.

97. ILLUSTRATION: Pam: Actually once I had a patient who was aboriginal, I think he was an elder or something, but what he asked us to do he asked if his family, his kids, his wife could come in and he just ...we explained to him first, then he went in and he just showed, he was lying on the table and said ‘see there’s nothing to be worried about’ but he was talking to them in his own language so i guess he was showing them there was nothing to be afraid of so they could spread the word in their community...it was very wise of him to do.

146. ILLUSTRATION: Esther: I think more to the point is that it is in comparison to others because generally I think you are always going to get some negativeness from people who don’t enjoy the experience...but it’s not as bad as the dentist! Yvonne: I agree!

147. ILLUSTRATION: Sandy: That’s right, people will say that was awful, that was the worst thing that’s ever happened to me, and I went ‘I’m sure I could think of much worse things to happen to me than that!’ Anne: Lying down for half an hour! Sandy: ...we didn’t stick anything in you, or hurt you or...

158. ILLUSTRATION: Louise: but we use baby needles...they’re not that bad Esther: We don’t pandering too much to them do we Louise, put the tourniquet on, ‘oh look, it’s over and done’. Louise: Arm’s gone numb they won’t be able to feel a thing.

11. ILLUSTRATION: Esther: Yea...it’s rare, I’d say, ish, that someone would describe it as a being enjoyable experience, that they had a nice sleep or something like that...yea, it’d be about one a day I’d say it’s kind of rare.

91. ILLUSTRATION: Louise: Sometimes it works in our favour because they are so hyped up, they think it is going to be so awful, and it isn’t as bad as they think. Yvonne: They often say that...

92. ILLUSTRATION: Sandy: And they very often come out and go...
that wasn't half as bad as what I thought it was going to be Anne:

oh I fell asleep... and yea

144. ILLUSTRATION: Louise: Well we are thinking long term because you don't want to just quickly get them in, give them a bad experience and then they'll never want to come back again... Yvonne: Very good point...

Louise: ...we need to think that they are going to come back for annual checks, they need to have a good experience, so that then they are going to be okay for the next time

51. ILLUSTRATION: Yvonne: Actually you've just reminded me of my very first late shift that I did on my own in MRI. It was a young girl rolled over locked in a car, up north, and she'd slept there for a couple of days and she had an injury and then...she was awful, she had dried blood all over her and had been locked up for two days and was very claustrophobic and I didn't know what else to do so I begged her to stay... she really didn't want to I just told her this is so important for them to fix you... please... and she did! It worked... She was so brave.... I just begged her, I begged her, I didn't know what else to do... and she was really... she was such a mess

7. ILLUSTRATION: One time I was concerned about a patient who was not a very good communicator for some reason, they had Parkinson's disease, we couldn't understand him... I was really concerned about this patient

105. ILLUSTRATION: Esther: ... It's a surprise: imagine if the tunnel was so small that it pressed on our skin, I don't... I'm not claustrophobic at all but I don't know that I'd really be comfortable, I can go in there no worries, but if you shrunk it down to make it the same experience for them
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<td></td>
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<td>24. ILLUSTRATION: Pam: at the end of the day we are sort of on their side, we are not a part of the machine we are sort of with the patient, looking after the patient talking to the patient,</td>
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<td></td>
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<td>55. ILLUSTRATION: Anne: I don’t know if you’ve ever had a scan but when you first go in there it is a bit ‘ooo’ and sometimes that’s the first time, if you put them in and bring them out they know what to expect, there not just shoved in there and left, you know, because it is quite a strange experience, even if you’re not claustrophobic. It is quite strange, and the noise is awful as well.</td>
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<td></td>
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<td>120. ILLUSTRATION: Anne: Do you remember that one that yelled at you, then you walked away and yelled at me... Esther: ...and then you walked away...</td>
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<td></td>
<td></td>
<td>124. ILLUSTRATION: Yvonne: but we pretty much manage, we don’t really ever feel that we haven’t done the best by the patient or by us, it always seems to work out</td>
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<td></td>
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<td>13. ILLUSTRATION: Yvonne: so that they can complete their examination, because you really want them, at the end of the day, to be able to complete their examination with the least stress that they possibly can...and the least pain</td>
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<td></td>
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<td>36. ILLUSTRATION: Esther: Our role is to make it an effective examination for the patient..what we feel we need to contribute to the patient in patient care</td>
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<td>76. ILLUSTRATION: Yvonne: Yes, to hold their hand, in fact we (radiographers) do at times too, if there is no alternative, we will stay with the patient</td>
</tr>
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</table>
We are doing well, but...
There was a thought that the department was doing well, but there were areas for improvement.

We are doing well, but...
There was a thought that the department was doing well, but there were areas for improvement.

A good department

Role of Doctors/Radiologists

140. ILLUSTRATION: Louise: (referring to how their department is compared to others) A lot of them say that I’ve had one elsewhere and this has been much better Yvonne: Yea, I’ve had that too Barbara: Yea, we get that a lot

141. ILLUSTRATION: Esther: I think a fair few of the private ones don’t have background music, so they don’t have the headphone choice at all, it’s just earplugs. Barbara: Don’t they? Louise: Yea, a lot of the patients say ‘I didn’t get any music, or they didn’t talk to me they just put me in’

142. ILLUSTRATION: Yvonne: I think, what you find, is that they don’t have anything...they don’t get as much explanation as we give them...I think we’re good

143. ILLUSTRATION: Sandy: yea, I think they feel that in private there is not the same time, I mean I know we are very busy here but we still take that time to talk to our patients and get them in there, even though we’ve got queues of people.

144. ILLUSTRATION: Yvonne: I’ve had patients say that ‘I’m going to come back here next time, I’m not going to go back to wherever’

67. ILLUSTRATION: Sandy: And the docs I guess are a big part of it, we’ve got to get them to give injections...they have to be involved and know what’s going on

68. ILLUSTRATION: Louise: They’re not actually a big part though (referring to doctors) Yvonne: No, because if they need informed consent, we go and tell them, what to come and say. Louise: Exactly...that’s right Barbara: I don’t think they are a big part Yvonne: Small part Louise: Tiny Sandy: A little part then...

69. ILLUSTRATION: Esther: with the, yeah,...probably with patient care as a whole, they are involved, but with the claustrophobic scenario, not at all.

70. ILLUSTRATION: Yvonne: they’re not at the forefront as such Sandy: they’ll go up and give sedation... Esther: yea, here’s your tablet...woohoo Sandy:...after you’ve done all the work first and gone up and told the radiologist

71. ILLUSTRATION: Anne: With the radiologists, they’re not really into patient communication...are they? Because they sit in their room and report all day, they don’t really have much
interaction, unless it is interventional work.

72. ILLUSTRATION: Moderator: So would you say that patient care is important for all staff but it is really the focus of the radiographers in the main. Sandy: yes Yvonne: yes Louise: yes Esther: Absolutely

116. ILLUSTRATION: Barbara: but it’s usually the reception girls who bear the brunt of their anger, by the time they get to us...

117. ILLUSTRATION: Sandy: Yeah, and it’s surprising how often that happens, that they yell at the girls at the front desk and by the time they come to us they think ‘god I can’t...because this is the person who has to put us through the scanner, I better not upset them’

119. ILLUSTRATION: Sandy: he was very aggro with our receptionist at the desk Esther: Was he late – were you running late? Sandy: no, no, we were pretty well on time he was just really, really annoyed at the whole system.

63. ILLUSTRATION: Sandy: I think our front desk staff have a huge role to play, really, because they are the first person the patient sees, and also they speak to them the day before, so if they’re not overly friendly or there busy or they just don’t talk to them then that can start them off totally on the wrong foot and then we’ve got twice as much to do to try to talk them into it

64. ILLUSTRATION: Anne: And their the first person that they might say I’m really nervous or claustro, and you know, they then set the ground for what we then do, you know, they try to reassure them and we try to reassure them even more

65. ILLUSTRATION: Sandy: and their normally pretty good they normally come and tell us if the patient is quite claustro and they’ll even sometimes tell us if the patient is really claustro they will ask us to come and talk to them in the waiting room before they even come in

66. ILLUSTRATION: Yvonne: Which is really good isn’t it, because then you get a bit of a heads up about all sorts of problems really...they might have difficulty with the language.
or overly anxious, or problems getting undressed, all sorts of things they will come and tell us.

148. ILLUSTRATION: Yvonne: (referring to evidence based practice)...I don't really know, I've never thought about it before.

149. ILLUSTRATION: Yvonne: Except now I want to have a television on the wall in the new hospital...I think that sounds like a really good idea, I know they watch movies, and they wear 3d type of glasses...the children’s have it... Barbara: I don't know how they do it Sandy: Some sort of goggles I think...that actually looks out...yea I’m not sure... Louise: I don’t know if it is 3d I think it is just so they can look out Yvonne: oh is that what it is Barbara: Are they actually watching a TV? Louise: Yea but they’ve got to look because they are laying like that they have glasses that make them look out to the TV...I think so Esther: does it? Yvonne: They’re special goggles Barbara: I thought it was some sort of projector thing Sandy: yes Barbara: Yeah Yvonne: Anyway, I think we want one!

150. ILLUSTRATION: Esther: it makes you want to be a better communicator, doesn’t it? Talking about it.

151. ILLUSTRATION: Yvonne: mmmhm its good to brush up...and if there is anything that can come out of your evidence based research that will help, that will be good

152. ILLUSTRATION: Esther: Well the patient’s survey will be very interesting to find out what they’re writing...because generally people write really negative things or really positive things Yvonne: it will be very interesting, the feedback...it will be good to know whether it is in line with what we think, because it may not be...it'll be very interesting to know Anne: it may not be! Louise: that’s right, we may be patting ourselves on the back Sandy: they’re all telling us we are awful! Moderator: We will find out! Yvonne: We will

159. ILLUSTRATION: Yvonne: you know what, if you get it straight in the vein it doesn’t actually hurt very much, if you miss it hurts Louise: I always say does that hurt they say I can't even feel it Sandy: Exactly Esther: it doesn’t not hurt at all they’re lying Yvonne: not very much! Esther: Right – I’m going to get a needle! Anne: you can’t stick a needle in without
<table>
<thead>
<tr>
<th>79. ILLUSTRATION: Barbara: I've heard in other scanners that have a TV, that helps amazingly... it will be nice in the new hospital if we could get the funding to have that sort of facility. Yvonne: it would be nice to have that.</th>
</tr>
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<tbody>
<tr>
<td>80. ILLUSTRATION: Sandy: Well the kids have got it haven't they and they said its cut down on their GA's, tremendously. Esther: you can imagine it would.</td>
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**Appendix 18: MRI Poster**
Magnetic Resonance Imaging

What is MRI?
MRI is a way of creating pictures of your body that does not use X-rays or radiation. The MRI machine makes pictures by organising and collecting the magnetic fields that naturally occur within the body. MRI pictures show the soft tissues of the body (muscles, nerves, brain, discs, ligaments etc). In many situations MRI offers unique information to help your doctor better plan your treatment and care.

Preparation for MRI
It is very important not to bring any metal into the scan room without letting the Radiographer know. Before the scan you will be asked to remove your watch, keys, coins, credit cards, bus tickets and phone cards, and these will be placed in a locker.
When you arrive at MRI, you will be asked to fill out a safety questionnaire to find out if you have any metal or implants in your body. You will also be asked to wear a cotton gown. If you are pregnant or could be pregnant at the time of your scan appointment, please let us know so we can discuss the situation with you and consult your doctor.

Getting Comfortable and Keeping Still
MRI images are very sensitive to movement. By keeping very still during the scan you can improve the quality of the images we obtain. We have found that the best way to keep still is to be relaxed, lying comfortably as if you were dropping off to sleep. The MRI Radiographer is very interested in making you comfortable in the scanner so that you feel settled, secure and relaxed. Let them know what they can do for you and together you will ensure the best possible picture.

During the Scan
During the scan you will be lying inside a large tubular machine. The Radiographers want you to be comfortable and will ask you to be very still during the scan because even slight movement can spoil the images and reduce their usefulness to you and your doctor. The inside of the scanner is well lit, and has a fan to blow fresh air gently over you. Music is provided from an FM radio, or from CDs. Most MR scans take between 15 and 60 minutes. The Radiographers will talk to you through an intercom system. You will also have a call bell if you need the radiographer's attention. Most MRI tests do not need you to have an injection, but in some situations a contrast agent can greatly improve the accuracy of the scan. The contrast is injected into a vein, and the dose is quite small. MRI contrast is not the same as 3-day contrast. Very few people notice when it is injected.

Results
MRI scans are usually not reported while you are in the MRI department. Following the scan, the results are made available to the Doctor who referred you. This may take several days.
ABOUT YOUR MRI SCAN

Patient Information

THIS INFORMATION IS INTENDED AS A GENERAL GUIDE ONLY. PLEASE ASK THE RADIOGRAPHER IF YOU HAVE ANY QUESTIONS RELATING TO THIS INFORMATION.

WHAT IS MRI?

The MRI machine makes pictures by organising and collecting the magnetic fields that naturally occur within the body. MRI pictures show the soft tissues of the body (muscles, nerves, brain, discs, ligaments etc). In many situations MRI offers unique information to help your doctor better plan your treatment and care. Unlike X-rays, Computed Tomography (CT or CAT scans) and some other types of imaging MRI is a way of creating pictures of your body that does not use X-rays or radiation.

During the scan you will be lying inside a large tubular machine. The Radiographers want you to be comfortable and will ask you to be very still during the scan because even slight movement can spoil the images and reduce their usefulness to you and your doctor.

Most MRI scans take between 25 and 60 minutes. The Radiographers will talk to you through an intercom system. The MRI scanner that will be used for your scan is below.

PREPARATION FOR MRI

In most cases there is no special preparation for an MRI scan. You can eat and drink normally on the day of the scan, unless specifically told otherwise, although it is best to avoid large amounts of coffee or other things that make you restless.

It is very important not to bring any metal into the scan room without letting the Radiographer know. Before the scan you will be asked to remove your watch, keys, coins, credit cards, bus
tickets and mobile phone, which can all be placed in a locker for you. These can all be damaged by the strong magnet of the MRI scanner, or might cause distortions in the MRI pictures.

When you arrive at MRI, you will be asked to fill out the MRI Safety Questionnaire to find out if you have any metal or implants in your body. You will also be asked to change into a cotton gown.

For some MRI scans we need to measure your heart beat by placing small dots and wires on your back or chest.

**Pelvis MRI - Abdomen MRI Special Preparation**

If you are having a scan of the abdomen or pelvis, **do not eat or drink anything for 4 hours before the appointment**. This is important to ensure high quality pictures.

**Please Bring Old X-rays**

You may have had other X-ray tests, Ultrasound, CT, or Nuclear medicine. These films can all be interpreted by the MRI Radiologist and greatly improve the relevance of the MRI report.

It is very important to bring old X-rays etc with you to the MRI scans so they can be reviewed. You may need to supply them before a full MRI report can be made.

Private films will be returned to your referring doctor if you are seeing them within the week. Otherwise they are posted to your home address.

**WHEN YOU ARRIVE**

Please report to the reception desk in the Department of Radiology: MRI Unit. You will then be asked to sit in the waiting room until it is time for your scan.

**DURING YOUR SCAN**

MRI images are very sensitive to movement. By keeping very still during the scan you can improve the quality of the images we obtain. We have found that the best way to keep still is to be relaxed, lying comfortably as if you were dropping off to sleep. The MRI Radiographer is very interested in making you comfortable in the scanner so that you feel settled, secure and relaxed, let them know what they can do for you and together you will ensure the best possible pictures.

During the scan you will be lying inside a large tubular machine. The Radiographers want you to be comfortable and will ask you to be very still during the scan because even slight movement can spoil the images and reduce their usefulness to you and your doctor. The inside of the scanner is well lit, and has a fan to blow fresh air gently over you. Music is provided from an FM radio, CDs or from our music library. Most MR scans take between 25 and 60 minutes. The Radiographers will talk to you through an intercom system. You will also be given a squeeze ball to call the radiographer if you need their attention.
Depending on the area being scanned, you may have some additional equipment placed on you prior to your scan. These coils or antennae help us to focus the MRI images on the areas that need investigating. The picture below demonstrates a coil that is used for scans of your head.

**NOTE:**
This figure/table/image has been removed to comply with copyright regulations. It is included in the print copy of the thesis held by the University of Adelaide Library.

**PROBLEMS WITH MRI**

It may not be possible, or safe, to have an MRI scan if you have any of these items:

- *Cardiac pacemaker*
- *Surgical clips in your head (particularly aneurysm clips)*
- *some artificial heart valves*
- *Electronic inner ear implants (bionic ears)*
- *Metal fragments in your eyes*
- *Electronic stimulators*
- *Implanted pumps*

Let the MRI Unit know well before your appointment if you have any of these. Experienced MRI staff will have to discuss the exact implant or metal with you to decide if it is safe to perform the scan.

Deciding which implants cannot be scanned takes special knowledge and experience. Please do not try to guess, and don’t just rely on your doctor to determine if we can scan you.

Before the scan you will be asked a series of questions to check that it is safe for you to enter the scan room, and asked to fill in a safety questionnaire.
People with dental fillings and bridges, hip and knee replacements, and tubal ligation clips can all be scanned safely. The Radiographers will want to know about these things to minimise the effect they have on your images.

CLAUSTROPHOBIA

If you have experienced claustrophobia, or have trouble in enclosed spaces talk about it with the MRI staff before your appointment date.

For mild claustrophobia we find that the staff can help you to relax enough to get rid of the anxiety in a few minutes.

If your claustrophobia is severe you may need an anti-anxiety prescribed by your referring doctor or G.P. Staff at the MRI unit can be contacted about this and can offer your doctor some advice. You shouldn't drive after taking such drugs, so arrange a safe way to get home.

Because there are no side effects of MRI you can bring a friend into the scan room for support if that will help your anxiety. Children in particular should feel free to bring an adult in with them. Everyone coming into the scan room will be asked the questions about metal and implants.

CONTRAST INJECTIONS (DYE)

Most MRI tests do not need you to have an injection, but in some situations a contrast agent can greatly improve the accuracy of the scan. The contrast is injected into a vein, and the dose is quite small.

MRI contrast is not the same as X-ray contrast. Very few people notice when it is injected.

PREGNANCY

If you are pregnant or could be pregnant at the time of your scan appointment, please call us early so we can discuss the situation with you and consult your doctor.

MRI causes a slight heating of your body, so most MRI sites avoid scanning during the first 3 months of pregnancy unless the diagnosis cannot wait and the only alternate test uses X-rays. Beyond that period, MRI is still avoided if the diagnosis can wait till your child is born as a matter of extreme caution. In many sites around the world MRI is used to examine pregnant women and their babies to avoid the need for X-ray tests.

MRI contrast is not used during pregnancy.

If you are breastfeeding:

Please inform the MRI staff before your examination if you are breastfeeding to discuss your options. If you require a contrast injection you may wish to not breastfeed for 24 hours after the injection.
RESULTS

MRI scans are usually not reported while you are at the MRI Unit. The images are sent to the Picture Archive Computer System (PACS) and then later interpreted by a specialist Radiologist. The results and images are made available to the doctor who referred you to us. This may take several days. If you have an appointment very soon after your appointment, let us know and we will try to arrange faster reporting and delivery. The referring doctor can also ring MRI for results.

WHO PAYS?

Most MRI in Australia is paid for by Medicare, who will pay a benefit when a specialist requests the scan for one of a list of specific indications. The Hospital Unit uses your Medicare card to claim this benefit directly from Medicare. Patients will not receive a bill for any gap, or need to send any forms in. Private inpatients are billed directly; your private health insurance company will usually cover the difference between the Medicare payment and the amount charged. Scans done in relation to Workcover or third party motor vehicle accident insurance are billed directly to the patient. In those cases Medicare will not pay a benefit and you are responsible for forwarding the claim to your insurer. The amount billed is equal to the benefit paid by these insurance systems so again you should not be out of pocket.

If you are a visitor to Australia not covered by Medicare, you will be sent an account.

The MRI unit also performs a range of advanced procedures that are not funded by Medicare. These examinations are performed at our expense and the patient is not sent a bill.

WANT TO KNOW MORE?

If you have any questions about the MRI scan or our service, please give us a call on (08) 82225417. You can also help us by offering suggestions for this information sheet, which is updated regularly.
Appendix 20: Music list
# MRI Music List

For most MRI scans, you will be able to listen to music through a set of special headphones. Below is a list of artists/compilations that we have available in this department. Please inform the radiographer of the music that you would like to listen to from the list below:

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<tr>
<td>1.</td>
<td>ABBA</td>
<td>37. Cliff Richard</td>
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<tr>
<td>2.</td>
<td>AC/DC</td>
<td>38. Cold Weather, Hot Country Music and Bluegrass</td>
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<tr>
<td>4.</td>
<td>Adele</td>
<td>40. Crowded House</td>
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<td>5.</td>
<td>Aitourne</td>
<td>41. Darin Brubeck</td>
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<td>6.</td>
<td>Akousic Odyssey</td>
<td>42. David Campbell</td>
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<td>7.</td>
<td>Alanis Morissette</td>
<td>43. David Guetta</td>
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<td>8.</td>
<td>All Woman Compilation</td>
<td>44. Dean Martin</td>
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<td>9.</td>
<td>Andre Reju</td>
<td>45. Delington</td>
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<td>10.</td>
<td>Andrea Bocelli</td>
<td>46. Dido</td>
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<td>11.</td>
<td>Andrew Lloyd Webber</td>
<td>47. Dire Straits</td>
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<td>12.</td>
<td>Anthony Worlow</td>
<td>48. Directions in Groove</td>
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<td>13.</td>
<td>Arcangel Corelli</td>
<td>49. Don Morrison</td>
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<td>14.</td>
<td>Archie Roach</td>
<td>50. Dr John</td>
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<td>15.</td>
<td>Ariel</td>
<td>51. Dusty Springfield</td>
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<td>16.</td>
<td>Backstreet Boys</td>
<td>52. E Type Jazz</td>
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<td>17.</td>
<td>Barbare Seisand</td>
<td>53. Ella</td>
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<td>18.</td>
<td>Barrenaked Ladies</td>
<td>54. Elvis Presley</td>
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<td>20.</td>
<td>Ben Harper</td>
<td>56. Enya</td>
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<tr>
<td>22.</td>
<td>Beyoncé</td>
<td>58. Eva Cassidy</td>
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<td>23.</td>
<td>Big Bad Voodoo</td>
<td>59. Even After That</td>
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<tr>
<td>24.</td>
<td>Bill Haley and the Comets</td>
<td>60. Fiared Hits and Platform Shoes</td>
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