AN INVESTIGATION INTO
FORMAL ROLE EXTENSION
OPPORTUNITIES
FOR MRI TECHNOLOGISTS
IN NEW ZEALAND

Adrienne J. Young

A thesis submitted in partial fulfilment of the
requirements for the degree of
Master of Health Science

Unitec
New Zealand
ABSTRACT

At present, role development and a possible career progression framework for medical radiation technologists (MRTs) in New Zealand (NZ) are being investigated. This study aims to examine the attitudes of MRTs working in magnetic resonance imaging (MRI) towards these opportunities.

Using a case study approach, data was obtained from three sources. Ninety-one New Zealand MRI-MRTs replied to a questionnaire related to their professional background and perceived job satisfaction. Current work practice in MRI departments throughout New Zealand was also ascertained. Four experienced MRI-MRTs were interviewed, in order to gain a greater understanding of historical, current and future issues, including the concern of retention of experienced staff. To support this information, twelve reporting MRI radiographers from the United Kingdom (UK) responded to an on-line questionnaire, relating their experiences of role extension.

This study has demonstrated that the role of the MRI technologist has changed considerably over the last ten years, and is continuing to develop. It was revealed that whilst technical or protocol-driven roles, such as venepuncture and scanning of routine examinations unsupervised, have become widespread in MRI departments throughout NZ, more cognitive tasks such as the authorisation and protocolling of request forms are not as widely practiced. However, NZ MRI-MRTs are keen to pursue more advanced role extension activities, particularly image reporting. With evidence from the UK supporting MRT-reporting, this is an opportunity worthy of further consideration. While it is probable that there will be resistance to it, particularly from radiologists, this is an important field to pursue in order to increase the job satisfaction of MRI-MRTs and to promote the retention of experienced staff. This study supports the development of formal, clinically-orientated ‘advanced practice’ MRI-MRT roles in New Zealand. These roles should include opportunities for further role extension, including MRI-MRT reporting.
Declaration

Name of candidate: Adrienne Jane Young

This Thesis/Dissertation/Research Project entitled: **An Investigation Into Formal Role Extension Opportunities for MRI Technologists in New Zealand** is submitted in partial fulfillment for the requirements for the Unitec degree of Master of Health Science.

**CANDIDATE’S DECLARATION**

I confirm that:

- This Thesis/Dissertation/Research Project represents my own work;
- The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
- Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number: 2006:662

Candidate Signature: ............................................................Date: .........................

Student number: 1007303
LIST OF PRE-PUBLICATIONS

- Results of the New Zealand MRI-MRT questionnaire have been accepted for publication in ‘Shadows: The Journal of New Zealand Medical Radiation Technology.’
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<td>A&amp;E</td>
<td>Accident and Emergency</td>
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<tr>
<td>ACC</td>
<td>Accident Compensation Corporation</td>
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<tr>
<td>AHP</td>
<td>Allied Health Professional</td>
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<tr>
<td>AP</td>
<td>Assistant Practitioner</td>
</tr>
<tr>
<td>ASETPA</td>
<td>Association of Science and Engineering Technology Professionals of Alberta</td>
</tr>
<tr>
<td>ASRT</td>
<td>American Society of Radiologic Technologists</td>
</tr>
<tr>
<td>ASUM</td>
<td>Australasian Society for Ultrasound in Medicine</td>
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<tr>
<td>COP</td>
<td>Certificate of Proficiency</td>
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<tr>
<td>CPD</td>
<td>Continuing professional development</td>
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<tr>
<td>CT</td>
<td>Computed tomography</td>
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<tr>
<td>DCBE</td>
<td>Double contrast barium enema</td>
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<tr>
<td>DHBNZ</td>
<td>District Health Boards New Zealand</td>
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<tr>
<td>DMU</td>
<td>Diploma in Medical Ultrasound</td>
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<tr>
<td>DSA</td>
<td>Digital subtraction angiography</td>
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<tr>
<td>ED</td>
<td>Emergency Department</td>
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<td>IAM</td>
<td>Internal auditory meatus</td>
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<td>IV</td>
<td>Intravenous</td>
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<tr>
<td>MOH</td>
<td>Ministry of Health</td>
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<tr>
<td>MRI</td>
<td>Magnetic resonance imaging</td>
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<tr>
<td>MRT</td>
<td>Medical Radiation Technologist</td>
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<td>MRTB</td>
<td>Medical Radiation Technologists Board</td>
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<td>National Health Service</td>
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<td>NZ</td>
<td>New Zealand</td>
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<td>NZIMRT</td>
<td>New Zealand Institute of Medical Radiation Technologists</td>
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<tr>
<td>OSE</td>
<td>Objective structured examination</td>
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<tr>
<td>PAM</td>
<td>Professional Allied to Medicine</td>
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<tr>
<td>PgC</td>
<td>Postgraduate Certificate</td>
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<td>Abbreviation</td>
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<tr>
<td>RA</td>
<td>Radiologist Assistant</td>
</tr>
<tr>
<td>RANZCR</td>
<td>Royal Australian and New Zealand College of Radiologists</td>
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<td>RCR</td>
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<td>UK</td>
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<td>UREC</td>
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<td>United States</td>
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CHAPTER ONE

Introduction

At present, there is a large-scale research study being conducted on behalf of the New Zealand Institute of Medical Radiation Technologists (NZIMRT) to investigate role development and a possible supporting career structure for medical radiation technologists (MRTs) in New Zealand (Yielder, 2007b). This thesis aims to investigate the attitudes of those MRTs involved in magnetic resonance imaging (MRI) scanning towards these possible career opportunities, specifically with the aim of identifying areas of role extension particular to MRI in order to develop proposals for the formal and recognised improvement of the MRI-MRT role.

The career path for MRTs in New Zealand is currently ill-defined with no formal recognition of advanced (postgraduate) qualifications or experience. Remuneration for experience/expertise is usually at the discretion of the employer, particularly in private practice where there are no formal career progression steps. Generally, MRTs who wish to advance their practice subspecialise in modalities such as computed tomography (CT), nuclear medicine, digital subtraction angiography (DSA), MRI and/or ultrasound. However, as pointed out by Yielder (2007a), this is a horizontal career move and there is currently no supporting structure that acknowledges advanced capabilities and increased levels of responsibility. Although many departments have a Charge MRT in each of these modalities, this role tends to require more administrative duties rather than advanced clinical practice. Further progression usually means moving into non-clinical positions such as management, teaching or applications roles for equipment suppliers.

From my personal experience, the expectations placed on MRTs working in MRI have increased exponentially over the past ten years as the technology has advanced, with an associated increase in workload for all involved. As a result, the role of the MRT has evolved to take on more responsibilities in order to alleviate the workload of the radiologists and to improve service to the patients by reducing waiting times. This
evolution would seem to have developed as radiologists’ confidence in both their own MRI knowledge and that of the MRTs has increased. However, as identified by the Role Development Working Party for the NZIMRT (NZIMRT, 2008), at this stage this role extension has occurred informally and rather haphazardly as a consequence of radiologists’ roles also expanding and diversifying, and due to shortages of radiologists in certain areas within New Zealand.

Accordingly, radiologists are requiring the MRT to be more actively involved in the decision-making processes during scanning. An example of this in MRI is the planning of scans that was previously performed by the radiologists. In 1997 it was not uncommon for the radiologist to be called in after each sequence (approximately every ten minutes) to plan the positioning of the next sequence. A decade later, a large number of routine scans are planned by the MRT. An extrapolation of this example could suggest a future role for MRTs in performing more complex studies without radiological supervision.

Another potential area of role extension for MRI-MRTs that is not currently being undertaken in New Zealand, is the area of MRI reporting. There is a substantial amount of literature, predominantly from the United Kingdom (UK), describing various fields in which radiographers are reporting images (Bates, Conlon & Irving, 1994; Cook, Oliver & Ramsay, 2004; Murphy, Loughran, Birchenough, Savage & Sutcliffe, 2002; Piper, Paterson & Godfrey, 2005). The most prevalent areas are reporting of ultrasound scans, plain films of the appendicular skeleton, and barium enemas (Price & Le Masurier, 2007). In addition to this, there are a number of other areas in which radiographers are extending their roles into reporting. These include specialist imaging areas such as mammography, nuclear medicine, computed tomography (CT) and MRI (Craven, 2003; Hogg, Williams & Norton, 1997; Moller et al., 2004; Wivell, Denton, Eve, Inglis & Harvey, 2003). An analysis of this literature could suggest another future role for MRTs in New Zealand and will be closely examined as part of this thesis. In addition, the first-hand experience of MRI reporting radiographers from the UK will be reviewed.
A number of inter-related terms are used within the literature on role development and it is important to define how these terms will be viewed within this discussion. White and McKay (2004) define role extension as encompassing the performance of tasks that are not generally included in the normal training required for registration. Therefore, role extension may allow a group of professionals to undertake a role or duty traditionally performed by another professional group. This covers the area of reporting by radiographers as reporting has, in recent history, only been performed by radiologists. Role expansion on the other hand implies an increased role within the boundaries of education, theory and practice (White & McKay, 2004). This may include the post-qualification acquisition of skills, for example training in specialist imaging modalities such as MRI. Role advancement encompasses the above definitions of role extension and role expansion, and adds a third dimension of attainment of a higher level of professional attributes including, but not limited to, increased decision making, teaching and leadership skills (Hardy & Snaith, 2006). Advanced practice therefore implies greater accountability, responsibility and autonomy (Snaith & Hardy, 2007).

It is also important to note and define here the use of a number of different terms throughout the literature that essentially have the same meaning. Whilst the term radiographer is still used in the UK, in New Zealand radiographers are more correctly called medical radiation technologists (MRTs). However, the historical term in New Zealand is radiographer and many MRTs still refer to themselves as such. Therefore, throughout this thesis the correct term from the country under discussion will be used, although all will have the same meaning. Similarly, in the United States (US) the term radiologic technologist is widely used and this may be used when referring to US literature. MRI-MRT will be used to describe MRI technologists, in other words MRTs who have specialised in MRI. Sonographer will refer to an MRT specialising in ultrasound. Also, the occupation itself has a variety of titles including radiography, medical imaging, radiologic technology and x-ray technology. The relevant term to the country under discussion will also be used in this context and all will have the same meaning.
The Aims and Structure of the Study

The aim of this thesis is to investigate the attitudes of those MRTs involved in MRI scanning in New Zealand towards role development and a possible supporting career structure for MRTs, and to identify areas of potential role extension for MRTs working in this subspecialty area. The objectives of this research are:

1. to provide recommendations to support the introduction of a new career progression framework within medical imaging in New Zealand,
2. to aid in the attraction and retention of high-quality staff in MRI by increasing job satisfaction and offering the possibility for higher salaries, and,
3. to potentially provide assistance in alleviating the workload of radiologists with the on-flow effects of increased service to referring practitioners and patients.

This study will pursue the following lines of inquiry in order to meet this aim:

• An investigation into why MRTs decide to subspecialise, their reasons for selecting the field of MRI, and their current opinions on their job satisfaction. In addition, current work practice in MRI departments throughout New Zealand will be ascertained. This information will be gained by a questionnaire sent to all New Zealand MRTs registered in the MRI scope of practice or the equivalent training scope.

• An in-depth examination of the changing role of the MRI technologist in New Zealand from an historical perspective including an analysis of the reasons for experienced MRI-MRTs’ departure from the field. Much of this information will be obtained by in-depth interviews of four previous charge MRI-MRTs who have either left the field or reduced their clinical hours in MRI to pursue different but associated careers.
• The development of recommendations for potential areas of advanced practice for MRI-MRTs, including suggestions for methods of implementing and supporting those practitioners who desire to move into these areas of role extension. Supporting evidence will be provided from information gained by surveying a group of MRI-MRTs in the UK already undertaking MRI reporting. This is essential as their experiences so far may provide clear perceptions into what has worked successfully and what lessons have been learned.

Following this introductory chapter, Chapter Two analyses the changing role of the MRT based on a review of the literature. Within the current context of health care reform occurring internationally, the importance of professional identity and the effects of medical dominance are discussed. In conjunction with the technological advances taking place in the field of medical imaging, these sociological trends have resulted in an increase in the required educational levels for MRTs, and the consequences of this are considered. The literature review continues, specifically focussing on role extension opportunities that have been developed within the field of medical imaging, particularly regarding radiographer reporting in the UK. Because of the paucity of literature related to MRI role development, this discussion is used as a foundation on which to build recommendations for MRI.

Chapter Three provides a discussion on the research processes including the choice of case study methodology as the research method for this thesis. Ethical considerations are discussed, and data collection and analysis methods are explained with an account of participants included. Chapter Four then quantitatively presents the results of the New Zealand questionnaire and the UK on-line survey.

Chapters Five to Eight incorporate the data presented with information from interviews of four key informants in a qualitative discussion. Four themes were derived from a thematic analysis of the interview data. These four themes constitute one chapter each with Chapter Five illustrating the changing role of the MRI technologist, Chapter Six exploring potential role extension opportunities in MRI, Chapter Seven challenging the
current career progression pathway in New Zealand and Chapter Eight suggesting the introduction of more clinically orientated opportunities, including an investigation of the potential for implementation of a tiered framework specifically within a MRI department.

Chapter Nine integrates the four themes and concludes with recommendations to support the introduction of a new career progression framework within medical imaging in New Zealand.
CHAPTER TWO

The Changing Role of the Medical Radiation Technologist: A Review of the Literature

Compare the role of the radiographer of thirty years ago to that of today’s MRT. Although there are essential similarities in the basic skills required, the day-to-day work experiences are vastly different with a significant increase in both skill and knowledge requirements. Role expansion has been steady and comprehensive. Certainly, the role of MRI technologist (MRI-MRT) was not even envisaged thirty years ago as MRI scanners were not introduced into the health care setting until the early 1980s (Young, 2004). Role extension on the other hand is a comparatively new concept for MRTs. This involves the opportunity to take over roles traditionally performed by other groups. Reporting of images is a key example of this.

As a result of a combination of sociological trends and technological developments, the educational requirements for MRTs have been steadily advancing. This has resulted in a highly-educated group of professionals potentially confined to a limited, non-stimulating career with little, if any, opportunity for increased professional autonomy. Therefore, role development of some sort would seem desirable, whether it remains within current definitions of the MRT role as role expansion, or manages to go beyond that with role extension.

Sociological Trends

Professional Identity

There are many documented features that contribute to a profession being recognised as such. These include, but are not limited to, the possession of a specific body of knowledge, the provision of a service for other people, participation in continuing professional development (CPD) and research, a professional regulating body, and

Whilst medical imaging by its very nature requires practitioners to have a specific body of knowledge and provide a public service, other professional attributes are not always so easily applied to MRTs. Within the context of a changing and developing profession in the 1980s, Deaville (1986) felt it necessary for radiographers to examine the image that they had of themselves as a profession. She questioned how radiographers could improve their professional image when many radiographers, in her experience, had negative feelings towards statutory registration seeing it simply as something else to pay. However, she correctly pointed out that registration not only protects the public from unqualified practitioners, but also provides professional status for those who do have the recognised qualifications.

In 1996, Price and Paterson identified radiography as an emerging profession based on the premise that work practices were changing with the development of new roles and the extension of traditional roles. They believed that with radiographers assuming responsibility in roles such as barium enema sessions and sonographer-led clinical sessions, autonomy was increasing and the issue of radiographer reporting was seen as a crucial issue and major factor in future professional autonomy.

More recently, Yielder (2005) emphasises that as professionals, it is essential for MRTs to be continually increasing their knowledge and skills in order to provide the best service possible to the public. As early as the 1920s radiographers recognised the important link between educational standards and professional image, and the first Radiography Diploma was established in the UK in 1921 (Reeves, 2002). As the profession has continued to adapt with advancing technology, educational requirements have steadily increased. However, this has not always been met with enthusiasm. In the 1970s in the UK, there were fears of overtraining that led to reduced intakes of students (Deaville, 1986) and later, for similar reasons, there was considerable resistance to moving towards graduate level status from within the profession itself (Reeves, 2002).
In addition, Reeves asserts that radiologists felt threatened by this increased level of qualification and also resisted these changes (ibid.).

Anecdotally, much of this can be related to contemporary MRTs who question the value of further education and ongoing CPD, do not understand the importance of registration and professional body membership, and seem to be content to have radiologists continue with the decision-making roles. In support of this, a study into the ethical commitment of Australian radiographers found that, as a result of a lack of professional autonomy, radiographers were unwilling to accept greater responsibility for roles related to the patient such as duty of care and consent (Lewis, Heard, Robinson, White & Poulos, 2007). One interviewee purported that radiographers in general “…tend to rely on other people around them to make decisions for them. An example of that would be with radiologists” (ibid., p.7).

Yielder (2005) suggests that MRTs need to have a change of attitude, including standing up to other professions such as radiologists, in order take on a more active role in determining the profession’s future. Lewis et al. (2007) also raise the point that the professional bodies have a strong responsibility for the professional identity of radiographers as they identified a negative attitude amongst Australian radiographers as a result of “…a lack of strong association to a professional community or organisation…” (p.7).

Medical Dominance

The dynamics of the interprofessional relationship between radiographers and radiologists have historically been based on a principle of medical domination, whereby MRTs are subordinate to radiologists (Price & Paterson, 1996). Perhaps the biggest stumbling block for radiography to be recognised as a profession is the obstacle created by the lack of autonomy currently exhibited by MRTs as a result of this medical dominance. Whilst the historical development of medical dominance over
radiographers will be discussed later in this chapter, the effect of that dominance on the emergence (or lack of) radiography as a profession needs to be briefly examined here.

Theoretically, by obtaining registration level, radiographers have gained professional status and are therefore an autonomous profession (Deaville, 1986). This should mean that radiographers have total responsibility for their own work. However, Deaville suggests that if radiographers are referring some of their decision-making responsibilities to radiologists, then the effect is one of devaluing our professional image. She gives examples such as assessing the diagnostic value of images and the selection of appropriate techniques that are largely controlled by radiologists.

Price and Paterson (1996) agree that this lack of control over work practices impacts on the ability of radiographers to develop radiography as a profession. However, as mentioned earlier, they identify areas of changing work practices such as sonographers conducting their own sessions, and radiographer-led barium sessions as chances to enable greater autonomy. While also recognising the potential for increased opportunities for autonomy as a result of role development, Carr and Fell (1997) suggest that because of the traditional working relationship between radiologists and radiographers based on medical dominance, extensive autonomy for radiographers is unlikely.

Interestingly however, the relevance of previous medical dominance models to current health care practice has been extensively evaluated. Increased public questioning of ‘expert’ knowledge and growing lay scepticism about health professionals have been identified as contributing reasons for the de-professionalisation of the medical profession and a linked decline in medical power (Broom, 2006). It has been suggested that the profession of medicine has been demystified in part by the accessibility of information and subsequent education via the internet of the general public (ibid.). Also, Boyce (2006), in a sociological study of the relationship between medicine and the allied health professions in Australia, states that studies pre-1980 describe hierarchal frameworks of medical dominance over the allied health professions based
on subordination and close supervision. However, with hospital restructuring in the 1980s as evidenced in countries such as the UK, the United States and Australia, there was an associated reorganisation of inter-professional relations leading to a position of marginalisation rather than subordination. This refers to the group having a self-image of important contribution but being excluded from input. Boyce suggests that this form of medical dominance over the allied health professions was in place leading into the period of healthcare reform seen in the 1990s. Since then, Boyce asserts that the changing healthcare environment in Australia has led to greater self-management by the allied health professions and, as a consequence, “…organisational and strategic independence from medicine” (p.532). She believes that these changes may give allied health professionals greater influence when redefining clinical roles and responsibilities.

Although in theory these changes have occurred, whether or not they may be applied to today’s MRTs is a matter of debate. Certainly in the UK where role extension opportunities are widespread it is evident that radiographers have pushed professional boundaries and, in the process, accepted greater responsibility and increased professional autonomy. In New Zealand however, I suspect that this is not the case and that the professional identity here is similar to that of Australian radiographers. It would seem that radiographers here are still plagued by feelings of subservience. As Willis (2006) acknowledges in his analysis of medical dominance in Australia:

…it is apparent that the medical profession retains much of its dominance. The extent to which that occurs varies in different countries although there is inevitably slippage between policies that seem to undermine the power of medicine, but do not, in the end, have much actual control or influence (p.428).

Healthcare Reform

In response to staff shortages and increased pressures on healthcare systems, governments around the world have recognised the need for healthcare reform. It is evident in the literature that a number of governments are being forced to review their
healthcare delivery systems and associated workforce issues related to the healthcare industry in response to global shortages of staff and an increase in pressure on services (Department of Health, 2000; Ministry of Health [MOH] and District Health Boards New Zealand [DHBNZ] Workforce Group, 2007; Productivity Commission, 2005).

The National Health Service (NHS) plan introduced in the UK in 2000 was designed to modernise a health system that was initially introduced in 1948 (Department of Health, 2000). As stated in the plan, this was a different era in which patient expectations were unlike those now. A patient-centred model was outlined with the rationale that we live in a consumer age and it is now patient expectation that services will be geared to meet the needs of individual users rather than a one-size fits all service (ibid.). It was identified that one of the key issues in delivering the plan was to ensure the recruitment and retention of staff, and various strategies were proposed. From this arose the development of the four-tier service model to provide a suitable career progression model for staff. This was designed to encourage the development of professional expertise and to remove inter-professional boundaries that not only resulted in wasted resources, but hindered the potential of other staff to extend (ibid.).

In Australia, the health workforce was examined in the Productivity Commission Research Report (2005) which also acknowledged the reliance of the healthcare system on the commitment and skills of its staff. This report identifies similar issues of developing technology, growing community expectations, and population ageing as being key reasons for the increased demand on healthcare services. These factors, in conjunction with the workforce shortages across a number of health professions, prompted the need for a review of current practice and the recommendation for changes to include the implementation of a National Health Workforce Strategic Framework. This framework acknowledges the fact that changes in existing workforce roles and the creation of new roles need to be considered in order to make better use of the existing health workforce (ibid.).

The New Zealand Government has also proceeded with investigation of modernisation of the healthcare system. They recognise that not only is the New Zealand population
ageing, but so is the workforce, thus leading to the potential for future workforce shortages (Ministry of Health and District Health Boards New Zealand Workforce Group, 2007). Recruitment and retention of staff are therefore of the highest priority. In conjunction with DHBNZ, the Ministry of Health has recently released a consultation document outlining a proposed career framework to be introduced for the health and disability workforce (ibid.). Within the document it is stated that “…there will be a need for new ways of working together, extended scopes of practice, new types of practitioner and new roles” (p.2).

These changes in healthcare service provision lend weight to the argument that it is timely for radiographers to be actively increasing their professional profile in order to be involved in the development and instigation of new roles and role extension opportunities.

**Technological Advances**

Carr and Fell (1997) state that the impact of technological changes in imaging has “…played the biggest part in shaping responses to changing service needs” (p.S187). They further explain that after the first few years following Roentgen’s discovery of x-rays when there were extensive developments in techniques, technological change slowed. It was not until the mid-seventies with the rapid advances in computer technology, most notably in micro-chip technology, that there was a major acceleration in technological and scientific development in imaging including the introduction of CT scanners (ibid.). This was followed by the introduction of MRI scanners into the clinical setting in the early 1980s (Young, 2004).

It has been established that the introduction of new technology within a medical imaging department may directly impact on organisational structure of the workplace by changing roles and patterns of interaction between staff members (Barley, 1986). In a study of the sociological impact of the introduction of the then new technology of CT scanners to two different departments, it was revealed that the balance of power between radiologists and technologists hangs in part on the expertise level of each
group (ibid.). At one of the departments, when CT was introduced there was greater challenge to the medical dominance within the department due to the fact that the scanner was staffed by experienced radiologic technologists and inexperienced radiologists. This meant that the technical complexity of the scanner was well understood by the technologists, and the radiologists were therefore more reliant on the support of the technologists. At the other scanner, novice technologists were employed. These technologists were therefore reliant on the radiologists’ knowledge and a different organisational structure ensued.

In turn, from the increasing complexity of medical imaging technology, the move from technician to technologist has resulted (Belinsky, Garcia, Keech & Matelli, 2003). Although sometimes used interchangeably with the expression “techs”, the terms denote different levels of education and subsequent technical responsibility (Association of Science and Engineering Technology Professionals of Alberta [ASET PA], n.d.). In general, technicians are trained to have specialist knowledge in their field, with training programmes generally between one and two years in length and with a focus on practical skills (AllAlliedHealthSchools, n.d.). Specifically applied to radiography, Belinsky et al. (2003) describe the original radiographic practitioners as technicians by defining them as “an individual who had been trained as an apprentice by a radiologist and who had the mechanical knowledge and skills to maintain the equipment and make repairs when needed” (p.253).

In comparison, technologists are also specialists in their field but generally require the minimum qualification of a bachelor’s degree with this advanced knowledge equipping them with the skills to undertake higher-level tasks (ASET PA, n.d.). Clearly the role of MRT today fits within the definition of technologist with Belinsky et al. (2003) emphasising the role of today’s technologist that bridges technology and medicine. Going one step further, Friedenberg (2000) suggests that the concept of technologists taking over some of the roles of the radiologist could be “the first medical revolution of the 21st century” (p.633) and coined the term ‘supertechnologist’ to describe those undertaking some areas of role extension.
**Educational Requirements**

Understanding the importance of technologists acquiring a sound educational background to support their changing role within a department is required to advance our professional image. As a consequence of both political and professional events, Australia was probably the first country internationally to have a bachelor’s degree as the minimum educational entry-level requirement for the profession of radiography (Cowell, 1999). Subsequently, many countries including the United Kingdom, France, South Africa and New Zealand have followed suit. The United States and Canada however have lagged behind and there is non-uniformity between states with regards to training requirements (Yelder, 2007b). This has led to the potential practice of radiological procedures being performed by personnel with no formal training (Belinsky et al., 2003). As a result, it is suggested that radiologic technologists in the US “…find themselves much lower on the professional totem pole” than their international equivalents (ibid., p.255).

As identified by Belinsky et al. (2003), changes in technology and in the delivery of health care, as outlined, have necessitated the re-evaluation of medical imaging education and training programmes. From a very technical, practical background, radiography has evolved to require technologists capable of critical decision-making and the ability to adapt to change (Marshall, 2006). MRTs now require a wider range of skills and knowledge including greater knowledge of anatomy, pathology, physics and technology, in addition to increased communication skills to deal effectively with a more informed and demanding patient set and managerial skills (ibid.). Consequently the education of MRTs requires substantially more than just training in skills related to a particular modality.

Specialisation also brings about its own set of criteria that need to be considered from an educational perspective. As pointed out by White and McKay (2004), doctors choose to specialise at a postgraduate level, with undergraduate study focussed on attaining a broad overview of medicine to enable practice as a general practitioner. This
may be likened to radiography whereby, in some countries such as New Zealand, postgraduate specialisation has been deemed to be necessary to ensure competence in more technologically complex modalities such as MRI, nuclear medicine and ultrasound (Marshall, 2006; Smith & Baird, 2007; Yielder, 2007b). Consequently, the educational requirements for MRTs, particularly those specialising in modalities such as MRI, have been steadily advancing and to be registered as an MRI technologist in New Zealand, it is now compulsory to have a postgraduate qualification.

The Consequences

In 2005 a survey of medical radiation technologists in New Zealand was conducted to investigate MRT perceptions of the need for role development (Yielder & Sinclair, 2006). 173 questionnaires were analysed, 133 of which were from medical imaging technologists. It was demonstrated that over half of the respondents (54%) did not feel that their knowledge and skills were being used to their full potential, suggesting a perception of being over-qualified for the role as it currently stands. In addition, 82% of respondents indicated that they would like to extend their current role. Linked to this, 82% of respondents believed that extending their role would increase their level of job satisfaction. It is evident from these results that as a group, MRTs in New Zealand are seeking opportunities for advancement in their clinical careers with the perceived benefit of increased job satisfaction. This was considered to be due to increased challenge, increased enthusiasm and stimulation, and feeling more valued and acknowledged.

With the introduction of postgraduate level study as a requirement for registration in MRI, this sense of being ‘over-qualified’ for the job may have been exacerbated. Whilst the role continues to be confined within New Zealand’s current single registration level of practitioner, there is therefore the potential for a highly educated group of professionals to be less than satisfied with their level of responsibility and/or professional autonomy. Consequently, the changing role of the MRT may act as a catalyst for role development of some sort, whether it remains within current definitions of the MRT role as role expansion, or manages to go beyond that with role extension.
Reasons for Role Development

*Increased Radiological Workload*

The major driving force for the rapid introduction of extended roles in medical imaging in the UK has been identified as the shortage of radiologists (White & McKay, 2004). Literature from the United States also identified a radiologist shortage there based on a survey conducted in 2000 (Sunshine, Cypel & Schepps, 2002). However, in an updated study in 2003, Sunshine, Maynard, Paros and Forman (2004) concluded that the shortage in the US had considerably eased. Nevertheless, Bhargavan and Sunshine (2005) identify that the workload of individual radiologists had increased steadily between 2002 and 2003 and they suggest that the easing of the radiologist shortage is therefore not explained by a decreasing workload.

Thus, in addition to radiologist shortages, it is evident that there are a number of other issues contributing to an increased workload for radiologists worldwide. With the rapid technological advances in medical imaging, the range of examinations that radiologists are required to be competent in has dramatically increased. Also, as a result of the ageing patient population and the subsequent increased demand for health care services, the number of imaging studies has also risen substantially (American Society of Radiologic Technologists, [ASRT], n.d.). In addition, McConnell (2007) notes several issues specific to New Zealand that will potentially increase the burden on the healthcare service. These are the imminent retirement of the ‘baby boomers’, and the large number of immigrants.

Nationally, there appears to be some debate over whether or not there is actually a shortage of radiologists. Tidey (2005) states that there is no shortage of radiologists in New Zealand but proposes that a system of radiographer reporting may be of use in the five larger cities, and in remote rural areas with a weekly visiting radiologist. In a response to Tidey’s letter to the editor, Price (2005) points out that he is not aware of radiographers undertaking extended roles in the private sector in the UK, presumably because of funding being directly related to income. In a letter providing additional
comments to this issue, McConnell (2007) points out that there are a number of cases that have already been reported in the press whereby the public sector has been unable to cope with its workload and work is sub-contracted out to private practices. He likens this scenario to the situation in the UK about ten years ago. In support of these comments, a shortage of radiologists at Hawkes Bay Hospital was recently highlighted in the media, in a New Zealand Herald article on digital x-rays, MRI and CT scans being sent to Beirut for reporting (Johnston, 2006, September 1). All of these comments suggest a greater need for MRT role development in the public sector in New Zealand rather than in private practice.

In addition, advanced imaging modalities such as MRI scanners are being introduced into departments throughout the country including smaller centres, so these issues of supply and demand will no longer be confined to large metropolitan centres. Combine this with the shortages of radiologists and radiographers and there are obvious consequences in relation to efficiency and productivity issues within medical imaging. As suggested by Woodford (2006), if the current medical imaging workforce can be re-structured to improve services, there may be immediate benefits including reduced waiting times for patients, freeing up radiologists’ time to perform more complex duties, and cost effectiveness.

*Radiographer Job Satisfaction and Retention*

The other side to the argument for role extension for MRTs is to promote the recruitment and retention of high-quality staff. The Australian Diagnostic Imaging Association (2005) acknowledges that there is a great degree of frustration within the profession that is causing many radiographers to leave the profession completely. They suggest that this is a “…result of a training program which has selected highly intelligent people into a career constrained by barriers that cannot be removed without additional clinical training” (p.9). There is obviously a necessity for improving radiographers’ job satisfaction, and role extension is a possible method of doing this.
On the other hand, as Smith and Lewis (2002) acknowledge, there is a widespread mentality amongst radiographers themselves that discourages clinical decision-making and the acceptance of responsibility. They contribute this to the traditional subservience of the radiographer to the radiologist that has occurred as a result of radiographers being legally required to work under the direct supervision of medical practitioners. This view is shared by Reeves (2002) who outlines the historical development of radiography as a profession. He explains the power struggle between radiologists and radiographers in the 1920s as the two groups were fighting to define their roles, and the subsequent oppression of radiographers that resulted, in part, from the ensuing female dominance of radiography and male dominance of radiology. Until recently, Reeves (2002) believes that “…radiographers have apparently been content to remain under the control of radiologists and relatively unwilling to press for their own development as a profession…” (p.100).

This apathetic attitude amongst radiographers has been identified in many studies and spans the globe. Smith and Lewis (2002) state that anecdotal evidence suggests that job satisfaction amongst radiographers in Australia is “not great”. In a study of job satisfaction in qualified diagnostic radiographers in the UK, although most respondents indicated that they were “fairly satisfied”, dissatisfaction was attributed to a lack of challenges and respect. A number of issues were identified for people to feel content including responsibility, challenge and motivation and it was reported that a majority of survey respondents (93%) believed that role extension for radiographers would improve job satisfaction (Naeem & Benwell, 2000). In a more recent study conducted on the job satisfaction of New Zealand diagnostic radiographers, the majority of MRTs were satisfied in their current role (Hay, 2004). However, it was recommended that a career pathway similar to the UK four-tier framework, with provision for role extension, could be introduced to increase job satisfaction.
International Models

United Kingdom

Internationally, the UK has led the way with role extension for MRTs, supported by the development and implementation of a four-tier framework to enhance career progression. By redefining roles and increasing responsibilities of MRTs, areas of role extension for radiographers in the UK are extremely diverse and include more opportunities for increased autonomy (Department of Health, 2003). This model is comprised of four levels representing increasing levels of competency and responsibility within a multidisciplinary team. The definitions of the four tiers are as follows:

Assistant practitioner:
An assistant practitioner performs protocol-limited clinical tasks under the direction and supervision of a State-registered practitioner.

Practitioner:
A practitioner autonomously performs a wide-ranging and complex clinical role; is accountable for his or her own actions and for the actions of those they direct.

Advanced practitioner:
An advanced practitioner, autonomous in clinical practice, defines the scope of practice of others and continuously develops clinical practice within a defined field.

Consultant practitioner:
A consultant practitioner provides clinical leadership within a specialism, bringing strategic direction, innovation and influence through practice, research and education.

(Department of Health, 2003, p.11).

By utilising personnel in the lower level of assistant practitioner to perform routine, protocol-driven work, the skill-set of practitioner radiographers can be extended to advanced practitioner level by undertaking some of the more routine tasks currently performed by radiologists who are then, in turn, freed up to perform more complex tasks. These new tasks for advanced radiographer practitioners include image reporting.
A potential solution to the medical imaging workforce problems in America has seen the creation of the radiologist assistant (RA). A RA is “…an advanced-practice role for the registered radiographer who performs complex or invasive imaging procedures under the supervision of a radiologist” (American Society of Radiologic Technologists, n.d.(a), p.1). The differences to the UK model are immediately clear from this definition; medical dominance is maintained with the requirement of radiologist supervision, and the tasks that have been ‘allowed’ to be passed to radiographers are very much ‘task-oriented’ rather than cognitive tasks. Perhaps much of this can be attributed to the US being such a litigious society. However it is important to note that there are also financial implications for radiologists in the US because of the fee-for-service reimbursement system. This implies delegation of duties to other personnel will directly affect income (Friedenberg, 2000).

**Image Reporting**

Role extension within medical imaging is well documented in the literature particularly with respect to image reporting (Bates, Conlon & Irving, 1994; Cook, Oliver & Ramsay, 2004; Murphy, Loughran, Birchenough, Savage & Sutcliffe, 2002; Piper, Paterson & Godfrey, 2005). Historically, in the formative years of radiography in England at the end of the 19th century, a number of occupational groups were involved in the use and development of X-ray technology including dentists, hospital porters, medical practitioners, pharmacists and photographers (Price, 2001). In addition, it was acceptable for non-medical practitioners to report on the images that they produced (Reeves, 2002). However, a period of conflict between medical and non-medical practitioners ensued, at the centre of which was the issue of image reporting. As time passed, two main groups emerged and, in 1923, ‘The Lancet’ published separate definitions of radiologist and radiographer, with a radiologist being a term applied to medical professionals who used x-rays and radium for the purposes of diagnosis and treatment, and radiographer being the term applied to trained non-medical assistants. Medical dominance ensued as “…the patriarchal nature of the medical profession and
the sociological recognition of medicine as a discipline over radiography as a technical skill contributed to the master-servant relationship of radiology and radiography…” (Decker & Iphofen, 2005, p.264).

In 1925, the reporting issue culminated in the prohibition of non-medical members of the Society of Radiographers from reporting (Price, 2001). This resulted in a subsequent de-professionalisation of radiography (Price & Paterson, 1996). However, the matter was re-ignited in 1971 by a radiologist named Swinburne who wrote a paper suggesting that radiographers had the potential to report on radiographic images. Interest in radiographer reporting was slowly revived and, as a result of healthcare reform in the UK supporting professional boundary blurring, one of the major areas that radiographers in the UK have extended their role in, and subsequently delved back into the traditional territory of radiologists, is in image reporting (Rudd, 2003). There is a substantial amount of literature, predominantly from the UK, describing various fields in which radiographers are reporting images. The most prevalent areas are reporting of ultrasound scans, plain films of the appendicular skeleton, and barium enemas (Price & Le Masurier, 2007). In addition to this, there are a number of other areas in which radiographers are extending their roles into reporting. These include specialist imaging areas such as mammography, nuclear medicine, CT and MRI (Craven, 2003; Hogg, Williams & Norton, 1997; Moller et al., 2004; Wivell, Denton, Eve, Inglis & Harvey, 2003).

**Plain Film ‘Red Dotting’ and Reporting**

The precursor to the revival of radiographer reporting was the ‘red dot’ system that was introduced into a London hospital in 1981 (Berman et al., 1986). Two radiographers conceived the idea after seeing a patient being discharged from their hospital although they had seen an impacted hip fracture on that patient’s x-ray (Field-Boden, 1997). They developed a system whereby radiographers placed a ‘red dot’ sticker on any films that they considered to be abnormal so as to alert the casualty officer to this finding.
The first structured assessment of the impact of this system was performed shortly after in 1982 whereby the assessments of radiographers of 1628 patients referred via the emergency department (ED) for radiography were analysed (Berman et al., 1986). It was found that radiographers missed 68 abnormalities (4.2%), casualty officers missed 63 abnormalities (3.9%), but when both groups were combined, only 35 patients had incorrectly interpreted radiographs (2.1%). More importantly, of the 28 cases that were incorrectly interpreted by the casualty officer, but assessed correctly by the radiographer, 16 cases were thought to be clinically significant by the ED consultant (ibid.).

Clearly the system worked and by 1995, the red dot system was standard practice in more than 150 departments throughout the UK (Paterson, 1995). By 1999, a further survey indicated that this had increased to 85% of EDs (McConnell & Webster, 2000). In 1999, Morrison, Hendry, Fell and Stothard published another audit analysing the accuracy of radiographers in recording abnormalities using the red dot protocol. Again, a positive result was reported with accuracy of 92.3%, sensitivity 82.3% and specificity 96% over the 651 cases reviewed. In addition, several studies have described improved sensitivity, specificity and accuracy in ‘red dotting’ after a short course of study, or training in image interpretation (Loughran, 1994; McConnell & Webster, 2000; NZIMRT, 2008). Contrary to this however, Brealey et al. (2006) systematically reviewed eight studies related to radiographer ‘red dot’ and triage of accident and emergency (A&E) films and concluded that training did not improve the accuracy of unselected radiographers ‘red dotting’ A&E films. The difference between these results may be explained, at least in part, by the amount of experience of the radiographers involved in each study. As Brealey et al. acknowledge, current evidence does support the training of experienced and postgraduate qualified radiographers in formalised reporting roles.

Several concerns have also been identified with the system particularly related to images that did not have a red dot placed on them, for example, Hardy and Culpan (2007) question whether this could be because the radiographer did not identify an
abnormality or because that particular radiographer was not participating in the scheme. Voluntary participation of the radiographer is part of this system and therefore there is no way to answer this question. In addition, the presence of a dot on an image only indicates that the radiographer believes that there is an abnormality demonstrated and there is no indication given as to what that abnormality may be (ibid.). This lack of consistency has led to the proposition that the ‘red dot’ system should evolve into a radiographer commenting scheme with a recent report from The College of Radiographers in the UK advocating this (College of Radiographers, 2005). The report also suggests that training to do this could be included in undergraduate programmes. However this has been criticised by Hardy and Culpan (2007) who argue that anecdotal evidence suggests that this may be an unrealistic expectation of newly qualified radiographers, and that it may be more appropriate to train experienced radiographers for this role. This assertion is supported by the results of Brealey et al. (2006) discussed earlier.

In addition, Hardy and Culpan (2007) question the validity of transferring the success of the ‘red dot’ scheme to any claim that radiographers providing written comments about their images will be as successful. They suggest that there is little evidence to support this claim and that the implementation of a commenting scheme is based on the assumption that radiographers participating in the ‘red dot’ scheme have been accurately recognising radiographic abnormalities. In their study, 115 radiographers were assessed on their ability to recognise (‘red dot’) and describe (comment upon) a number of radiographic abnormalities before and after completing a short course on musculoskeletal trauma. The results of this study demonstrated a reduction in accuracy when comparing the comments to the ‘red dot’ system (ibid.). Radiographers in this study were shown to be accurately ‘red dotting’ 88.5% of abnormal cases post-training but the accuracy of the associated comments was only 74.4%. Also, specificity of both ‘red dotting’ and comments post-training was low, indicating a tendency for the radiographers to overcall normal radiographs through the misinterpretation of normal variations. The authors concluded that since radiographer commenting would have increased professional responsibility and accountability, it is essential that
radiographers have supporting research, further training and audit to protect them in this extended role.

The next step in the development of this role has been in image reporting and it has been suggested that there is actually more evidence to support radiographer reporting than ‘red dotting’ (Brealey et al., 2006). After reviewing a number of ‘red dot’ and film triage studies, Brealey et al. concluded that radiographers were found to ‘red dot’ A&E films at 87% sensitivity and 92% specificity. In contrast, their meta-analysis of studies of selectively trained reporting radiographers revealed reporting sensitivity of 93% and specificity of 98% (Brealey et al., 2005c). They proposed that by extending the radiographers’ role from ‘red dotting’ to reporting, radiographers are made directly accountable for their clinical decisions and therefore focus and enhance their systematic analysis, judgement and interpretation of the images. They concluded that reporting by carefully selected radiographers with postgraduate training is significantly more accurate than ‘red dotting’ or triage of films by unselected radiographers with limited training (Brealey et al., 2006).

Initially the concept of radiographer reporting was revived by Swinburne (1971), a radiologist, who suggested that radiographers seemed to function below their full potential. Since then, there is mounting evidence to suggest that the introduction of radiographer reporting has been successful with the production of timely and accurate reports (Brayley, 2000; Brealey et al., 2005a; Piper, Paterson & Godfrey, 2005; Robinson, Culpan & Wiggins, 1999). A review of 11,322 accident and emergency (A&E) skeletal cases reported by two specially trained radiographers demonstrated only a small incidence of errors and, although the reports were not directly compared to radiologist reports, findings from a previous study by these authors demonstrated no difference in performance between the two groups. Most significantly in this study, 25 patients had fractures including significant skull and spinal injuries that were missed by the A&E clinicians and were subsequently detected by the reporting radiographers (Robinson, Culpan & Wiggins, 1999).
Further to this, an analysis of 6796 radiographer reports undertaken by 28 radiographers as part of Objective Structured Examinations (OSEs) for a postgraduate clinical reporting course found that the mean scores were very high (Piper, Paterson & Godfrey, 2005). Both A&E and non-A&E cases were included and analysed independently. Mean reported sensitivity was 92.9% (A&E), 93.1% (non-A&E); specificity 92.3% (A&E), 94.5% (non-A&E); accuracy 92.5% (A&E), 93.9% (non-A&E). The authors concluded that these results confirm the significant contribution that reporting radiographers can make.

**Barium Studies**

Radiographer role development in the field of gastrointestinal imaging also appears to have been widely accepted in the UK with Nightingale and Hogg (2003) estimating that at least 1,000 radiographers have been trained to perform barium enemas. Almost ten years ago, a survey of 96 hospitals in the UK (McKenzie, Mathers, Graham & Chesson, 1998), indicated that the practice of radiographer-performed barium enemas was already widespread with 49 of those hospitals responding that they supported the practice. Although the responsibility for reporting of those enemas ultimately remained with the radiologists, 74.5% indicated that this reporting was done in consultation with the radiographer who performed the examination. It was identified that the main reasons for the introduction of this practice were “radiographer enthusiasm, radiologists’ requirements to perform other procedures, shortage of radiologists and the pressure to reduce waiting lists” (p.19). The authors concluded that the radiographers and radiologists surveyed expressed high levels of satisfaction with the practice.

This practice has also been supported by a number of other studies as evidenced in a review of the literature by Nightingale and Hogg (2003). Not only has the technical quality of radiographer-performed barium enemas been shown to be equal or superior to that of radiologists or registrars, studies comparing the diagnostic value have reported favourable results. Risk assessment studies comparing the two groups with respect to radiation doses and complication rates have also been encouraging (ibid.).
With regards to reporting of barium enemas, it has been recognised that there may be considerable inter-observer error in the diagnosis of colorectal neoplasia on double contrast barium enema (DCBE) with the overall standard of performance being poor even amongst experts (Halligan et al., 2003). Several studies have demonstrated the value of double-reading barium enemas in significantly reducing such reporting errors (Booth & Mannion, 2005) and this supports further extension of the role for radiographers. Murphy, Loughran, Birchenough, Savage and Sutcliffe (2002) state that “double reporting is a significant benefit of radiographer-performed studies” (p.218) and conclude that “radiographers with extensive experience in barium enema techniques are capable of reporting the examinations to a high standard” (p.220).

Price and Le Masurier (2007) undertook a survey of National Health Service (NHS) hospitals to identify current radiographic practice trends within the UK and found that 146 sites confirmed that barium enemas were being performed by radiographers. Of these, 78 sites indicated that radiographers were reporting barium enemas, including 15 sites where the radiographers report independently of a radiologist.

**Mammography**

Investigation into the benefits of double-reading breast screening mammograms has also been extensive. As far back as 1994, a comprehensive review of over 30,000 screening mammograms was undertaken in the UK to assess whether or not double reporting increased the sensitivity of the screening programme. An increase of 10% was noted with double-reading, but with an associated slight decrease in specificity of 1.8%. Overall however, the authors appear to be of the opinion that double reading was advantageous (Anderson, Muir, Walsh & Kirkpatrick, 1994).

The following year, results were published of an American study investigating whether or not radiologic technologists could be trained to interpret mammograms and therefore used as a more cost-effective second-reader (Bassett et al., 1995). Eight technologists were assessed pre- and post-training by evaluation of 1,238 screening mammograms.
After training sensitivity was significantly increased and the authors suggested that after formalised training, technologists could be utilised in the role of second-reader. This is supported by several similar studies from the UK and Canada that also concluded that radiographers could play a useful role as second-readers in screening mammography (Pauli, Hammond, Cooke & Ansell, 1996; Tonita, Hillis & Lim, 1999; Wivell, Denton, Eve, Inglis & Harvey, 2003).

Price and Le Masurier’s (2007) survey of NHS hospitals to identify current radiographic practice trends within the UK found that at 38 sites radiographers were reporting mammograms, including 14 sites where the radiographers report independently of a radiologist.

**Nuclear Medicine**

In 1996, a survey was undertaken to establish the nature of nuclear medicine technologists’ roles in the UK (Hogg, Williams & Norton, 1997). It was suspected that technologists were developing new skills in response to local service needs, but that there was no educational support for this. One hundred and fifteen questionnaires were analysed and it was discovered that 8% of respondents were reporting their images. It was however noted by most of these respondents that this reporting was unofficial and limited to a small range of procedures.

Price and Le Masurier’s (2007) more recent survey of NHS hospitals to identify current radiographic practice trends within the UK found that at 20 sites radiographers were reporting nuclear medicine scans, including eight sites where the radiographers report independently of a radiologist suggesting an increase in the development of this role. This has been supported in part by the development of a range of postgraduate courses in nuclear medicine (Hogg, Williams & Norton, 1997).
**Computed Tomography (CT)**

Radiographer reporting of CT head scans has developed as another area of role extension. Since CT head scans are essential in the diagnosis and management of stroke and trauma patients, a timely and accurate report is required (Lal, Murray, Eldevik & Desmond, 2000). Many of these examinations are performed outside of regular working hours and therefore a radiology resident is generally responsible for issuing the report. As a consequence of radiologist shortages in the UK, the reports of 81 patients who had a CT scan within a two week period at a UK hospital were analysed (Craven & Blanshard, 1997). Images were reported on by both an experienced CT radiographer and a Senior Registrar. Both of these reports were then compared to a report by a Consultant Radiologist and this was considered the gold standard (ibid.). Whilst the radiographer’s sensitivity was slightly lower than that of the registrars, (85.4%; 87.5%), specificity was slightly higher, (96.9%; 93.9%). When further narrowed down to significant errors, defined as a report that might have altered patient management, the radiographer had reported no false positives and three false negatives compared with the registrars who had reported one false positive and three false negatives. True positive and true negative results were concordant. The results showed that in this case, an experienced CT radiographer was able to provide reports on head CT scans as accurately as a Senior Registrar and this supported the further development of the role (ibid.).

As further evidence, the same author reported the results of an audit of 252 patients who had CT head scans at her hospital in 2002. Reports were prepared by both the CT radiographer and a Consultant Radiologist. Using the Consultant Radiologist’s report as the gold standard, the radiographer scored 99.4% sensitivity and 98.5% specificity (Craven, 2003). Again it was concluded that the CT radiographer was “…capable of reporting all general adult CT head scans without significant reduction in quality of service delivery…” (p.16).

Price and Le Masurier’s (2007) survey of NHS hospitals to identify current radiographic practice trends within the UK found that the role of CT head reporting had
officially been introduced since their previous survey in 2000. Of the 177 acute NHS trusts that responded, eight trusts were identified as having radiographers reporting CT head scans, with a further 32 trusts indicating that this extended role was anticipated to be introduced over the following 12 months.

**Ultrasound**

It has been suggested that the historical background leading to role development in radiography may be attributed to sonographers who were the first specialty to be responsible for producing a report on their images (Hogg, Williams & Norton, 1997). In fact, Fernando (1999) questions why the development of the sonographers’ role has not been used more extensively to support the arguments for radiographer reporting. It may be that radiologists approve of the sonographers input because of the dynamic nature of image acquisition for ultrasound and therefore the high degree of operator dependency. Indeed, although the Australasian Society for Ultrasound in Medicine (ASUM), in their policy on the role of the sonographer (2007), states that “the final diagnosis and writing of the report are the responsibility of the medical practitioner” (p.3), they conclude in this policy that “by the nature of ultrasound examinations sonographers, compared with other imaging technologists, are accorded a high level of autonomy and responsibility in obtaining accurate diagnostic information from the ultrasound examination” (p.3).

Nevertheless, Paterson (1995) suggests that it is now established practice in the UK for sonographers to report on obstetric examinations. Other areas of ultrasound such as abdominal scans and general diagnostic ultrasound (that is, non-obstetric) have been investigated and there is growing evidence to support the quality of such practice (Dongola, Guy, Ward & Giles, 2003; McKenzie, Mathers, Graham & Chesson, 2000). Several studies directly comparing radiologists’ and sonographers’ reports have concluded that they demonstrated no statistical difference in accuracy (Bates, Conlon & Irving, 1994; Leslie, Lockyer & Virjee, 2000). Price and Le Masurier’s (2007) survey identified 146 NHS trusts where sonographers were reporting ultrasound images,
involving 689 sonographers. Of these trusts, sonographers were reporting independently of a radiologist at 134 sites.

MRI

Although role extension within medical imaging is well documented, there is a paucity of literature related to role extension within MRI. More specifically, there is limited information regarding the role of MRI radiographers reporting, although several studies are beginning to emerge from the UK where the practice has been introduced. In 2001, Gillmore, Byrne, Piper, Jeffree and Millar provided evidence that an experienced MRI radiographer was accurately able to report on MRI scans of the internal auditory meati (IAMs) after a short period of training (cited in Piper & Buscall, 2007). In 2002, another study suggested a radiographer reporting role could be developed for MRI lumbar spines (Griffin, cited ibid.). Subsequently this has become a reality with MRI radiographers in the UK now reporting on MRI scans of the knee, lumbar spine and IAMs (personal communication, K. Piper, 2006). Price and Le Masurier (2007) confirm this, with the results of their survey indicating that MRI spine (presumably the reporting of) has been introduced as an extended role at three NHS sites since 2000 and that MRI reporting was anticipated to be introduced at a further twelve sites over the subsequent twelve months. Piper and Buscall (2007) more recently indicated that at least 15 radiographers had completed the Postgraduate Certificate (PgC) in Clinical reporting (MRI) at Canterbury Christ Church University in the UK and were reporting MRI scans, with more than 20 additional radiographers nearing completion of the course.

In a more limited role, a Danish group have reported on their practice in which appropriately trained radiographers provide an initial report on MRI scans of the scaphoid (Moller et al., 2004). They suggest that this protocol has provided significant cost savings to society in general by providing an accurate and timely diagnosis thus reducing unnecessary immobilisation.
Barriers to Role Development

It is almost certain that there will be some resistance to any change within the profession. Potential obstacles or barriers to role extension evident in the literature are MRT reluctance to move outside their current boundaries, radiologist resistance and legal/ethical issues.

Radiographer Resistance

Paterson (1999) identifies a number of positive and negative features of role development for radiographers. While the positive aspects include enhanced professional and personal fulfilment, improved career progression prospects and greater job security, the negative elements include increased accountability, additional study requirements, and the relinquishing of traditional job functions. Anecdotally, the recently introduced requirements for MRI-MRTs to have postgraduate qualifications for registration and the compulsory, ongoing CPD requirements are still being reluctantly accepted by many. In support of this, a study of MRTs in all modalities across New Zealand confirmed that on the whole, MRTs have a “fairly ambivalent attitude towards CPD” (Henwood, Yelder & Flinton, 2004, p.258). However, the point of difference in this proposal is that moving up the career ladder would be a matter of personal choice.

Radiologist Resistance

In general, radiologist support for radiographers’ role extension, particularly in regard to reporting, has been hesitant. Yelder (2005) places much of the resistance by radiologists into perspective with her discussion on medical dominance. She states that:

Although in some countries such as the United Kingdom (UK) role extension has become accepted practice, this change threatens the monopoly over the domain of knowledge traditionally held by radiologists, and has been met with varying degrees of resistance in other countries (p.3).
However, because of the political influence of the Colleges of Radiology, it is suggested that the support of the radiologists is essential to the successful implementation of role development for radiographers (Smith & Lewis, 2003). Cook, Oliver and Ramsay (2004) also point out how important it is to get radiologist support for any role extension of radiographers, as radiologists “…will be the source of ongoing training, support and identification of knowledge gaps” (p.65).

Whilst a number of studies have found favourable results when comparing the accuracy of image interpretation by radiologists and radiographers, the main area of concern is the knowledge gap that radiographers have when linking image interpretation findings with diagnostic meaning (Donovan & Manning, 2006). For this reason, Donovan and Manning suggest that radiographer-reporting needs to be limited to certain well-circumscribed tasks. In the postgraduate certificate course provided in the UK at Canterbury Christ Church University College for reporting in MRI, “the programme aims to equip practitioners to carry out clinical reporting on MRI examinations of the IAMs, thoracic and lumbar spines and the knee, and consists of three M level modules, which include an initial module covering the foundations of clinical reporting (MRI)” (British Association of MR Radiographers, n.d.). This appears to be a good example of well-defined boundaries.

Robinson (cited in Friedenberg, 2000) also stipulates that technologists perform better within strictly bounded limits. He bases this on the premise that radiologists’ duties may be divided into cognitive and procedural tasks. He further asserts that procedural tasks may be well-defined and taught, therefore making them more amenable to other staff with appropriate training. On the other hand, cognitive tasks (such as image reporting) generally require problem-solving and decision-making skills to give relevance to the information, and this is more difficult to train other staff to do. However, he does support technologists reporting in well-circumscribed circumstances such as skeletal trauma, barium enemas, obstetric ultrasound, trauma head CT, and mammography. As discussed above, all of these areas are currently being pursued in the UK.
Although the Royal College of Radiologists (RCR) in the UK is supportive of radiographers reporting on some images, they have defined two different types of reports. The first is a descriptive report which could potentially be provided by a radiographer. The second is a medical report to include an opinion on the further medical management of the patient which is generally provided by a radiologist (Royal College of Radiologists, 1998). This distinction supports the view of Donovan and Manning (2006) that radiographers are only capable of delivering a certain style of report. They are however supportive of descriptive reporting by MRTs.

On the other hand, the official position of the Royal Australian and New Zealand College of Radiologists (RANZCR) is that, although it acknowledges the need for a more flexible health workforce, “the RANZCR supports role extension only in the confines of delegation and with defined and agreed supervision by a radiologist, who remains responsible for the conduct of the service and issuing the report” (Royal Australian and New Zealand College of Radiologists, 2006, para 7). However, Smith and Lewis believe that

It is probable that, while the official line would be obstructive, covert factionalism would exist on the ground, with some more open-minded and lateral thinking members of the college being agreeable to expanding the clinical role of radiographers, under strict guidelines (p.38).

Certainly, radiographer reporting is in its infancy in New Zealand, with one reported case of radiographers issuing unofficial written opinions on musculo-skeletal trauma films at Tauranga Hospital (Tidey, 2005). However, it is noted that the “…radiologists are not entirely supportive of radiographer reporting…” (ibid., p.226). In addition, Kumar (2007) describes the background of the cohort of ten students undertaking the initial postgraduate image interpretation course at Unitec in 2006. Previous clinical experience related to providing verbal opinions to ED medical staff (2/10), participation in informal ‘red dot’ systems (3/10), or a combination of both (2/10). However, at this stage, there is no evidence of MRTs providing an official written report in any areas of medical imaging in New Zealand.
**Legal Issues**

It is likely that the legality of radiographer reporting will be one of the main reasons that radiologists will cite as a reason to oppose this role development. Radiographers may also be hesitant because of concerns over their increased responsibilities and the associated legal accountability. Although essentially outside the boundaries of this study, the legal aspects are briefly considered here.

As a starting point, Hansen (1999) outlines the issues involved in a negligence action. He states that radiographers could potentially be sued “…under the tort of negligence where they provide inappropriate treatment to a patient (or they provide poor quality treatment to a patient) AND the patient suffers injury as a result” (p.8). A patient who sues for negligence must establish that there was a duty of care owed, that the duty was breached, and an injury or damage occurred directly as a result of that breach. In New Zealand however, the Accident Compensation Corporation (ACC) legislation has a no-fault liability provision. This means that compensation may be provided in cases of ‘medical misadventure’ or ‘treatment injury’, but claims for negligence against health professionals are prohibited (NZIMRT, 2008). Therefore, court action against individual MRTs is unlikely.

The employer however, may be liable for the actions of their employees. Vicarious liability refers to circumstances in which an employer takes responsibility for the acts or omissions of an employee (White & McKay, 2002). The issues that need to be demonstrated to establish vicarious liability are: that the individual has committed a tort, he/she is an employee of the defendant, and the tort was committed in the course of employment (Keenan, 1995, cited in White & McKay). As White and McKay (2002) recognise, it is the third point that is the potential grey area when considering role expansion issues. It is therefore essential that clear guidelines are established for role development by the relevant professional bodies, and that individual job descriptions clearly define responsibilities and scope of practice (ibid.). The development of an appropriate medico-legal framework to support role extension, is therefore necessary in order to protect the employers, radiologists, MRTs and patients involved in such
practices. This would require input from all stakeholders, including the Medical Radiation Technologists Board (MRTB), NZIMRT, RANZCR, DHBNZ and the Ministry of Health (NZIMRT, 2008).

Although it is unlikely that individual MRTs would be sued for damages, negligence would most certainly result in disciplinary action by the employer and/or the professional bodies (NZIMRT, 2008). Therefore, it is important to note the issue of personal accountability, as each practitioner is responsible for his or her own actions and there is no recognition of team liability (Nightingale & Hogg, 2003). Also, there is no legal defence based on inexperience due to age, junior status or being delegated a role from another profession (ibid.). Nevertheless, Brady (1995) suggests that recognition of increased accountability by radiographers pursuing role extension opportunities, may lead to increased professional practice as a result of radiographers developing their skills in problem-solving and decision-making. In addition, Alderson and Hogg (2003) provide practical advice to limit legal repercussions including the use of evidence-based practice to ensure that a breach of duty of care does not occur, the use of detailed records and protocols, and the necessity for radiographers involved in role extension activities to recognise their own limitations.

Summary

As has been demonstrated in the literature, role extension in medical imaging is well-developed in the UK, particularly with respect to image reporting. Traditional radiological hierarchies based on medical dominance are being challenged, and professional boundary blurring is occurring. Evidence has been presented to demonstrate that image reporting by radiographers in all modalities is accepted practice in the UK. MRI-MRTs are particularly well placed to further their role, based on postgraduate registration requirements, and using sonographers as an example that has already been accepted by radiologists. With the support of new healthcare workforce initiatives, it is timely for MRTs in New Zealand to be pro-active in shaping the future of the profession.
CHAPTER THREE
Research Procedures

Methodology

This study combines both qualitative and quantitative research methods to provide an in-depth investigation into role extension opportunities for MRI technologists in New Zealand and to support recommendations for the potential improvement of practice based upon the UK experience. To this end, a case study approach was selected to best meet the objectives of this research topic.

Yin (2003) gives a technical definition of the case study as a research strategy, stating that the scope of a case study may be defined as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (p.13). He explains that because of this blurring of boundaries in real-life situations, “there will be many more variables of interest than data points” (ibid.). A case study may overcome this situation by using multiple sources of evidence with resulting triangulation of data. He maintains that the prior development of theoretical propositions is beneficial to guide the data collection and analysis. It is further noted by Yin that case studies should not be confused with qualitative research and that they can actually be based on any mix of quantitative and qualitative evidence (ibid.).

Trochim (2001) highlights the benefits of mixing qualitative and quantitative research stating, “Quantitative research excels at summarizing large amounts of data and reaching generalizations based on statistical projections. Qualitative research excels at telling the story from the participant's viewpoint, providing the rich descriptive detail that sets quantitative results into their human context” (ibid., p.153). Case study is therefore an appropriate research methodology when an holistic approach is required to investigate a problem of practice, and the main interest is in the actual process rather than a particular
outcome. Merriam (1998) supports this view by giving examples where process has been used as a focus for case study research.

Merriam (1998) stresses the importance of the case being a unit around which there are boundaries, and further characterises case study by the following features:

- **Particularistic**: there is a focus on a particular situation, event, program or phenomenon,
- **Descriptive**: the end product is a rich, thick description of the phenomenon, and
- **Heuristic**: the study illuminates the reader’s understanding of the phenomenon.

This current study therefore is well-suited to the case study methodology, as the particular situation being investigated is a well-boundaried unit, being role extension for MRI-MRTs, and the resulting discussion and analysis of results meets the other characteristics defined above.

The design of this particular study is a multiple-case design in that there are essentially two separate cases being studied. Initially the New Zealand MRI-MRTs results are analysed independently from the UK MRI-MRTs in Chapter Five and the beginning of Chapter Six. Supporting evidence is then introduced from the UK survey results and the subsequent discussion chapters are a cross-case analysis that leads to the final conclusions and recommendations. The use of two cases has been used to strengthen the robustness of findings. Multiple-case design requires a replication logic to be followed. This means that each case should be expected to either have similar results (a literal replication), or contrary results (a theoretical replication) (Yin, 1993). These results are predicted at the beginning of investigation. As an example from this study, it was theorised that the UK MRI-MRTs may have a stronger professional profile than NZ MRI-MRTs based on their involvement in role extension opportunities currently unavailable in New Zealand. If found to be justified this could serve to promote role extension as a means of increasing recruitment and retention of MRTs in MRI in NZ. By
selecting two cases that should theoretically demonstrate different levels of professional profile, it may be possible to conclude that the differences between the groups (that is, involvement or not in role extension) may be responsible for other differences, for example, radiologists’ respect or job satisfaction.

This type of theoretical formulation is compatible with an explanatory case study. As outlined by Yin (2003), each case study is used to explain how and why a particular event occurred, and a cause-effect relationship is proposed. Yin states that the case study method is particularly appropriate when ‘how’ and ‘why’ questions are being investigated. The following questions are therefore suitable for investigation using this method.

- NZ MRTs – What do they want and why do they want it?
- **How** can we improve the MRI-MRT role to increase retention of experienced staff?
- The UK Experience – **Why** was it introduced and **how** has it worked so far?
- **What** would work here and **how** can this be implemented?

Two further issues that need to be specifically considered are the validity and reliability of the findings. Merriam (1998) addresses each of these areas with specific advice related particularly to qualitative research to ensure the most accurate results. Internal validity refers to how closely the research findings reflect reality. Merriam suggests that high internal validity is actually a strength of qualitative research because human beings (that is, the researcher) usually collect and analyse the data directly, as opposed to quantitative research that generally requires an intermediary data collection instrument between the researcher and the participants. She does, however, suggest some specific strategies for enhancing internal validity (ibid.). These include triangulation, member checks, and clarification of researcher biases. Certainly for this study, the results have been gathered from several different sources using different data collection methods so that findings may be cross-referenced to support and therefore validate the findings. Also, with the interviews, transcripts were returned to the participants for them to review and check for
accuracy. Researcher biases are acknowledged and addressed later in this chapter when discussing the role of the researcher.

Reliability of research traditionally refers to the reproducibility of the results were the research to be performed again. However, as Merriam (1998) acknowledges, this is difficult in this type of social study as human behaviour is constantly changing. She cites Lincoln and Guba (1985) who suggest that in qualitative research it is preferable to consider the consistency or dependability of the results. Therefore, rather than expecting future studies to reproduce the results, it should be expected that anyone reading the results could agree that the conclusions reached are consistent with the data collected. Strategies that Merriam suggests for ensuring dependable results are declaring the researcher’s position, triangulation, and maintaining an audit trail. My position as researcher, and the underlying assumptions and theory that prompted this research, are defined in the preceding chapters outlining the background to the study. Much of this information is then put into context with supporting information in the literature review. Descriptions of the questionnaire and interview participants, and the reasons for their selection in this study are outlined below. As mentioned previously, triangulation has been integrated into the data collection phase with multiple sources of data being acquired. In the analysis and discussion of the results I will strive to be logical and transparent so that the reader may easily arrive at the same conclusions as myself.

Finally, external validity refers to how readily the results could be applied to other situations. Whilst quantitative studies can be readily applied to other contexts using statistical justification, generalising qualitative studies is more difficult. Merriam (1998) maintains that the best chance of being able to apply results to different situations is by generating themes that include “rich, thick description”, and by using several sites, cases or situations. It should be noted however that the issue of generalisation is a frequent criticism of case study research (Tellis, 1997).
Data Collection

The methods of data collection for this research were two questionnaires and four interviews.

NZ MRI-MRT Questionnaire

The questionnaire is an inexpensive tool for obtaining data from an extensive population covering a wide geographical area (Neuman, 1997). For this first phase of data collection, a questionnaire was developed and piloted on three MRI-MRTs, two of them with extensive clinical experience, and one a trainee. One of the experienced MRTs also had an academic background. After some minor adjustments based on their feedback, the written questionnaire was mailed to all MRTs in New Zealand with a scope of practice in MRI, or a training scope of practice in MRI, as identified by the publicly available MRTB register in December 2006. Some sites were telephoned to verify current staff if there was any uncertainty. A total of 128 MRI-MRTs were identified. Of these, five were known to be on maternity leave, and one was myself. These technologists were excluded.

Neuman (1997) acknowledges that response rates are a major concern for mail questionnaires and states that a response rate of 10-50% is common. However, of the 122 questionnaires sent out, 91 respondents returned this questionnaire representing a very good response rate of 75%. It could be suggested from this response rate, that there is currently a high level of interest in this topic amongst the MRI-MRTs in New Zealand.

This questionnaire was designed to gain a general impression of the motives of MRTs for specialising in MRI, their perceptions on current job satisfaction and potential role extension, and their aspirations (or otherwise) for future career progression (see Appendix Two). Some of the questions were directly taken from a similar questionnaire sent by NZIMRT researchers to MRTs (both MRI and non-MRI) throughout New Zealand so as to allow direct comparison of responses between groups and to increase internal validity. Not only did the questionnaire give a widespread account of current
views, but it introduced previously unthought-of ideas to the study that were able to be followed up in the next stages of data collection.

**Interviews**

Patton (1990) suggests that the purpose of interviews is to access different perspectives and assumes that the perspective of others is “meaningful, knowable, and able to be made explicit” (p.278). In addition, obtaining other people’s perspectives may help minimise any preconceived ideas of the researcher.

Four experienced MRI-MRTs were selected to provide more in-depth information about the current role of MRI technologists in New Zealand, in addition to insights regarding the historical development of this role and the potential impact of further role extension and advanced clinical practice opportunities. At the time of the interview, the interviewees had a combined amount of experience in MRI of 44 years (individual median of nine years). All of the interviewees were, or had been, Charge MRI technologists. Two were currently working in MRI while the other two had left the field completely to pursue different but associated careers. Each had experience in one of the following careers: radiology management, clinical applications specialist, academic lecturer, sonographer.

By undertaking one-on-one interviews with four key informants, an understanding into their motives for leaving or reducing their hours in clinical MRI positions to pursue other career paths was obtained. Issues of attraction and retention of experienced staff were explored in-depth, including a discussion of their opinions regarding role extension proposals and whether or not this option, if it had been available at the time that they resigned, may have impacted their decision to change career paths. Questions were based on those used in the questionnaire (see Appendix Three). However, by using a semi-structured interview technique, the ability to further analyse specific relevant areas was utilised as appropriate.
All of the interviews were conducted by myself and, by using my experience and knowledge of the subject, I was able to direct the questions in such a way as to glean the maximum amount of relevant information. Finally, all participants were encouraged to read the transcript of the data to ensure accurate interpretation of their answers, thus increasing validity of the research.

**On-Line Questionnaire**

The third and final stage of data collection involved an on-line questionnaire (see Appendix Four). This was developed using the NZ questionnaire as a guideline, and the software ‘Survey Monkey’ was used to create, distribute and collect the questionnaires electronically. The Programme Director-MSc Clinical Reporting at Canterbury University in the United Kingdom was utilised as a central point of contact for distribution of the questionnaire link to any students who had completed the course. This programme is the only course of its kind, offering a postgraduate qualification specifically in MRI reporting for MR radiographers (personal communication, K.Piper, 20th July, 2006). A total of 36 MR radiographers who had completed the PgC programme at Canterbury were identified and sent the questionnaire link (personal communication, K.Piper, 12th September, 2007). Of these, twelve responded representing a response rate of 33.3%. As I anticipated the response rate to be similar to a standard mail questionnaire, based on Neuman’s (1997) prediction of 10-50% this was the expected response rate.

The questions investigated the prior hopes of these MRTs, their experiences so far, and the expectations of their future role. This data was then able to be used in cross-case analysis with the NZ data.

**Data Analysis**

Data collected from the questionnaires and interviews has primarily been analysed qualitatively. Anderson (1998) suggests that there are two approaches that may be taken to analysing qualitative data. The first is an analytical strategy that uses existing literature
and the background of the case as an organisational framework. The other approach uses thematic analysis by identifying common threads (or themes) that exist throughout an interview, or across a number of interviews or questionnaires, and then grouping the data into the descriptive themes that emerge. By combining these two approaches to data analysis, the data may be grouped into themes and then the data analysed in the context of previous literature and theory (ibid.).

As this is primarily a qualitative study, the data collected from the questionnaires that is amenable to quantitative analysis, has been analysed using descriptive statistics only. This data has then been used to support the qualitative thematic analysis, thus strengthening the validity and reliability of the subsequent interpretations.

A major advantage of the case study method is that preliminary data analysis occurs while the data are being collected. Therefore, this information may be used to shape subsequent data collection as new questions arise and lead the research in previously unthought-of directions. This occurred on several occasions with initial interviews shaping the format of the subsequent interviews, and analysis of the NZ questionnaire data aiding in the development of the UK questionnaire.

**Ethics**

Anderson (1998) identifies a number of ethical standards of which I believe the following to be relevant to this study and these were therefore put forward to the Unitec Research Ethics Committee (UREC) for consideration in the research proposal:

*Informed Consent*

An explanation of the purpose of the research was attached to all questionnaires and included a statement that participation was voluntary and anonymous, and that the subject was free to withdraw from the study at any time (see Appendix One). A similar participant information sheet was also provided to interviewees who were required to
sign an informed consent form prior to commencing. This form also included consent to tape the interview (see Appendix One).

**Debriefing**

All participants were given the opportunity to ask questions of the researcher at any stage. Questionnaire participants were also offered a summary of results and interviewees were given transcripts to check for accuracy.

**Confidentiality**

It is crucial that all data collected remains confidential and all returned questionnaires and interview transcripts will be kept in a locked cabinet for five years when they will be destroyed. Also, it is essential to guarantee that no participant will be individually identified, either directly or indirectly, when analysing and reporting data. This has been ensured by the coding of responses to the first questionnaire, the use of pseudonyms for interviewees, and the use of the ‘Survey Monkey’ programme for the international online questionnaire.

Ethics approval was obtained from the Unitec School of Health Science Research Committee in December, 2006; Unitec Research Ethics Committee (UREC) Registration Number: 2006:662.

**Researcher’s Role**

Merriam (1998) compares the role of the researcher to that of a detective whereby the researcher must systematically search through large amounts of information to piece the puzzle together. She suggests that, because the researcher is the primary data collector and analyser, he/she is in a position to actively respond to the information as it is collected and therefore take full advantage of the opportunities for producing meaningful results. However, because of the lack of structure involved in a case study approach,
Merriam further suggests that the researcher must have a high tolerance for ambiguity. In addition, since the development of hypotheses prior to data collection is recommended in a case study inquiry, it is beneficial if the researcher has some knowledge of the phenomenon under investigation. Certainly this was evident in my ability to re-direct interview questions, interpreting the information as it was presented, and understanding useful ways in which to cross-analyse supporting information. Yin (1993) confirms these attributes and points out that commonly required skills for the case study researcher are: the ability to ask good questions and to interpret the responses, be a good listener, be adaptive and flexible, have a firm grasp of the issues being studied, and be unbiased by preconceived notions.

Importantly, it is also essential that the researcher understands their position of power and ethical responsibility in analysing and interpreting the data in a manner that accurately represents the data collected (Patton, 1990). Obviously as an MRI technologist myself, with over 15 years experience in the modality, this thesis involved questions directly related to my own work-practices and potential opportunities for an extended career pathway. Therefore, I already had opinions on a number of areas that were to be investigated. In addition, I knew all four interviewees personally prior to their interviews. However, by acknowledging any biases and remaining open-minded to different opinions, I believe that I have presented the findings in an accurate manner and that the recommendations derive from analysis of the data rather than any pre-conceived notions of myself as researcher. Fortunately, as described, the case study approach encourages the use of multiple sources of data thus increasing the reliability and validity of the results. This technique, known as triangulation, is the major safeguard for validity of qualitative studies (Anderson, 1998).

**Evaluation of Methods**

As outlined earlier, Merriam (1998) points out that the researcher must have a high tolerance for ambiguity when undertaking qualitative research. She acknowledges that there are no specific procedures to follow and that, although there are guidelines, there is
a distinct lack of structure. Although this can be appealing in that it allows a degree of flexibility, it can also be disconcerting, particularly to the novice researcher. The choice of the case study method turned out to be both frightening and rewarding. I often felt lost along the way but it was reassuring to read in the literature that this is not uncommon. Certainly, for the topic in question, case study was the most appropriate research method.

The dynamic nature of the case study method means that data collection could be refined along the way. Two key examples of this are as follows:

1. The questionnaire respondents indicated that they felt that role extension opportunities would increase their job satisfaction. Certainly the literature discussing role extension seemed to support this view however, at that stage, I was unable to find any studies that directly investigated those already undertaking role extension and their subsequent levels of job satisfaction. It became clear that this needed to be investigated further, therefore questions relating to this were specifically asked in the UK questionnaire.

2. Initially I was intending to interview ex charge MRI-MRTs who had moved to other careers. The purpose of this was intended to allow an investigation of their reasons for leaving, and to determine whether or not role extension could assist in the retention of highly experienced technologists. However, during analysis of the questionnaire data, it became evident that there was a core group of experienced MRI-MRTs currently practicing who may or may not be in charge positions, but for whom role extension could provide a means of improving job satisfaction and increasing their professional standing. I believed that including some key informants who are still practising would potentially be of more relevance and use to the study. Fortunately, case study methodology supports the adaptive nature of data collection and is identified as one of the advantages of this method (Anderson, 1998).

Two concerns that I encountered along the way were related to quantitative data analysis and ensuring anonymity of interviewees. The first issue related to my total lack of experience regarding statistical analysis. I proceeded a long way down the path using the
NVivo7 statistical software programme but frustratingly found several shortcomings in the way that the information could be presented. In the end I reverted to manually counting the data and using Excel spreadsheets to present the data. This was all I needed to do to present the descriptive statistics, as the main purpose for this was to visually support the qualitative data rather than providing further statistical analysis.

My second major frustration resulted from the interviews. Although I planned to interview four ex MRI-MRTs to investigate their reasons for leaving MRI, I felt that the majority of useful information would be obtained by comparing their new roles in associated careers. My concern however was that I would unwittingly identify the participants due to the small group of MRI technologists in New Zealand and the even smaller numbers who have pursued other positions. However, I was encouraged to continue with these interviews by my supervisor and it eventuated that a lot of very useful information was obtained. In addition, it was not generally necessary to specify the other role in the discussion, so anonymity was able to be maintained.

In hindsight, I am able to see that several key areas were missed from the NZ questionnaire and that other questions that were included did not really add to the useful information and could have therefore been left out. However, a personally beneficial experience was the writing of a peer-reviewed article for ‘Shadows: The New Zealand Journal of Medical Radiation Technology.’ By timing this after the collection of the first phase of data, I was able to collate my literature and questionnaire results, and it gave me guidance on how to proceed from there. The peer-reviewers also provided useful advice that I was able to incorporate into both the article and this thesis.

Overall however, I found the whole process interesting and rewarding (although often challenging!) and I look forward to undertaking further research if the opportunity arises. Further to submission of this thesis, I intend to submit a poster for the next NZIMRT conference presenting the results of the UK questionnaire, as I am fully aware of the necessity for informing MRTs of current developments in order to get their buy-in to potentially significant changes in the profession.
CHAPTER FOUR

Results

Data collection involved three methods: a postal questionnaire sent to NZ MRI-MRTs; one-on-one interviews with four experienced MRI-MRTs; and an on-line questionnaire sent to MRI reporting radiographers in the UK. While the two questionnaire results will be presented in this chapter, interview data will be integrated into the following four discussion chapters.

New Zealand MRI-MRT Questionnaire

A questionnaire approach was selected to give a widespread account of current views. A written questionnaire (see Appendix Two) was mailed to all MRTs in New Zealand with a scope of practice in MRI, or a training scope of practice in MRI, as identified by the publicly available MRTB register in December 2006. A covering letter outlined the purpose of the study, the voluntary nature of participation, and contact details (see Appendix One).

A total of 128 MRI-MRTs were identified. Of these, five were known to be on maternity leave, and one was myself. These technologists were excluded. Some sites were telephoned to verify current staff if there was any uncertainty regarding current staff. Of the 122 questionnaires sent out, 91 were completed and returned, representing a response rate of 75%. Returned questionnaires were tracked numerically to allow follow-up of non-respondents. Questionnaires were separated from the envelope by a third party to ensure that anonymity was maintained. Non-respondents were then sent a reminder which resulted in an increase in the initial number of respondents.

The questionnaire was extensive, involving 46 questions. Both open and closed format questions were included in the questionnaire to allow the collection of both qualitative and quantitative data. Likert scales or option selection were used for the majority of the
closed format questions so as to enable simple selection for participants and to therefore encourage maximum number of responses (Hinds, 2000). Open questions were included to allow participants to comment on any areas in greater depth. In this way, respondents were able to provide further insight and in some cases, to introduce previously unthought-of ideas into the study (ibid.).

Results are reported by question. Qualitative comments will be reported thematically where appropriate, in order of decreasing frequency.

**Section One: About You**

**Questions 1 & 2: Gender and age**

All 91 MRTs who returned the questionnaire responded to these questions; 16 (18%) were male. Of the 31 MRTs who did not return the questionnaire at all, 5 (16%) were male. Therefore gender bias of the respondent group is representative of the entire group of practicing MRI-MRTs.
**Question 3:** Where did you train/qualify as a medical radiation technologist?

![Figure 2: Where Trained as a MRT](image)

**Question 4:** In what year did you qualify?

For ease of analysis, answers to this question were grouped into 10 year intervals.

![Figure 3: What year qualified as MRT](image)
**Question 5:** What is your highest medical imaging qualification?

![Bar chart showing highest medical imaging qualifications](chart1.png)

**Question 6:** Have you completed, or are you currently studying in a postgraduate MRI course?

![Pie chart showing postgraduate study](chart2.png)
**Question 7: What motivated you to enrol in a postgraduate MRI course?**

Those respondents who answered ‘yes’ to the previous question were asked to indicate their reasons for studying at postgraduate level. This question was included to determine whether or not MRTs had voluntarily decided to gain a postgraduate qualification, or whether more extrinsic factors (such as requirement for registration and/or increased pay) had a bearing on their decision. More than one response was permitted and included the opportunity for respondents to suggest their own reasons.

*Figure 6: Motivation - Personal fulfillment*

*Figure 7: Motivation - Requirement for registration*

*Figure 8: Motivation - increased pay*

*Figure 9: Motivation - to increase knowledge*

‘Other’ responses were as follows:

- Change of career direction (2)
- Felt it would become a requirement
- To get an internationally recognised Masters (degree)
**Question 8: Do you have any other tertiary qualifications?**

18 respondents indicated that they had tertiary qualifications including one respondent who had two further qualifications as follows:

*Medical Imaging related:*
- Postgraduate Nuclear Medicine  (2)
- Graduate COP (certificate of proficiency) (MRI)
- DMU (Diploma in Medical Ultrasound)
- Part 1 DMU
- Postgraduate Certificate (CT)
- Postgraduate Certificate (Mammography)
- Certificate of Competency (Mammography)

*Other:*
- Diploma Radiotherapy  (2)
- BSc(Hons)
- BSc(Hons) Psychology
- Diploma in Tertiary Education
- Diploma in Veterinary Nursing
- BA (Hons) Anthropology
- Diploma in Farm Management
- Certificate in Business Administration
- BA (Geography)
- QTA Immunohaematology
**Question 9:** How many hours per week do you work in MRI?

![Bar chart figure 10: Hours per week in MRI](chart)

**Question 10:** What other areas of medical imaging do you currently work in?

![Bar chart figure 11: Other medical imaging areas](chart)

Respondents could indicate any number of other medical imaging areas that they were currently working in. The majority of respondents were working in MRI only. One respondent also indicated management.
**Question 11:** In what countries have you worked in medical imaging?

Figure 12: Countries worked in medical imaging

**Question 12:** In what countries have you worked as a MRI technologist?

Figure 13: Countries worked in MRI
**Question 13:** How long have you worked in MRI?

Figure 14: How long worked in MRI

**Question 14:** At this stage, how long do you anticipate working in MRI?

Figure 15: How long anticipate working in MRI
**Question 15:** Do you have intentions to pursue, or are you currently practicing, any other career (other than MRI technologist)?

![Figure 16: Intentions to pursue a non-MRI career](image)

Approximately half of the respondents indicated that they had no intention to pursue another career. Those who responded that they did have intentions, or possibly had intentions, to pursue another career were asked to answer the following two questions for clarification.

**Question 16:** Please indicate what other career you plan to pursue/are currently practicing.

44 MRTs responded to this question. Some respondents gave more than one answer.

![Figure 17: Future careers](image)

Single response answers were: Different career; Outdoor career.
**Question 17: What reasons do you have for wanting to leave your MRI career?**

This question turned out to be slightly ambiguous as it implied that pursuing another career meant leaving MRI. However, it demonstrated that some MRTs intended to continue in MRI and pursue other careers, particularly in other fields of medical imaging. Of those respondents who indicated that they were intending to leave MRI, the following reasons were given:

![Figure 18: Reasons for leaving MRI](image)

13 respondents selected ‘other’ and 31 respondents provided further comments in this section. Of those respondents who indicated that they would pursue a change of career and provided further comments, the following themes emerged:

- Further challenges (6)
- Management issues (4)
- Financial reasons (3)
- Positive aspects of other career (2)
- Part-time requirements (2)
- Postgraduate study (2)
- Stress (2)
- Lifestyle Choices (1)
Section Two: About Your Workplace

Question 18: Which of the following best describes your workplace?

Figure 19: Type of workplace

Question 19: How many MRI scanners does your practice/department have?

Figure 20: Number of scanners
**Question 20:** For each scanner, please specify the following:

- Magnet strength
- Manufacturer
- Hours of business
- Average number of examinations per day
- Total number of MRI-MRTs who work at scanner
- Number of MRI-MRTs working per day

This data will not be presented here as it does not collectively contribute to the research question. It was collected to aid in gaining more in-depth analysis of certain cases and may be used to support individual analysis of specific issues in the subsequent discussion section.

**Question 21:** Is your scanner(s) located in a:

![Figure 21: Scanner location](image-url)
**Question 22:** How many MRTs are rostered full-time in MRI at your practice?

To ensure consistency, respondents were instructed to indicate the number of full-time staff for the whole practice rather than any individual magnet if their practice has more than one magnet.

![Figure 22: Number of full-time MRI-MRTs](image)

**Question 23:** How many MRTs are rostered part-time in MRI at your practice?

Again, respondents were instructed to indicate the number of part-time staff for the whole practice rather than any individual magnet if their practice has more than one magnet.

![Figure 23: Number of part-time MRI-MRTs](image)
**Question 24:** Do you have recognised levels (e.g. charge, grade, senior, staff, trainee MRTs)?

63 of the 82 respondents who answered ‘yes’ to question 24 specified the levels that are recognised in their practice/department.

Figure 25: Recognised staff positions in MRI

Single responses received were:

- Specialist MRI-MRT; MRI manager; MRI with responsibility; Recognition by qualification.
These respondents were also asked to further clarify their answer by answering the following three questions:

**Question 25: Are these levels formally recognised by your employer? If so, how?**

![Figure 26: Levels of staff positions recognised by employer](image)

Several respondents qualified or expanded on this with three reporting that pay was confidential and therefore unknown, and six responding that title and/or remuneration was only given to charge/grade positions.

**Question 26: What do you perceive your current position to be in MRI?**

![Figure 27: Perceived current position in MRI](image)

One respondent answered ‘locum’ to this question and another answered ‘deputy charge’.
**Question 27:** Is this position formally recognised by your employer? If so, how?

![Bar chart showing methods of recognition of the position](image)

Further analysis was performed to determine whether there was a discrepancy between the position as perceived by the MRTs in comparison to the employers:

**Table 1: Perceived current position in MRI * Perceived position recognised by employer**

<table>
<thead>
<tr>
<th>Perceived current position in MRI</th>
<th>Perceived position recognised by employer</th>
<th>Not recognised</th>
<th>Title only</th>
<th>Remuneration</th>
<th>Title and remuneration</th>
<th>No Response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trainee</td>
<td></td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>9</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Staff MRT</td>
<td></td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Senior MRT</td>
<td></td>
<td>9</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>Grade MRT</td>
<td></td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Charge MRT</td>
<td></td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>16</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>16</td>
<td>14</td>
<td>16</td>
<td>35</td>
<td>4</td>
<td>85</td>
</tr>
</tbody>
</table>
**Question 28:** What factors are considered when appointing charge or senior MRT positions in your department?

- **Figure 28: Experience in MRI**
- **Figure 29: Length of service in department**
- **Figure 30: Postgraduate qualifications in MRI**
- **Figure 31: Management qualifications**
- **Figure 32: Leadership qualities**
- **Figure 33: Willingness**
Other factors:

Four respondents added other factors that they considered were used in appointment of senior/charge staff: Ability to mix with rest of team; management opinion; patient through-put ability; pleasant personality and be able to work as part of a team.

Two respondents were unsure of the criteria used: Factors unknown as same senior/charge for 16 years! Who knows?!!

**Question 29:** On average, approximately what proportion of your scanner(s) working hours has a radiologist in attendance?
**Question 30:** Please indicate the types of MRI that are performed at your workplace and the level of MRT responsibility.

**Figure 36: Types of MRI and level of MRT responsibility**

![Chart showing types of MRI and level of MRT responsibility](image)

**Section Three: Job Satisfaction and Career Perceptions**

**Question 31:** What factors contributed to your decision to enter medical imaging? (Respondents could give more than one answer to this question).

**Figure 37: Reasons for entering medical imaging**

Of those respondents who indicated ‘other’ the two main reasons were:

- Interesting/variety (5)
- Ability to work overseas/travel opportunities (4)
**Question 32:** Why did you choose to enter MRI?

Figure 38: Reasons for entering MRI

Reason for entering MRI – other
- Better paid (3)
- Choice between MRI and ultrasound (2)
- Needed a change (2)
- No on-call (1)
- Rapidly developing modality (1)
- MRI always fascinated me more than other modalities (1)
- Technology (1)

**Question 33:** Please indicate the most appropriate response to the following statements:

1. Figure 39: MRI is extremely challenging
2. Figure 40: I am satisfied in my job

![I am satisfied in my job](image1)

3. Figure 41: My skills and knowledge are used to their full potential

![My skills and knowledge are used to their full potential](image2)

4. Figure 42: In general, patients are aware of my expertise and professional knowledge

![Patients are aware of my expertise and knowledge](image3)
5. **Figure 43: The radiologists respect my opinion**

![Bar chart showing radiologists' respect for opinion]

6. **Figure 44: Role extension opportunities would increase my job satisfaction**

![Bar chart showing role extension satisfaction]

7. **Figure 45: I would be willing to complete further academic requirements to enable extension to my current role**

![Bar chart showing willingness to complete academic requirements]
8. Figure 46: I would be willing to complete further clinical requirements to enable extension to my current role

![Graph showing responses to I would be willing to complete further clinical requirements]

9. Figure 47: Management of my practice/department would be supportive of role extension opportunities

![Graph showing responses to Management would be supportive]

10. Figure 48: Radiologists would support MRTs reporting routine MRI scans e.g. knee, lumbar spine, IAMs

![Graph showing responses to Radiologists would support MRTs reporting routine MRI scans]
11. Figure 49: I would prefer to progress my career in MRI by advancing my clinical expertise rather than taking on a management role

I would prefer to progress my career clinically

12. Figure 50: A formalised ‘advanced practice’ role as a nationally recognised step in clinical career progression, would be good for the profession

A formalised advance practice role would be good for the profession

Question 34: Please comment below if you have further views on any of the above statements.

A total of 24 respondents chose to comment further on the previous responses. Thematic analysis revealed the following main themes:

- concern over potential lack of appropriate remuneration (4)
- concern over more study requirements (4)
- non-viability of MRT-reporting roles working within the private system (3)
- need for radiologist support (3)
- concern regarding indemnity insurance (2)
Section Four: Role Extension in MRI

**Question 35**: Please indicate the current duties of MRI technologists at your scanner and who is expected to do these duties.

The following graph represents the number of MRI-MRTs who indicated that the role was performed either by all MRI technologists at their workplace, or was performed by some MRI technologists including themselves, representing the total number of MRI-MRTs currently undertaking each task.

![Figure 51: Current MRT roles in MRI in New Zealand](image-url)
**Question 36:** What are the criteria used for selecting those MRI technologists who perform tasks that are not performed by all MRI technologists?

85 respondents replied to this question. More than one answer could be selected.

![Figure 52: Selection criteria for MRI-MRTs to perform extended roles](image)

**Question 37:** Would you be interested in extending your role?

90 respondents answered this question. This information was cross-referenced with the length of time that the respondent has been working in MRI. Those MRTs with 5-10 years experience in MRI indicated the greatest desire to pursue an extended role.

![Figure 53: Interest in role extension](image)
**Question 38:** What areas of role extension that you are not already involved in, could you be interested in?

Those respondents who specified that they were interested in, or possibly interested in role extension opportunities, were asked to indicate what type(s) of role extension they would be interested in.

![Figure 54: Areas of role extension interested in](image-url)

**Question 39:** Do you think that extending your role would encourage you to remain in the profession?

![Figure 55: Encourage to remain in profession?](image-url)
**Question 40:** Which of the following groups in your practice/department do you think would support role extension for MRI-MRTs? (tick as many as appropriate)

![Figure 56: Groups supportive of role extension](image)

A total of 29 respondents chose to comment further on the previous responses. Thematic analysis revealed the following main themes:

- lack of radiologist support (6)
- supportive radiologists (5)
- support dependent on type of role extension (5)
- lack of support from MRTs (5)
- lack of management support (4)
- supportive management (3)
- MRTs requiring more money/recognition (3)
- MRTs supportive (3)
**Question 41:** Which of the following requirements do you think would be necessary to ensure ‘best practice’ in role extension?

![Figure 57: Requirements to ensure ‘best practice’](image)

Other requirements identified were:

- Support and training opportunities within department (4)
- Support groups of MRI-MRTs (1)
- Financial assistance (1)
- Willingness (1)

**Question 42:** What do you think would be appropriate recognition of MRI technologists participating in role extension activities? (tick as many as appropriate)

![Figure 58: Recognition of MRTs performing role extension](image)
Other requirements identified were:

- Recognition/respect (3)
- Responsibility (1)
- Specific time (1)
- Definite education budget (1)

**Question 43:** What advantages can you see for providing further roles for MRI-MRTs?

Of the 91 returned questionnaires, 23 (25%) did not respond to this question. Of those who did respond, the main advantages identified were:

- Increased job satisfaction (31)
- Decreased radiologist workload (18)
- Job retention (16)
- Increased interest/challenge/versatility or responsibility (16)
- Better pay (14)
- Increased patient throughput (9)
- Attract recruits (7)
- Increased respect (6)
- Increased professional profile (4)
- Recognition of what is already happening (4)
- Increased knowledge leading to better quality of service (3)
- Better team dynamics within department (2)
- Career progression pathway (2)

**Question 44:** What disadvantages can you see for providing further roles for MRI-MRTs?

**Question 45:** Are there any areas of concern that you can envisage with extending MRT roles in MRI?

The results for these two questions have been combined and will be reported together as, on thematic analysis, many of the same recurring themes were identified across both questions. Of the 91 returned questionnaires, 25 (27%) did not respond to question 44,
and 34 (37%) did not respond to question 45. Of those who did respond, disadvantages/concerns identified were:

- pay not reflecting increased responsibility/workload (19)
- medico-legal issues (16)
- lack of time and/or money for further training and study (14)
- inadequate workforce to support time for training and up-skilling, and time for radiologists to provide support (13)
- lack of radiologists/referrers support (13)
- encourage people to leave or chose not to enter MRI (12)
- increase in stress associated with the increased responsibility (12)
- lack of clinical knowledge when compared with a radiologist (12)
- need for further education and competency assessment (10)
- exploitation by management (9)
- interprofessional rifts may ensue (8)
- over-specialisation (5)

**Question 46: Do you have any other comments regarding this topic?**

28 respondents chose to provide additional comments in this section and the main themes identified were:

- Would prefer to extend current clinical knowledge to improve imaging rather than reporting (6)
- Further comments of support for role extension and advanced practice (4)
- Concern regarding lack of referrer support (4)
- Not enough experience to consider role extension at this stage (3)
UK Reporting MRI-MRT On-line Questionnaire

An on-line questionnaire was developed and the software ‘Survey Monkey’ was used to create, distribute and collect the questionnaires electronically. A total of 36 MR radiographers who had completed the PgC in Clinical Reporting (MRI General Investigations) at Canterbury University in the United Kingdom were identified and sent the survey link (personal communication, K.Piper, 12th September, 2007). Of these, twelve responded representing a response rate of 33.3%. Results are reported by question.

**Question 1: In what year did you qualify as a radiographer?**

For ease of analysis, answers to this question were grouped into 5-year intervals.

![Figure 59: Year of qualification as a radiographer](image-url)
**Question 2:** What is your current job title?

**Figure 60: Current job title**

- Advanced Practitioner: 8
- Superintendent Radiographer: 3
- Service Lead: 1

**Question 3:** How long have you worked in MRI?

**Figure 61: How long working in MRI**

- < 1 year: 6
- 1-3 years: 6
- 3-5 years: 6
**Question 4:** On average, how many hours per week do you work in MRI?

![Figure 62: Number of hours per week in MRI](image)

**Question 5:** How long have you been reporting MRI scans?

![Figure 63: Length of time reporting MRI scans](image)
**Question 6:** On average, how many hours per week do you spend reporting MRI scans?

Figure 64: Number of hours per week reporting MRI scans

![Bar chart showing hours per week reporting MRI scans]

Reasons given for not reporting:

- My department has not yet been able to allow time for me to report. This is due to too few staff especially in MRI. Remuneration has also not been agreed.
- Still awaiting support by radiologists - I shadow report.

**Question 7:** On average, how many MRI examinations do you report per week?

Figure 65: Number of MRI scans reported per week

![Bar chart showing number of MRI examinations reported per week]
**Question 8:** What areas are you reporting? (select as many as appropriate)

Figure 66: Areas reporting

![Areas Reporting Chart]

Responses to other areas being reported:
- Thoracic spines
- Currently undertaking Postgraduate Diploma at Canterbury Christchurch university to extend the areas to include brain and cervical spine
- Thoracic spine. Starting to double report Brains and C-Spines as well.

**Question 9:** Approximately what percentage of your reporting is unsupervised by a radiologist?

Figure 67: Percentage of reporting time unsupervised

![Percentage of Reporting Unsupervised by Radiologist Chart]
**Question 10:** At this stage, how long do you anticipate working in MRI?

*Figure 68: Anticipated length of time left in MRI*

**Question 11:** Do you have intentions to pursue any other career (other than MRI technologist) in the future?

*Figure 69: Intentions to pursue another career*

*If yes, please specify:*

- Retirement!
**Question 12:** Do you think that extending your role has encouraged you to remain in the profession?

![Figure 70: Role extension encouraged to remain in MRI](image)

**Question 13:** On average, how many MRI examinations are performed in your department/practice per week?

![Figure 71: Average number of MRI examinations performed in department](image)
**Question 14:** How many radiographers are rostered in MRI at your practice?

This question was broken down into the four levels of practitioner as defined by the four-tier framework. Therefore each respondent’s answers are displayed individually to allow the demonstration of each department’s organisation.

Of the 12 responses received, the following set-ups were portrayed:

Figure 72: Department 1

![Department 1 Diagram]

Figure 73: Department 2

![Department 2 Diagram]
Figure 80: Department 9

Figure 81: Department 10

Figure 82: Department 11
**Question 15:** How many radiographers are reporting MRI scans at your practice?

Figure 84: Number of reporting MRI radiographers per practice
**Question 16:** How many radiographers are training to report MRI scans at your practice?

Figure 85: Number of MRI radiographers training to report per practice

![Pie chart showing the number of MRI radiographers training](chart.png)

**Question 17:** What factors contributed to your decision to enter radiography?

Figure 85: Reasons for entering radiography

![Bar chart showing reasons for entering radiography](chart.png)
Of the three respondents who indicated ‘other’ the reasons given were:

- Didn’t have a good experience as an inpatient aged 11, wanted to do better.
- Joined Royal Navy – radiography seemed a good career path within the navy.
- No idea.

**Question 18: Why did you choose to enter MRI?**

Figure 86: Reasons for entering MRI

Of the two respondents who indicated ‘other’ the reasons given were:

- Coming from a CT background, it seemed to be a natural progression.
- I was an ultrasonographer, disappointed in anything I found then needing a CT. Started doing CT as well and progressed from there into MRI.
**Question 19:** Why did you choose to begin reporting MRI scans?

Figure 87: Reasons for choosing to report MRI scans

Of the three respondents who indicated ‘other’ the reasons given were:

- My manager suggested it might be a good thing to do and supported me 100%.
- To try help alleviate the waiting time problems.
- Working towards trying for a consultant position.
Question 20: Please indicate the most appropriate response to the following statements

1. Figure 88: MRI is extremely challenging

2. Figure 89: I am satisfied in my job

3. Figure 90: My skills and knowledge are used to their full potential
4. **Figure 91: In general, patients are aware of my expertise and professional knowledge**

5. **Figure 92: The radiologists respect my opinion**

6. **Figure 93: Role extension opportunities have increased my job satisfaction**
7. **Figure 94:** Management of my practice/department are supportive of role extension opportunities

8. **Figure 95:** Radiologists at my department support radiographers reporting routine MRI scans

9. **Figure 96:** I would prefer to progress my career in MRI by advancing my clinical expertise rather than taking on a management role
10. **Figure 97:** The formalised ‘advanced practice’ role as a nationally recognised step in clinical career progression has been good for the profession

![Graph showing the distribution of responses to the statement about the formalised ‘advanced practice’ role as being good for the profession.]

**Please comment further on any of the above statements.**

A total of five respondents chose to comment further on the previous responses. Single person responses identified two positive aspects and four negative aspects related to role extension:

- Challenging role
- Supportive radiologists
- Lack of consultant roles
- Radiologists threatened
- Lack of appropriate remuneration
- Lack of support within department
**Question 21:** From your experience, how important do you think the following requirements are to ensure ‘best practice’, and to provide appropriate support to the reporting radiographers?

Figure 98: Best practice requirements – postgraduate academic qualifications

![Postgraduate academic qualifications](image1)

Figure 99: Best practice requirements – continuing professional development

![Continuing Professional Development (CPD)](image2)

Figure 100: Best practice requirements – clinical training

![Clinical training](image3)
Figure 101: Best practice requirements – specific short courses

Figure 102: Best practice requirements – on-going supervision/mentorship by radiologists

Figure 103: Best practice requirements – audit of competence

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Question 22: What advantages have you seen by providing role extension opportunities for MRI technologists?

All 12 respondents answered this question. The main advantages identified were:

- Increased patient throughput (4)
- Quicker turn-around times for reports (3)
- Increased professional profile (3)
- Clinically-oriented career progression pathway (3)
- Increased knowledge leading to better quality of service (2)
- Increased job satisfaction (2)
- Increased challenge and responsibility (1)
- Increased respect (1)
- Better team dynamics within department (1)
- Cost-effective (1)
**Question 23:** What disadvantages have you seen by providing role extension opportunities for MRI technologists?

All 12 respondents answered this question. The main disadvantages identified were:

- Lack of other staff to perform scanning duties (3)
- Lack of appropriate remuneration (3)
- Lack of time for extended duties/ study (3)
- Lack of management support (2)
- Lack of radiologist support (2)
- Lack of referrer support (1)
- Possible medico-legal implications (1)

**Question 24:** Are there any areas of concern that you have personally experienced as a reporting radiographer?

11 of the 12 respondents answered this question. The main concerns identified were:

- Lack of appropriate remuneration (4)
- Personal insecurities (2)
- Lack of on-going support from the radiologists (1)
- Lack of money to support continuing education (1)
- No appointments to Consultant positions as yet (1)

**Question 25:** Do you have any other comments regarding this topic?

Six of the 12 respondents answered this question. Enthusiasm and advice for extended roles was offered:

- Very rewarding (2)
- Use of radiographers inherent knowledge (2)
- Improved patient care (2)
- Traditional boundaries being broken down (1)
- Careful selection of staff required (1)
- Aim to report unsupervised (1)
- Can be lonely (1)
CHAPTER FIVE

The Changing Role of the MRI Technologist

Not only is the role of the MRI technologist a relatively new one in the health industry, but it has developed at an exceptionally fast pace in that time. MRI scanners were introduced into the health care setting in the United States in the early 1980s (Young, 2004) and the first MRI scanner opened in New Zealand at the Mercy Hospital in Auckland in 1991. Recruited from radiography staff, MRI technologists have been exposed to a career that has been constantly evolving as the hardware and software developments continue.

Sorensen (2002) identifies three major advances in MRI technology in the early years of the 21st century as revolutionising the use of MRI. They are the development of high-performance gradients, high-field MRI systems, and improved software and hardware to utilise the advantages of these developments. These advances in technology have not only decreased scan times and improved image quality, but they have allowed a vastly increased number of applications to be performed with MRI. As a consequence, the number of examinations being requested has increased and MRI scanners are being installed throughout the country. There are now in excess of thirty-five scanners in New Zealand servicing all of the major cities in addition to a number of the smaller towns.

This increase in the number and type of examinations now being performed on MRI scanners has contributed to the changing role of the MRI technologist. In the early years of MRI, much of the daily work was neurologically based as well as some basic musculoskeletal work. Scan times were long, with an average examination taking approximately one hour. Experienced MRTs recall an average day ten years ago and compare that to today’s caseload:

I think as technology has changed, the length of time that an average scan would take has altered dramatically. Something that would have taken say 45 minutes to
an hour ten years ago could possibly take 20 to 30 minutes now. I think that the number of examinations that can be offered has also grown because of these technological advances, so perhaps ten years ago there might have been ten kinds of examinations that could have been done whereas now there could be thirty. **Ann**

There is a huge variety of examinations, body regions and the like, and the demand…. there is a never-ending demand on MRI now, possibly due to the fact that we’ve shown our imaging capabilities to a greater degree and people are grasping on to that and going with it. **Maree**

The increasing demands on radiologists and greater demands on scanner time have also had an effect on the role of MR technologist over the last ten years or so, as evidenced by the interviewees comments who were eye-witnesses to these changes. Interviewees describe some of these changes, particularly the increasing autonomy of the technologists:

There’s a hell of a lot more autonomy….that’s probably the biggest thing. Back when we started, the radiologists had a lot of hands-on input with virtually every single scan that you did. They checked every single patient before you got them off the table. Then again, the scan times were longer…..you had five minutes to check the previous sequence whereas now you’ve got a minute and a half. So because of the speed of the scanners…plus confidence in what they are doing and confidence in what they see you are doing… it’s made a big difference. **Leigh**

In the past the radiologist would spend much more time sitting beside you helping you to plan a large amount of the daily work and you would check everything before getting the patient off the bed. Now the radiologist has got no time to be sitting watching what you’re doing and helping you to plan so probably a large amount of the work would be done unsupervised. **Ann**

This increased autonomy does however come at a price. Whilst affording greater responsibility and job satisfaction for experienced MRTs, it results in greater pressure being placed on new technologists.
I feel really sorry for the new people starting out now because I don’t think there’s the time for people to give help and to give guidance along the way… I think you’re expected to learn a lot more on your own. As a new person, I liked the idea that someone was watching me, I liked the idea that I didn’t have to make the decisions, that I could check things with someone be it the senior technologist or the radiologist. As time has evolved though, I think I would be very frustrated as a senior person if that was still happening. I would feel that lack of trust, lack of respect of knowledge so I think it’s a double-edged sword. I think still as a new person you should be looked after to the point where you can make the right decisions at the right time. I don’t think new people should be forced into situations where they have to feel uncomfortable or put the patient examination at risk and not perform an adequate examination or the best examination that they can. As a senior person I like being given more autonomy and responsibility.  

Ann

Consequently, when asked whether or not it would be the same sort of person entering MRI now as ten or fifteen years ago, interviewees identified an increased level of knowledge as a pre-requisite expectation:

No, I think things are very different. I think that it’s a very, very technical job now because before you just did a brain scan, you did two sequences, it was very similar to CT… occasionally the patients would get contrast, you know it was really routine. Whereas now, especially as it’s becoming more musculoskeletal, it’s becoming functional MRI, it’s becoming spectroscopy, where the requirements are very technical… So I think the knowledge requirements for MR techs are much higher if you want to be at that level where you’re not just sitting there pushing a button. You know, you can be churning out scans and not having a clue at what you’re looking at, and I think that’s what is going to separate the techs. 

Jane

I think that you need to be adept at the scanning of multiple areas which possibly in the past was not necessary, and I think that because the complexity has increased, your understanding and abilities that are expected of an MRT are a lot higher, so yeah basically the goalposts have moved and we’ve got to move with them. 

Maree
It may be suggested that increased pressures on scanners have directly contributed to these higher expectations and resulted in a cyclical effect on the technologists’ professional status. As radiologists’ workloads have increased as a result of greater demand, MRI technologists have been required to assume additional responsibility in decision-making situations. Consequently, further autonomy has been achieved by the technologists and, as the role has evolved and radiologists have gained increasing trust and respect of the technologists’ abilities, many radiologists have been happy to pass on additional responsibility to the technologists. In fact, of the 91 respondents to the NZ MRI-MRT questionnaire, six strongly agreed with the statement that ‘the radiologists respect my opinion’, 31 agreed, 26 tended to agree, 21 were neutral, and seven tended to disagree. No one disagreed or strongly disagreed with this statement although several comments inferred that there was some variance between radiologists:

It is difficult to assess the radiologist opinion. I feel I have an excellent working relationship with them built over time and experience.

Respect from radiologists varies immensely between different practices and has a profound effect on how you feel about a job - I left a job and now commute a long distance because of lack of respect and autonomy.

In addition, in the early 1990s as an emerging modality, MRI staff lacked expertise. This included both the radiologists and the MRTs. As a result, there was heavier reliance on the radiologists to inspect the work being undertaken. As the experience of both of these groups has increased, so too has the confidence in each other’s abilities, leading to an increase in the autonomy and responsibility of MRTs within many departments. However one interviewee identifies a trend in the relationship between MRTs and radiologists based on the radiologist’s experience:

There’s always a range. I think the ones (radiologists) with no experience almost desperately cling on to anything anybody has got to offer so they love the fact that people (MRTs) with some experience could give them any guidance. Then those with heaps of experience also were probably so comfortable with what they know and they
could appreciate what you knew, that you had a very autonomous sort-of working relationship. It was the ones in the middle that possibly liked to have a bit more control.

Maree

Another interviewee also identifies the importance of the individual radiologist’s confidence in their own expertise and the relationship it has to the level of autonomy they allow the MRTs:

I think that as the radiologists have more security in their own knowledge, then they’re happier probably to allow us as technologists to use the knowledge that we have…and respect it and probably believe it.

Ann

Nevertheless, independent of individual radiologists’ opinions, a number of roles that would have previously been considered as role extension are now widely practiced and have been integrated into the role of MRI-MRT. As evidenced by the questionnaire sent to all MRI-MRTs throughout New Zealand, these include venepuncture, administration of contrast media, performing routine scans unsupervised, and post processing. Previously, all of these tasks were undertaken by the radiologists. It is interesting to note that all of these tasks are either technical in nature or protocol-driven. More recently emerging is the authorisation and protocolling of request forms. These tasks require a higher level of cognitive input. However, at this stage, the final responsibility of image reporting is retained fully by the radiologists.

Venepuncture and Contrast Medium Administration

It would appear that for some time now, radiologic technologists in the United States have been performing venepuncture routinely in their practice (Tottorici & Mixdorf, 1997). In 1987 venepuncture was incorporated into the scope of practice for radiologic technologists who had received appropriate training, and in 1991, the American Society of Radiologic Technologists integrated venepuncture into the radiography curriculum (ibid.). Results of a survey into drug administration practices in medical imaging across the US indicated that of the 121 responding hospitals, 86% (n=104) of the institutions allowed radiologic technologists to administer pharmaceuticals (Tottorici & Mixdorf,
The modality with the highest number of respondents indicating that radiologic technologists performed venepuncture was nuclear medicine (91.8% of modality respondents). Moreover, although only 70.2% of the respondents had MRI facilities at their hospital, the second highest modality where venepuncture was performed by the technologists was MRI (72.9%). It was noted in this study however, that there was limited education provided to the technologists to perform this role, apart from the nuclear medicine technologists (ibid.). Another shortcoming noted in this role extension activity was the fact that, while most technologists were allowed to administer contrast media, only 17.3% of responding institutions allowed the technologists to administer antidotes if an adverse reaction occurred. Therefore, a radiologist was always required to be on site when contrast media was administered, thus reducing some of the benefits of technologists undertaking this role.

Radiographers in the UK have also been performing intravenous (IV) injections for some time, with 161 hospital managers (93.6% of respondents) indicating that it was being performed in their department, in a survey undertaken in 2000 (Price, Miller & Mellor, 2002). The date of implementation was reported as early as 1980, with the greatest increase being in 1996 (ibid.). More recently, Smith and Lewis (2002) stated that “…intravenous cannulation and the administration of IV contrasts is now commonplace in busy CT and MRI units in Australia” (p.163).

In New Zealand, Sinclair and Yielder (2007) indicate that a large percentage of MRI departments have MRI-MRTs performing venepuncture and injection of contrast media. Of the 19 respondents to their questionnaire, 14 (74%) had MRTs performing venepuncture. This is supported by the results of this study where 70% (n=64) of respondents to the questionnaire indicated that venepuncture was being performed either by all MRI technologists at their workplace, or was performed by some MRI technologists including themselves, representing the total number of MRI-MRTs currently undertaking each task.
Certainly, the response to this role extension opportunity has been positive with interviewees describing several different advantages including greater departmental workflow and increased efficiency:

From a technologist’s perspective, you would often be waiting for a radiologist to finish the report they were writing, to finish the telephone conversation they were having, to finish their lunch (laughs)… basically you spent a lot of time waiting for the radiologist to come and put the line in. Also you would have to wait for them to come and inject the contrast even if the patient already had a line in. So that one factor alone, the time-saving, was just a huge, huge positive step.  

Ann

I think it’s had a huge impact on workflow. Every MRT just says how much better it is to not have to track down a radiologist or nurse. So that’s the main thing, the workflow. 

Maree

Yeah that’s (venepuncture) had a huge impact. The radiologists have fed back that it’s been fantastic, particularly when reporting something quite complicated, to get disturbed to go and do a simple injection when really all they need to do now is be aware that that’s going to happen.  

Leigh

Several interviewees also recognised advantages for the patients related to the fact that the technologist has more contact with the patient and another person such as the radiologist is not required to see the patient.

It’s the flow, not just flow of patient numbers but also the flow of the patient. That patient only deals with one person… the radiologists don’t get put on the spot by being asked an opinion anymore when they haven’t got all the information. Also I think the patient rapport is better because one small team of just say maybe one or two MRTs are dealing with that patient and it gives you a little bit more of an opportunity to bond with that patient because otherwise you’re just getting them on and off the table.  

Leigh

I think also that it adds to the patient contact, like the patient sees the same person over and over again. So they don’t have some scary doctor coming in and think, “oh
my goodness, why am I getting contrast?” I think that’s also helped, and I think that on the whole they’re (MRTs) having very good success rates with venepuncture. They’re obviously doing a very good job of it.

Maree

Another advantage described by the interviewees was increased job satisfaction for the technologists. However, it is interesting to note that several interviewees described the initial reluctance of technologists to undertake this role.

It took a long time for the other tech to finally get the courage to do the venepuncture, but eventually she did it and I think slowly people are doing it. I think a lot of people’s reluctance is because they’re not used to doing procedures to patients. I think especially in the DHBNZ, the nurse does everything with the patient. Even with barium enemas, they handle all the clinical side of the patient, you just do the imaging. So it was a little step but I think for a lot of people it was quite a difficult step to go to the point of “I’m going to put a needle into you” which was somebody else’s role, it was never a radiographer’s role.

Jane

Before we started it (venepuncture) at the practice I was working in, there were colleagues that had expressed a negative approach and were not particularly interested. But when it was obvious that some of us were going to go and learn, I think they thought more seriously about it and could see the advantages to it. I think, certainly from my own perspective and from colleagues that I’ve spoken to that work in other places, that the majority do find it a satisfying experience.

Ann

Therefore, it would seem that despite some early unwillingness, MRTs generally find that having greater control over their working day provides increased job satisfaction.

I think that when you’re working, you don’t want to wait for ten minutes for someone to come and do an injection because it’s just wasting time. You’re the one who’s going to carry the ten minutes running late. So by you being able to go and do the contrast injection and being able to carry on scanning, I think it is satisfying to see you’re getting done with your list. You actually have some sort of control over relieving one work pressure.

Jane

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It is important to note however that, as with all areas of role extension, there are a number of requirements that need to be considered. Keenan, Muir and Cuthbertson (2001) state that in relation to MRT performed venepuncture and contrast administration, issues that must be addressed include “appropriate training and assessment of competence; departmental protocols; allocation of responsibility; cost effectiveness; and performance monitoring” (p.684). They suggest that all of these need to be developed within a framework of audit and research. Whilst acknowledging increased job satisfaction and motivation as advantages of role development, they further highlight the fact that with the increased professional responsibility comes an associated increase in legal liability (ibid.).

When discussing what training and support systems have been put into place in NZ for practices that are undertaking venepuncture, several different training programmes were identified.

I think it does depend where individuals are working. I do know of places that have in-house training. Those places are generally hospitals that have nurse educators that can come in and do that training. Other private institutions have paid for nurse educators to come from other places to come on site to do a recognised training programme. The educational institution Unitec has instigated a recognised IV cannulation course as well. So as far as I know, every department that has MR technologists perform IV cannulations has gone through some recognised training programme.

Ann

Despite this support and apparent acceptance of MRTs in performing venepuncture and contrast media administration, it would appear from the results of the NZ questionnaire, that radiologists are still responsible for selecting those patients that require contrast media, and for administration of other drugs. Although 34% of respondents indicated that they selected patients for contrast administration, it is uncertain from these responses whether or not they were then required to gain approval from the radiologists before actually administering the contrast. Anecdotally, it would seem that approval for the
administration of the contrast media is still required from a radiologist, although some experienced MRTs may informally be doing this.

I think the radiologists rely on experienced MRTs, whether they’re in charge or not, a tremendous amount. We were given the opportunity to basically decide whether contrast was to be administered, up to the point that we would just have to say “look, I can see a lesion here, are you happy that I give contrast?” and if it was a senior person they would often just say “Yep that’s fine” and not even necessarily always look at the images. It just sort of depended on what the imaging criteria were, you know, what we were imaging.

Maree

Also, fifteen questionnaire respondents indicated that they administered other drugs. Again, it is not possible to determine from the answers what exactly these other drugs are, but I would assume that they are referring to oral sedatives such as Ativan for claustrophobic patients. I am unaware of any MRTs who are administering contrast media antidotes if an adverse reaction occurs. Therefore, as discussed previously, both of these restrictions in the role of the MRT mean that a radiologist is always required to be on site when contrast media is administered, thus limiting some of the benefits of technologists undertaking these roles.

Performing Routine Scans Unsupervised

From the NZ questionnaire results, performing routine scans unsupervised clearly stood out as being the most common role extension activity currently occurring in NZ MRI departments, with 90% of respondents (82) reporting that this was being done in their department. Responses also indicated that all areas of the body are being performed unsupervised by radiologists in at least some departments. However, once again it is difficult to infer the meaning of this due to the latitude in interpretation of the term ‘unsupervised’. While some MRTs may understand this to mean that the radiologist does not physically plan each sequence, others may take it to mean that there is not even a radiologist on site. This is apparent by the fact that a number of respondents indicated that contrast-enhanced MR angiography is sometimes or usually performed unsupervised. Therefore there may be a discrepancy in this data in the actual numbers of scans being
performed unsupervised. However, the results clearly demonstrate that performing routine scans unsupervised is now common practice in most NZ departments. The main reasons given for the development of this role were the radiologist shortages, increased workloads and the routine nature of many of the examinations.

Yeah, I think again, there probably isn’t a department that isn’t performing some scans without supervision, partly due to the fact of the routineness of those exams, but also because of radiologist shortages as well. I think it frees them up to do things that are more interventional, etcetera. I think that pretty much any radiographer who has had a reasonable level of time on the scanner is able to perform scans and to know when they need to flag someone that potentially needs to be checked or come back.  

Maree

Potentially there might be very general protocols and you as a MRI technologist might have to interpret which one to apply to that particular patient. You may or may not, depending where you work, be asked to check those with the radiologist before letting the patient go. I think a large number of practices now would let the patients go and then risk a small number of recalls. I think that’s come about because it’s much busier, the clinicians are asking for more scans, there are more scans available to have, the radiologists are in short supply, and they’re getting pulled every which-way to report other modalities, not just MRI.  

Ann

…that’s the nature of the beast. Radiologists are in short supply as well, it’s ridiculous to have them watching stuff that is very routine… the big thing is that there’s a lot of discussion and review of protocols on a regular basis. That is the best way to go, that basically you do a routine set of scans that covers a lot of eventualities.  

Leigh

Certainly this is an area of role extension that has developed in recent times, with one interviewee commenting that “…nothing was done unsupervised nine years ago” (Maree).

It is interesting to note that the main disadvantage of this role extension activity is the fact that patients may be recalled for further views or for contrast administration. Sometimes an examination that has been protocolled as routine, based on the clinical indications on
the referring request form, may reveal unexpected pathology that may then require more complex scanning and/or the administration of contrast media to further clarify the diagnosis. If the MRT does not detect the relevant pathology or does not realise the relevance of that pathology and the need to either do further views or to get the radiologists to check the scan, patients may be required to be recalled at a later stage. Alternatively, patients may need to be recalled due to the fact that because the examination has been protocolling as routine or unsupervised, it may be booked into a session where there is no radiologist on site to check the scan or to supervise the administration of contrast media.

The benefits of increased patient throughput and decreased radiologist workload must however surely outweigh these costs for it to have been so widely implemented. With the appropriate training of staff and the set-up of straightforward routine protocols, recall numbers can be kept to a minimum.

Yeah, I think that you need the radiologists to be fully on board. Like if you’re setting up a new practice, you need the radiologists to have a long, hard think about where they are actually at and what they want at the end of the day. They’ve got to decide what pathologies fit with what protocol so that … OK, do that for all of these things… it has to be decided on beforehand. Too much trial and error in the beginning is going to end up with inconsistency and you’re going to miss things further down the track…You’re always going to have recalls. Our recall number’s low…400 patients a month, two or three recalls. 

Leigh

Authorising and Protocolling of Request Forms

Price, Miller and Mellor (2002) identify one site in the UK at which authorisation of MRI requests had been introduced as an extended role task. However, in a following survey, no further sites undertaking this task are mentioned, suggesting that this role has not been developed further (Price & Le Masurier, 2007). In New Zealand this is a new area of role extension. The questionnaire results indicate that 53 (58%) respondents were working in practices where protocolling of request forms was being
performed by MRTs. Authorisation of request forms was not given as an option in the questionnaire and it is therefore not possible to discriminate between these two activities.

What exactly authorisation means in practical terms may be interpreted differently between different practices, as the authorisation process may or may not include protocolling the forms. Generally however, the process of authorisation involves: ensuring that an appropriate examination has been requested based on the imaging indications; determining whether or not the examination can be undertaken as a routine, unsupervised scan, or needs some level of radiologist supervision; prioritising urgent examinations; and in some cases determining a protocol for it. Advantages of MRTs performing this role include increased departmental efficiency as identified by one of the interviewees:

I think it would have a positive impact on the department because surely there would be less likelihood of mistakes in appointments. There would be less likelihood of a technologist being unable to perform the examination, or perform it so badly that the patient had to be recalled. Also sometimes, particularly for invasive procedures like arthrograms, you would have to book it so that the radiologist was available to do that. I definitely think the operational running of the department would be smoother with the MRI tech being involved in that process.  

Ann

At this stage, different levels of authorisation are currently occurring within MRI departments in New Zealand.

Not that many places are authorising requests. The majority of them are still getting them checked by a radiologist.  

Maree

I used to go through all the forms and then I would, from my point-of-view, prioritise them by giving the more urgent ones to the radiologist who would then mark them off, because he would officially mark them off. But you know, I was doing a pre-audit of the request forms…in the hospital there was a need to prioritise the forms, so
I was doing that. You could select out the patients that needed their scan more urgently and the ones who were for IAMs and could wait quite a bit.  

Jane

The only experience I’ve had (with authorising) is after the radiologist has protocolled the initial ones, and then we have filtered those through to the booking people. I have heard though, since then, there are places where the MR technologists do protocol some of the requests and I believe that works reasonably well.  

Ann

It would appear from these comments that authorising forms is a more prevalent role for MRTs than protocolling of forms. However, it was suggested that unlike the more technical or strongly protocol-driven role extensions such as venepuncture, performing routine scans unsupervised, and post-processing that are being offered to most MRI-MRTs, it would not be suitable for all MRI-MRTs to pursue authorising and protocolling of request forms.

I think that obviously wouldn’t be appropriate on an ad hoc basis, but that if you had a designated person who could be there when the Charge/Head Radiologist wasn’t…and perhaps if they were involved in some sort of multidisciplinary meetings so they had an understanding of the whole sort of healthcare cycle for that patient, then that would be more than appropriate.  

Maree

I think you’ve got to have a bit of time in the department. I reckon you’d need to have been involved for about two years. It depends where you’re authorising. You know, authorising the work that comes through a public hospital referral base versus a sports medicine referral base, they’re completely different situations.  

Leigh

This suggests that there are a number of roles that would support the introduction of an advanced practitioner position. Interviewees expressed that MRTs undertaking these roles needed to be carefully selected. They further indicated that a requirement to perform these role extensions should be experience, both personal and of the specific department, as this contributes to a broader knowledge base of the MRT to ensure competency to undertake these roles that require more cognitive input.
Several interviewees identified protocolling as an area of role extension that should be pursued by MRTs, but highlighted the necessity for uniformity between radiologists which needs to be supported by reliable protocols. One interviewee also suggested a team approach to the development of protocols to include the input of MRI technologists, as this would have implications if MRTs are to protocol forms.

I think the radiologists have to come to a consensus. I think you’re only going to get complaints and unhappiness if the radiologists aren’t all on the same page and they don’t all adhere to the same criteria. I think everybody has to be aware of the procedures for protocolling the various examinations and I think everybody could meet together and discuss it, which has never happened in my experience. I think that would be ideal rather than the radiologists discussing it separately and then the result being filtered to one person i.e. the Charge and then the Charge person filters it to their staff. Basically we all want the same result – we just come at it from different angles.

Ann

Ideally, the set-up phase of routine protocols therefore needs input from all radiologists concerned (and MRI technologists if they are to be involved in protocolling) so as to attain this consistency. This is highlighted by one interviewee who explains that even though routine protocols have been developed in their department to encourage unsupervised scanning by MRI-MRTs, the radiologists may or may not choose to protocol a form as routine, and that this is not constant even among radiologists.

Basically two radiologists can protocol the same form quite differently… I know that someone will protocol a form and write standard (unsupervised) on it, someone else gets hold of it, crosses that all out and writes a huge list of sequences – what are they seeing that’s different?

Leigh

The impact of the introduction of MRI-MRTs protocolling is seen as a positive step with one interviewee from a department that has already pursued this, identifying the benefits of increased acknowledgement and responsibility for MRI-MRTs.
We’ve just started doing that and it harps back to that ten years ago thing. It’s nice that they’re giving us credit now to work out what is a standard examination and that they’re giving us credit for our knowledge of the system and using our experience to adapt.

Leigh

In summary, these findings demonstrate that the role of the MRI technologist has changed considerably over the last ten years, and that these changes are continuing to occur at a steady pace. This could suggest that the role will continue to transform, as further technological advances and changing workplace dynamics seem inevitable. Increased job satisfaction is perceived as a benefit of extended roles and has been demonstrated by the fact that those undertaking these roles report increased job satisfaction, associated with such factors as greater autonomy, responsibility and control over work. Whilst the introduction of technical or protocol-driven extended roles has been widespread in MRI departments throughout New Zealand, more cognitive tasks such as the authorisation and protocolling of request forms are not as widely practised. It has been identified that roles such as these should not be undertaken by all MRI-MRTs, thus suggesting a need for the introduction of a career progression framework to support an advanced level of practice. Furthermore, additional areas of possible role extension will be considered in the following chapter. These areas, that include image reporting by MRTs, lend even further support for a formalised ‘advanced practice’ role for MRI-MRTs in New Zealand.
CHAPTER SIX
Potential Role Extension in Magnetic Resonance Imaging

Two further advanced areas of practice that may be suitable for investigation and implementation are the supervision of complex cases and image reporting. Both of these could contribute to decreased waiting times for scans by improving efficiency with current workloads. The MRI and CT Expert Panel reporting to the Ontario government on wait times for MRI scans, identified two distinct waiting times; Wait #1: from the time when the request for the MRI is received by the department to the date the scan is performed; Wait #2: from the time the scan is performed to the time when the radiologist verifies the report (Ontario Ministry of Health and Long-Term Care, 2005).

A number of issues were seen as contributing factors to Wait #1. These included needing to schedule the examination when a radiologist was present either because of the administration of intravenous contrast in case of a contrast reaction, or because of the study being complicated and needing direct radiologist supervision in the planning of the scans (Ontario Ministry of Health and Long-Term Care, 2005). Another contributing factor to this wait time was needing a radiologist to protocol the request form before the scan could even be booked. Wait #2 was generally attributed to the need for more radiologists (to report) and/or transcription staff. Therefore if MRTs were able to expand their role into those areas, it could be argued that patient waiting times would be decreased.

However, the NZ questionnaire results suggested that respondents believed there was support for the role extension activities that were currently being performed, such as those discussed in the preceding chapter, but were hesitant about any support for further opportunities such as image reporting:

Definitely support for IV access and contrast administration etc. We believe reporting and informing patients/staff of results should be left for the radiologists.
Depending on which aspect of role extension - venepuncture/contrast - all MRTs should perform. Reporting - this is a huge subject and is fraught with a lack of clinical knowledge to make reporting relevant and accepted by referrers.

Depends on the role extension - all the above (MRT staff, management and radiologists) have supported us training to do venous punctures but none would support reporting scans.

It would be very interesting to know whether or not these respondents would have believed support for venepuncture by MRTs would have been forthcoming if questioned five years ago, before the general introduction of this role for MRTs. As evidenced by interviewee comments about the hesitation of many MRTs to perform venepuncture when this first commenced, I would suggest that results may have been quite different. Therefore, it could be hypothesised that a lot of the opposition to the development of these roles is more about resisting change rather than a non-belief in the ability of the participants to undertake these roles successfully. Yielder (2005) states that it is important for the profession to actively seek out these role development prospects because, by not making a stand on these issues, a negative decision may be made by default. Indeed, this view is supported by Carr and Fell (1997) who assert that organisational change is both inevitable and unavoidable. They also believe that as professionals, MRTs need to be pro-active in directing future changes in order to avoid possible hostile forces from outside the profession, perhaps alluding to resistance to these changes from radiologists.

Advantages to pursuing additional role extension opportunities for MRTs identified in the literature are many and have been backed up by the responses to the NZ questionnaire. The most commonly perceived advantage of role extension identified by the NZ questionnaire respondents was increased job satisfaction either directly (31), or indirectly (6) with comments about increased interest and/or challenge such as:
Further roles for MRI techs would provide job satisfaction especially with reading and reporting of cases. This area of role expansion would add a new and challenging dimension to the technical requirement.

Challenge/satisfaction for those who need it or feel they have so much more to offer with their level of knowledge.

These comments led to another advantage identified by several respondents. That is, the flow-on effect that greater interest and knowledge will have. It was suggested that the increased knowledge of normal and abnormal imaging appearances required to report images could have a direct influence on the quality of the MR images themselves. For example, one NZ MRI-MRT stated that: “I think a deeper understanding of pathology (as in having the ability/knowledge to report images) would make the job more interesting and allow MRTs to produce great images.” This in turn would mean an associated higher quality of patient service, an example being less recalls required for additional imaging or for contrast medium administration if the MRT identified these requirements at the time of scanning. This is supported by one MRT’s comment regarding the perception of the current role perpetuating the ‘button-pusher’ mentality:

Further roles for MRI techs would help improve MRI tech’s knowledge of MRI and understanding of diagnosis of examinations. Sure we can push the buttons but we want to learn about what we see and why the sequences have differing appearances.

In addition, it was felt that role extension may promote job retention, particularly of experienced technologists (16). Certainly, the Australian Diagnostic Imaging Association (2005) acknowledges that there is a great degree of frustration within the profession that is causing many MRTs to leave the profession completely. They suggest that this is a “result of a training program which has selected highly intelligent people into a career constrained by barriers that cannot be removed without additional clinical training” (p.9). There is therefore a necessity for improving MRT job satisfaction, and as mentioned previously, role extension may be a possible method of doing this. One NZ MRI-MRT
felt that an advantage of role extension could be: “retaining intelligent, satisfied staff members,” while another stated that: “Senior MRTs may stay in the job longer as they are happier and feel valued. This is good for the younger staff as well.”

The second most commonly identified advantage was the impact that MRT role extension would have on decreasing the radiologists’ workload (20). Flow-on effects then include better service to both the patients and the referring doctors as waiting times for examinations and reports are reduced by increasing patient throughput. Although seen as an obvious advantage for the radiologists, and for departments/practices in general, concerns were expressed at how this could potentially be a major disadvantage for the MRTs involved. While extending the MRT role could lighten the radiologists’ workload, the MRTs’ workload could increase with an associated increase in stress (13). As one respondent commented: “? reduce workload on other staff…..but increased workload on MRTs, when MRI-MRTs are already a rare breed. How much more of the workload must they carry?”

Along similar lines, several of the identified advantages of role extension were also considered to be potential disadvantages or areas of concern. Role extension opportunities were seen by some to increase job satisfaction by providing challenges, but conversely, others saw this increased challenge as a source of increased stress (9). In addition, while role extension has been promoted as a partial solution to the shortages of radiologists and MRTs, there were those who felt that the inadequate number of personnel could create difficulties for any role development programme. A number of respondents (13) indicated several associated issues including lack of time for training and up-skilling, and for radiologists to provide support. Furthermore, although a number of respondents (14) indicated that the increased responsibility could result in better pay conditions, others (9) saw this as a way for management to exploit staff and to use MRTs as “cheap radiologists”.

The most commonly identified disadvantage or concern was that pay would not reflect the increased responsibility and workload (19). This increased responsibility was also
considered to be potentially stressful, particularly in light of current staff shortages. Several (12) felt that this could result in recruitment and retention issues. The actual experiences of reporting MRI-MRTs from the UK will be examined in Chapter Eight, where such issues will be discussed in more depth.

**Supervising Complex Scans**

Unfortunately, supervision of complex scans was not included as an option for selection in the NZ questionnaire so it is uncertain how prevalent this role is within MRI departments in NZ. However, one questionnaire respondent commented on this aspect of role extension stating that: “Senior MRTs already extend their roles (without recognition) by doing complicated supervised scans “unsupervised” and decide when and if extra sequences are necessary when the Radiologist is busy elsewhere.” In addition, this potential role extension opportunity was identified when considering the MRI and CT Expert Panel report from Ontario discussed above, and was able to be included for discussion in the interview stage. It would appear that informally at least, supervision of more complex scans is in fact a reality in some practices and that it is probably an acceptable role for experienced MRTs to be undertaking:

There’s certainly some sites where the radiographer/MRT has got extensive experience and is able to supervise more complex scans and you see them supervising less experienced MRTs. I guess it seems to be MRT-dependent and site-dependent, whether the radiologist is happy for that to happen or whether they’re more interested in looking over their shoulder.  

Maree

Look we’re almost doing that. We have the senior registrars come through in the evenings and realistically, the techs are telling them what pulse sequences are expected by the radiologist that’s going to end up signing the report. And that is a two-way knowledge thing that, you know…”I know that’s what Dr M. or Dr P. expect” or “I know that’s what Dr W. would expect…Dr W. will do that extra view only or Dr W. would give Gad in this case, or Dr W. wouldn’t but if you want to that’s fine.  

Leigh
Usually the radiologist’s role. Possibly supervising the ones in-between where if something is not quite standard but not quite as complicated as needing a radiologists’ input… I think you would need to do it at as an experienced MRI technologist. So it would be a situation perhaps where a relatively new or inexperienced technologist would be scanning a standard examination and perhaps there would be something seen that was unexpected and, as an experienced MRI technologist, you could suggest other sequences to be included to prevent the patient from having to come back again. Ann

All of these interviewees identify experience as an important component in who should be supervising complex scans. Evidently supervision of complex scans is fraught with difficulties for newer technologists and my concern is that some radiologists do not distinguish between the abilities of experienced and novice technologists. This perception is supported by interviewee comments as follows:

I think that management, from the point of view of radiologists, because I’ve only been in private practice, initially they may not know what your experience is, but I think that you demonstrate your ability and that you’re able to scan efficiently to produce scans that they want to see, so they do recognise your skills. But I think like anything, they get used to your skills and then you just become…it is expected. You never really get continually acknowledged, not that you want that, but sometimes you find that you get lumped in with everybody else and they don’t always know if you have the higher skills, as long as you’re producing the goods. It tends to be in a private practice that things are money-driven, as long as you’re churning out the scans, often they don’t appreciate the extra effort that you put into your scans. I think sometimes they do miss that. Jane

…but I also think that places do have high expectations of even the junior person, and perhaps not always realistic expectations. I think sometimes for people that are not technologists themselves, whether they’re managers, doctors… I think that it’s harder for them to appreciate how long it takes to grasp the basic MRI principles… Ann
These views would support the introduction of a formalised ‘advanced practitioner’ role to readily distinguish technologist’s abilities and experience. Furthermore, interviewees were supportive of this role extension for experienced technologists, with one noting that newly qualified radiologists are currently performing these tasks when often, the MRT has more experience:

I think that there should be very few things that an experienced MR tech can’t fully scan by themselves…most MR techs with five years plus experience working with the same referral base, should be able to make a lot of these decisions and come out at the end of the day…if the protocols are set up already with a set of scans for that patient then you should be able to get a report from them.  

Leigh

I mean if you consider the fact that you have newly qualified radiologists who have basically seen about six months of MRI when they’re a consultant, and they come in and technically supervise scan sessions, versus a MRT who has done five years of MRI and they’re post grad, there’s no reason that that MRT couldn’t provide just as good a service as that newly qualified radiologist in my opinion.  

Maree

While the supervision of cases by experienced MRTs may be more acceptable than MRT-reporting on first glance, I would propose that a comparison between ‘red dot’ systems versus image reporting, and supervision of complex cases in MRI versus reporting may be made. As discussed previously, shortcomings in the ‘red dot’ system have been identified and it has been suggested that MRTs would become more accountable and therefore more accurate if responsible for the actual reporting (Brealey et al., 2006). In addition, it has been widely recognised that technologists perform better within a well-defined and limited scope (Donovan & Manning, 2006; Friedenberg, 2000; Robinson, 1996). Practically, it would be much easier to define and support limited areas for reporting as opposed to defining more complex areas for supervision. This is because the complexity of supervised scans is often related to the non-routine nature of the examination, thus making appropriate training difficult. While the final report for supervision of complex areas by MRTs would remain with the radiologist, I anticipate
that there would be the potential for more recalls and that possible advantages may not necessarily outweigh disadvantages.

**Image Reporting**

Although the NZ questionnaire results demonstrated that post-processing, performing routine scans unsupervised, venepuncture and the administration of contrast media are all becoming integrated into the role of the MRI-MRT, clearly image reporting by MRTs is not presently being undertaken in MRI in New Zealand (see Figure 51). However, those respondents who specified that they were interested in, or possibly interested in role extension opportunities, were asked to indicate what type(s) of role extension would interest them. There was enthusiasm expressed for reporting, either of routine scans or double-reporting (see Figure 54). This information was cross-referenced with the length of time that the respondent has been working in MRI. Those MRTs with 5-10 years experience in MRI indicated the greatest desire to pursue an extended role in reporting routine scans.

**Double Reading**

There have been a number of studies assessing the feasibility of double reading scans to improve accuracy, most predominantly related to mammography and barium enema reporting where this appears to be accepted as standard practice (Murphy, Loughran, Birchenough, Savage & Sutcliffe, 2002; Nightingale, 2004; Pauli, Hammond, Cooke & Ansell, 1996; Tonita, Hillis & Lim, 1999; Wivell, Denton, Eve, Inglis & Harvey, 2003). While one study specifically relates the value of double-reading to improved accuracy in MRI (Wakeley, Jones, Kabala, Prince & Goddard, 1995), it must be noted that the article is over twelve years old. As already discussed, expertise of radiologists was limited at this time and there may have been a greater need for obtaining two opinions. Contemporary practice seems to be that double reading is performed more as a training exercise for radiologists new to MRI reporting. While a number of interviewees described the use of double-reading related to two radiologists, none had any experience where MRTs were used as either the first or second reader. Double-reading was generally
performed when one radiologist was in training rather than in support of increased accuracy:

I think a lot of double-reading occurs basically for educational purposes, to give people ‘time’ in MRI…because I don’t think that it’s necessary for routine lumbar spines to be double-read…..but obviously in complex cases then any form of collaborative work is a good way of doing it…..but, yeah, I don’t know any radiographers doing it.  

Maree

So what would happen was the guys would report it and then they would have a more senior radiologist in Auckland double-checking their scans so as they got more confident they would then select the ones that they would want to send down for double-reading.  

Jane

The double-reading’s only done for junior doctors being read by a senior doctor. It’s a hard call because I don’t really understand the effort involved in double-reading. Mammography double-reading’s a bit different – they look at the report, they look at the films with fresh eyes, it’s four films…  

Leigh

The interviewees did however acknowledge that there may be some benefits in pursuing double-reading by MRTs, particularly with respect to increased job satisfaction for the MRTs. However, whether or not double reading reduced or increased the radiologists’ workload was debated:

Well I would have thought if you could have the preliminary report done on obviously relatively routine cases, say lumbar spines and knees, by the MRT then the radiologist just needs to look at the films and just check, so it’s not using the radiologists time up on something that’s quite routine for them, then they can use their time for something, and it also develops the MRTs. I sort of see that as a win-win. I think they’d probably spend probably like a third or a quarter of the time that they’d spend actually reporting a full study, just doing the double-read so they could whip them off quite quickly.  

Maree
Double reading in MR when you’ve got, you know, six sequences of 20 images….some of the radiologists would prefer to read them from scratch because of the effort involved in double-reading …..So it’s a hard call you know…are we going to end up causing more work than we’re saving? If we’ve got experienced MSK radiologists, having to double read is to a certain extent a waste of time. Got to remember what the referrers expect – especially in private.

Leigh

Nevertheless, results of the NZ questionnaire demonstrated that support in general for role extension opportunities was strong, with reporting of routine scans, and double-reading or provisional reporting of scans being the most favoured options. There was however, considerable concern expressed about the potential for increased legal accountability, particularly with regards to MRT reporting. Many respondents directly referred to a lack of clinical knowledge when compared with a radiologist (12). It is important to bear in mind that although the radiologist is usually the gold standard, even they do not report to 100% accuracy and there is variation in interpretation even between experienced observers (Robinson, Wilson, Coral, Murphy & Verow, 1999).

Certainly, error in radiology is well-documented (Fitzgerald, 2001; Goddard, Leslie, Jones, Wakeley & Kabala, 2001; Peterson, 1999; Robinson, 1997). While the MRT does have a knowledge gap in comparison to radiologists, it has been reported that perceptual errors in radiology, whereby the abnormality is not actually detected at all, are far more common than cognitive errors related to the misinterpretation of an abnormality (Berlin & Hendrix, 1998; Littlefair, 2006). This distinction lends support to the argument for provisional reporting or double-reading of images to improve reporting accuracy. If an MRT was utilised in this role, two people would be involved in the perceptual task of detecting abnormalities, thus reducing the incidence of this type of error. In addition, the radiologist could be responsible for the cognitive task of providing a medical interpretation of the relevance of the findings.
MRT Reporting

Although probably the most contentious area of proposed role extension, MRT reporting has been widely introduced in the UK. This includes the reporting of MRI scans (Piper & Buscall, 2007). In NZ however, MRTs have expressed reluctance in pursuing reporting opportunities with concern expressed in the questionnaire responses that a reporting MRT would not have the breadth and depth of knowledge that a radiologist acquires during their extensive training. There is no denying this. However, based on entry requirements to MRT undergraduate programmes, MRTs are a highly intelligent group of professionals. In addition, some MRTs do not consider the additional training that would be undertaken prior to taking on these roles. While the introduction of ‘red dot’ systems has generally been informal, often without any associated training, it is not expected that MRTs would report images without advanced education and training.

More specifically, MRI-MRTS are now required to undertake postgraduate studies to obtain registration. There is therefore every reason to believe that, with the right training and educational support, MRI-MRTs would be capable of undertaking advanced cognitive tasks such as image reporting of specific areas to the same level of performance as radiologists, and this contention is supported by recent studies from the UK (Booth & Mannion, 2005; Brealey et al., 2005a). The key point here is the limited scope of reporting. Radiologists train to not only report images from a number of modalities, but also to cover the whole body. This is in addition to the other duties that their role is expanding to include, such as interventional procedures. However MRI-MRTs would specialise in a very narrow area of imaging allowing them to focus and develop their expertise. In the UK, MRI reporting by MRTs is limited to certain well-defined anatomical areas such as the lumbar spine, knees and internal auditory meati (IAMs) (British Association of MR Radiographers, n.d.).

It could be asked, what is the point if there are to be such limitations? Consider the patient case mix that currently is undertaken at MRI scanners in NZ. For many, this would involve a large number of routine spines, musculoskeletal and brain cases. Based on the UK experience, a small and specific range of examinations such as those outlined
above could be assigned to MRT reporting (Donovan & Manning, 2006). Whilst limited in variety, the actual number of these cases would be a large percentage of the workload at many practices/departments. This could have a significant effect on the radiologists’ workload, subsequent departmental efficiency and to patient service.

The UK reporting-MRI radiographers who responded to the questionnaire indicated that, out of an average department caseload of a little over 120 MRI examinations per week (see Figure 71), they were mostly reporting between 10-40 examinations a week (see Figure 65). For half of them this equated to more than 20% of the departmental reporting. None of them were reporting more than 16 hours per week (see Figure 64). The reporting case mix consisted primarily of knees, lumbar spines and IAMs, with the recent introduction of extension to thoracic spines, cervical spines and brains (see Figure 66).

Certainly, if we view any role extension for MRI-MRTs as a complementary, not competing, role to that of the radiologist, there is scope to develop an emphasis on patient-centred healthcare teams and this is supported by comments from the UK MRI reporting radiographers:

I have my own session, I scan my patients and then report them, that has to be great for the patient ‘cos I can ask relevant questions when they attend. Patient centred or what!

Radiographer reporting is a great challenge yet is hugely rewarding professionally. I currently feel that some of the older radiographer/radiologist boundaries have been broken down and I continually find that the radiologists accept our new role and are starting to realise the departmental benefits of radiographer reporting.

This is the way more radiographers should progress their careers – there is a wealth of knowledge that is un-tapped that would be of benefit for patient care.
Barriers to MRI-MRT Reporting

Radiologists’ Resistance
In addition to the issues discussed earlier related to radiologists’ resistance to MRT reporting, two further issues were raised in the interviews regarding radiologists’ reluctance to support MRTs reporting MRI scans. The first one was turf protection:

I mean if you look at cardiac catheterisation, radiologists used to traditionally do that. They gave that up because they were too busy, now the cardiologists are doing it, and not to be cynical again, the cardiologists are probably doing quite well financially out of the cardiac catheterisations and the radiologists I think are looking back on that and wishing that they hadn’t done that so much. So there is always an element of that too, a little bit of turf-protection. Just as we would if someone came in and said that they would want to perform MRI studies. I can imagine that we would have some problems with that too.

Maree

They (radiologists) were quite happy to say “what did you see?” and the sonographers – they would do their own report. Occasionally if they were struggling with a scan, you know, that was a particularly difficult pathology, they would get a second opinion from a radiologist and they never had a problem with that because it just developed. They (sonographers) started right at the beginning whereas CT was radiologists’ territory and I think that’s what has happened. It’s (MRI) become radiologists’ territory and they are very protective about it. …I think that’s the biggest hindrance we have in New Zealand is a turf war.

Jane

The issue of sonographer-reporting was raised by several interviewees and, with both sonographers and MRI-MRTs now requiring postgraduate qualifications to be registered, it is a relevant comparison to make. Although it is often argued that because of the dynamic nature of ultrasound image acquisition it is imperative for sonographers to be involved in the reporting process, one interviewee also recognised the importance of the historical development of the sonographer role in relation to territorial claims:

I’ve seen the other side where the sonographers report their scans and the biggest advantage I think the sonographers had was that when ultrasound first came in,
they took the territory right from the beginning. The sonographers, because they did the scan, if they didn’t record an image, it’s in their mind. It’s not like a scan where you’ve got 20 slices and as long as I cover from the top to the bottom, you don’t even have to know what you’re looking at. The radiologists have got the images. But a sonographer, when he scans, if I don’t record the pathology, I could pretend it wasn’t even there so the onus is a lot on the sonographer and because it was a developing modality when they took it on, it just developed with them and they took that territory right from the beginning. They never really had to fight for it whereas in MRI, it was sort of an off-shoot from CT and CT was always the radiologists’ territory so when MRI came along, he just took that territory. To try it now, it’s going to be huge…it’s going to be a real struggle because they’re like “it’s mine”, whereas they’re quite happy for the sonographers to report. Jane

In addition, the dynamic nature of image acquisition in ultrasound may be the standpoint that radiologists take to refute claims to MRI-MRT reporting, but if the job satisfaction of MRTs is to be recognised as important for retention of experienced staff, the fact that MRI-MRTs are equally educated, is surely an argument for the profession to be advancing in support of their case. Therefore, rather than arguing that MRI-MRT reporting would be advantageous to the radiologists in order to decrease their workloads, perhaps it is more valuable to be presenting the case for experienced MRI-MRT retention. Certainly this is an area that could be further researched in greater depth and could include a comparative investigation of sonographer and MRI technologist job satisfaction.

The second issue identified in the interviews regarding radiologist resistance to MRI-MRT reporting related to the fact that, just as MRTs find MRI challenging and interesting, so to do radiologists so, they may be reluctant to give it away.

I can’t see personally in the near future, us as MRTs reporting solely on our own without some form of double-reading. But maybe I’m being cynical…. Just because I can see how many people are clamouring to get into MR from a radiologists’ perspective, that MRI is the pot at the end of the rainbow so they don’t want to give that up either. Maree
The difference of an image from a CT to an MRI was just mind-boggling and it’s always stayed ahead. It’s always developed. I mean every time we have an upgrade, my goodness, it’s impressive. So with the rapid development of the modality…as it’s developing, the radiologists are not going to let that go. **Jane**

This is a more difficult issue to address, but as MRI technology continues to evolve, so too does the complexity of the cases able to be examined. Consequently, while MRTs may become adept at reporting specific areas such as routine knees and spines, the more complex and, one could argue, more interesting cases would remain the territory of the radiologists.

**MRT Resistance**

Whilst the NZ questionnaire results indicate that many MRI-MRTs will be interested in pursuing role extension opportunities, others may be more hesitant. Some of this may be related back to the historical development of the MRT role and the subsequent impact of medical dominance. Smith and Lewis (2002) suggest that amongst radiographers generally, there is a “…widespread mentality in the profession that discourages clinical decision-making and the acceptance of responsibility” (p.161).

Other non-medical professions such as nurses are, however, keen to introduce the task of image interpretation into their roles. Consequently, the introduction of nurse practitioners in the UK who are able to request and interpret trauma radiographs has already occurred. This is of more concern perhaps than MRT reporting due to the limited training available to nurses in this area, and because radiographic interpretation will always be only a small part of the nursing role (Hardy & Barrett, 2004). In addition, as Hardy and Barrett point out, most of the studies investigating the accuracy of their provisional reports have compared nurse practitioners with junior casualty doctors. While these two groups have demonstrated comparable results in a number of studies, it must be questioned whether or not this is a satisfactory level of accuracy to be achieving. However in practice, it is suggested that this role may continue to expand rapidly simply due to the fact that nurse
practitioners are generally more readily available than reporting MRTs to inform diagnosis and treatment at the time of initial presentation of the patient (ibid.).

In contrast, the majority of studies on the accuracy of radiographer reports compare their results with radiologist reports (Hardy & Barrett, 2004). The legal designation of acceptable professional performance has been defined as “that level of performance which would be expected to be achieved by the majority of practitioners having similar experiences and responsibilities as the individual being scrutinised” (Donovan & Manning, 2006, p.8). Donovan and Manning suggest that this therefore relates reporting radiographers’ performance to that of radiologists. Consequently, it has been suggested that because radiographers who have undergone specific education and training in reporting have demonstrated reporting accuracy comparable to consultant radiologists, they are able to interpret images with greater accuracy than nurses (Hardy & Barrett, 2004).

More specifically involving medical imaging professionals, the parity of sonographer and MRI-MRT educational requirements and the disparity in role responsibilities, raises the issue of whether or not the MRI-MRT role justifies the required educational level, and supports the idea of MRT resistance to such requirements. One interviewee, when asked to comment on why prospective MRI technologists may not want to do postgraduate study, whereas people are happy to accept the proviso of further study in order to become sonographers, noted the significance of the reporting role:

Ultrasound is completely different. As far as I’m concerned, they are virtually reporting. In MR you are handing the radiologists all of the data that you have gathered. In ultrasound you are handing the radiologist the seven pictures that you chose to take at that moment in time. So I think that we’re talking quite different. We are doing a very generalised, very prescribed set of examinations or protocol on each of those patients, and it’s experience that helps us with a lot of it. All the study in the world still doesn’t give you….. Oh it does, I suppose the pathology and things, you get the idea that that is that pathology, or more likely to be that pathology, and you know that “oh if I run a T1 through it and it’s bright, it’s blood or fat and if I fat sat it
then it’s blood”, you know… you can do some of the technical work for them. But we’re not reporting, you know….I still think that the sonographers are virtually reporting those films.  

Leigh

It is interesting to note that in this response, that as the interviewee is talking about what the study provided for her in as far as relating to her job, she initially starts to say that the study is not necessarily useful, but then realises some of her own expertise has been developed as a result of her study. It is important that professionals are able to see the relevance of their study, and that they can develop benefits from it. This lends weight to the argument for providing a career pathway that recognises and rewards further education, training and clinical expertise.

In summary, NZ MRI-MRTs are keen to pursue more advanced role extension opportunities, particularly image reporting. There is evidence from the UK where this has already been implemented, to support the introduction of image reporting by MRTs, although it should be expected that there will be resistance, particularly from radiologists. However, this is an important field to pursue in order to increase the job satisfaction of MRI-MRTs and to promote retention of experienced and highly-qualified staff. Comparison with the similarly qualified sonographers, and the acceptance by radiologists of their extended role into image reporting, may lend weight to supporting a career framework that encourages clinical progression opportunities for MRI-MRTs. Presently, career advancement choices for experienced MRI-MRTs in New Zealand are limited. Current options are discussed in the following chapter, so as to provide a platform from which to consider why and how a number of stakeholders could benefit from a different approach.
CHAPTER SEVEN

Current Career Progression Options for Experienced MRI-MRTs in New Zealand

A discussion on the benefits or otherwise of introducing a formal career progression framework into the New Zealand medical imaging domain must first begin by examining the current situation in New Zealand. The career path for MRTs in New Zealand is currently ill-defined with no formal recognition of advanced (postgraduate) qualifications or experience. Both New Zealand and Australia currently have a registered practitioner level only (Yielder, 2007a). The title of ‘Senior MRT’ exists on an ad hoc basis, with associated remuneration for experience/expertise also at the discretion of the employer, particularly in private practice where there are no formal career progression steps. Generally, MRTs who wish to advance their practice subspecialise in modalities such as computed tomography (CT), nuclear medicine, digital subtraction angiography (DSA), MRI and/or ultrasound. However, as pointed out by Yielder, this is a horizontal career move and there is currently no supporting structure that acknowledges advanced capabilities and increased levels of responsibility (ibid.). Although many departments have a Charge MRT in each of these modalities, this role tends to require more administrative duties rather than advanced clinical practice.

Presently, experienced MRI technologists in New Zealand have three options regarding career progression within MRI. These are to remain in a clinically focussed Senior MRT position, to take on a more management focussed Charge MRT role, or to leave the profession altogether. Each of these scenarios will be analysed further below. As an introduction to this theme, it may be initially useful to consider the reasons why MRTs choose to enter MRI, their perceptions on whether or not these needs are met, and how the current choices available to experienced MRTs are perceived.
**Reasons for Entering MRI**

When analysing the significance of providing a career progression pathway for MRI technologists, it is important to examine their reasons for entering the career in the first place. Of the 91 respondents to the New Zealand questionnaire, 68 participants (75%) indicated that they were looking for more of a challenge, 67 (74%) indicated that they believed that MRI would be interesting, 63 (69%) pursued the opportunity because it arose, and 59 (65%) indicated that they wanted to increase their job satisfaction (see Figure 38). These themes were supported by comments from the interviewees:

I was always fascinated with MRI when it first came around, and I guess as an extension of CT, I thought that it was going to be even more interesting having looked at the kind of images that you could get. I really liked the idea of it and I wanted to do it.

*Ann*

Well…. I was a Charge Radiographer in South Africa and then it was the second MRI scanner installed in the country and so it was an opportunity to learn MRI… I wasn’t going to turn that down. So that was it, and I just stayed in MRI after that.

*Jane*

It was really the only part of radiography that interested me (*laughs*). I loved the imaging, I liked the clarity of the images, the fact that you could see all the different organs and structures. I liked the fact that it didn’t use radiation and, yeah, basically I just knew when I was a student that if I couldn’t do MRI, I didn’t know whether I wanted to do radiography.

*Maree*

The UK on-line survey respondents rated the options in a slightly different order with ten (83%) indicating that they believed that MRI would be interesting, six (50%) citing the opportunity arose, four (33%) looking for increased job satisfaction, and two (17%) suggesting MRI would be more of a challenge (see Figure 86). It is important to note however that this was a much smaller sample size than the NZ questionnaire respondents. Also, these MRI technologists were answering this question from a position of advanced
practice as they have all trained as reporting MRI radiographers. It is therefore relevant at this stage to review their responses to the question asking for their reasons for choosing to pursue a reporting role. Nine (75%) respondents indicated that they were looking for increased job satisfaction, eight (67%) required more of a challenge, five (42%) had the opportunity arise, and five (42%) felt that reporting would be interesting (see Figure 87).

Therefore, in all of the data collection groups, whilst a number of respondents perhaps fell into either MRI or reporting because the opportunity arose, the majority of participants actively pursued the chance to learn the modality or to undertake role extension openings in the quest for increased job satisfaction, further challenge and interest.

**Were Expectations Met?**

Interviewees expressed great satisfaction in their MRI career, including those who had left the field. They identified the challenge and interest factors that MRI offers as a constantly developing modality as being contributory factors to their job satisfaction. Therefore, when asked if their expectations of MRI had been met, the answer from all four interviewees was positive:

- Yes I still love MR and I will continue to keep my APC (annual practicing certificate) up.  
  **Maree**

- Yes. It was interesting, fast-paced and interactive.  
  **Leigh**

- I think so, and I think it’s what you want to get out of the profession. I was just talking to the applications guys today saying I’ve never been bored doing MRI, even if I do ten spines in a row. I’m never bored because each patient’s images are unique. I never get into that autopilot thing with it because for me everything is an exciting scan.  
  **Jane**

- Certainly MRI as a modality is all that I expected and more because the technology is evolving so rapidly. If you were to ask anybody if they knew all there was to
know about MRI and they said yes, then I would think that they were barmy *(laughs)*. I can not believe that anybody could say that they were bored if they were doing MRI, even if you were doing routine imaging. I still think that the technology that is coming out, even just with software updates that the vendors generally load on the machine at least every couple of years, would keep your interest up. 

Ann

Interestingly, the two MRTs who are not currently in a clinical MRI role, discuss the possibility of returning to a clinical role at a later stage. Both relate this to working conditions that may be more favourable than their current career:

I’ve thought about it. I don’t see it yet but I wouldn’t rule it out. The role I’ve got is not a part-time role. If I wanted to change to part-time, then that would be a different consideration. At the moment I can cut my hours enough to manage my family life. I think that’s the key. You know I think that it’s quite nice that some of the girls work hours that fit around being able to do stuff. And management there are good, they let me go to school plays and stuff like that, but if that changed then I may have to change from this position. 

Leigh

I fully expect to go back and work clinically because I don’t think that the lifestyle that I’m leading now would be something that I could continue to do for the rest of my life. No, so I still totally love MR. 

Maree

In addition, both of these people acknowledge the lack of patient contact as being one of the main disadvantages of the new career that they have undertaken:

It would be nice to still have some form of patient contact…, although patients are a bit of the devil you know, the devil you don’t *(laughs).*

Leigh

The only thing that I don’t do as much of is I don’t have any patient contact really other than in a supervisory manner and I’d like to think that I was reasonable with patients. But I’m still dealing with the MRTs and I really enjoy that. 

Maree
However, when asked whether or not their skills and knowledge were used to their full potential in MRI, some suggested that they were not. Two interviewees identified areas of role extension that they considered appropriate for MRTs to be undertaking. Both acknowledged that the introduction of such roles could have an impact on job satisfaction of MRTs and consequently retention of staff:

Probably not. I think that I was lucky because I was given the chance to really get some skills in one particular area… and the people that I worked with appreciated that and fostered that so in that area, yes. I think if there had been a potential for some form of first-line reporting or something of that nature that that would have been great and I would have hung around.  

**Maree**

I think there’s still things that we could help in. I know that there are situations where new radiologists, and not necessarily consultant radiologists, but perhaps radiology registrars or fellows that are coming through, don’t have the background MRI knowledge that as an experienced person you have, so perhaps we could be utilised at helping them…I think that certainly things like helping the radiologists’ time by perhaps taking some of the more mundane tasks that they need to do like protocolling the requests; you know if we were given guidelines that’s something extra that we could do. I know that from again a quality issue, that there are some practices that perform double-reading of MRI scans and perhaps that could be an avenue where someone could be trained…and perhaps we could have some training and do the first-reading and get the radiologist to do the double-reading. That would save them time and it would give us another challenge and avenue for advancement and interest.  

**Ann**

Overall, the questionnaire results indicated that most MRI-MRTs in New Zealand believed that their skills and knowledge were being used to their full potential (73%). However, in support of the interviewees’ assertions that role extension opportunities would increase job satisfaction, 78% of NZ questionnaire respondents agreed. Whether or not increased job satisfaction is a consequence of role extension will be further examined in Chapter Eight when the UK questionnaire replies are discussed in detail.
**Job Satisfaction**

Herzburg’s (1966) theory of motivation (cited in Collins et al., 2000) relates job satisfaction with extrinsic and intrinsic conditions. If intrinsic conditions such as achievement, recognition, responsibility and advancement are present in a job, satisfaction of the employee has been found to be high. Conversely, if certain extrinsic factors such as salary, job security, working conditions, status, company procedures, and quality of interpersonal working relationships are not acceptable, job dissatisfaction is more likely to occur (ibid.).

Whilst literature on the job satisfaction of MRI-MRTs in New Zealand is non-existent, there are several reports related to MRTs more broadly. Herzburg’s theory is supported by a recent study into the job satisfaction of NZ MRTs in which it was reported that MRTs identified both extrinsic and intrinsic rewards that contributed to job satisfaction or lack of (Hay, 2004). Job satisfaction was generally linked to intrinsic rewards such as patient contact, professional respect from colleagues and patients, and recognition of skills and ability. Conversely, job dissatisfaction was related to extrinsic rewards such as poor remuneration, communication issues with management, lack of training opportunities, and staff shortages (ibid.). Tubb (2003) also identified intrinsic and extrinsic rewards in her smaller-scale study of NZ MRTs. She states that the profession of medical imaging offers both satisfaction and dissatisfaction, linking satisfaction with the work being interesting and enjoying working with their colleagues. Dissatisfaction was related to lack of variation in work, poor pay, and being too busy or not busy enough depending on the department. Overall however, both studies concluded that the majority of MRTs were quite satisfied in their role, although Hay (2004) recommended the introduction of a career pathway similar to the UK 4-tier structure in order to improve job satisfaction.

In this study of MRI-MRTs, both the NZ MRI-MRT questionnaire respondents and UK MRI-MRT on-line survey respondents were asked to indicate whether or not they are satisfied in their job. 78 (86%) of the NZ respondents agreed that they were satisfied in their job, and 9 (75%) of the UK respondents agreed that they were satisfied in their job.
Only three tended to disagree and one strongly disagreed in the NZ cohort, while only one tended to disagree in the UK cohort. The remaining respondents were neutral. One interviewee added:

I use my skills. I get my own job satisfaction in that I look for pathology; I spot pathology when scanning the patient, so I get the job satisfaction because I make each scan interesting for myself. I might not always be formally acknowledged for it, you know from the boss’s point of view, but for me I’m getting job satisfaction because the fact that I spotted the pathology is good for me. ***Jane***

If challenge and interest are key factors in determining job satisfaction, then it would appear that MRI is providing intrinsic rewards to the technologists. 100% of the UK respondents and 98% of the NZ respondents believed MRI to be extremely challenging. Therefore since these figures are so high, it could be surmised that the number of respondents not agreeing to the statement that they were satisfied in their job may actually be indicating job dissatisfaction related to extrinsic factors such as those identified above. Indeed the NZ questionnaire respondents indicated the most common reasons for considering leaving MRI were extrinsic pressures related to management issues (10) and postgraduate study requirements (8).

**Current Options for Experienced MRI-MRTs in New Zealand**

**Senior MRT**

Of the 91 NZ questionnaire respondents, 22 (24%) identified that their current perceived position in MRI was that of senior MRI-MRT. Of these, only four indicated that this position was recognised by their employer with title and remuneration, six indicated recognition by remuneration only, two by title only, and nine specified that this position was not recognised by their employer at all.

As far as experience in MRI was concerned, of these 22 perceived senior technologists, six had more than ten years experience in MRI, ten had between five and ten years, and five had less than five years, with one person not responding to this question. Disappointingly, of the six technologists with more than ten years experience in MRI
who perceived themselves to be Senior-MRTs, four were not recognised by their employers as such with either title or remuneration, one was recognised by remuneration only, and only one was appropriately acknowledged with both remuneration and title.

Interestingly when asked to rate their current job satisfaction, 19 of the perceived Senior-MRTs (86%) agreed that they were satisfied in their job. The one respondent who strongly disagreed to the statement that they were satisfied in their job, indicated that they were not recognised by their employer as a Senior-MRT. However, 18 (82%) of these respondents also agreed that role extension opportunities would increase their job satisfaction suggesting limitations of the current career structure for experienced MRTs.

**Charge MRT**

Nineteen (21%) of the questionnaire respondents indicated that they are Charge MRI-MRTs. Sixteen (84%) of these revealed that this was acknowledged by their employers with both title and remuneration, indicating that this is an acknowledged step in a career path. It would however appear that experience is not necessarily a requirement for being offered a Charge position, with three of the Charge MRI technologists stating that they had less than five years experience in MRI. Indeed it was indicated by one interviewee and several questionnaire respondents that clinical expertise is not necessarily the most important requirement for a Charge MRT:

> Management recognises more than clinical skills, they recognise leadership because that’s what they need in their magnets. They need people to keep the thing working, going, so to a certain extent, some of that clinical stuff would be second to them. I’m not saying that they dismiss that, I think it’s still important, but that’s probably the thing they’re looking for more. And not even maybe an ability to lead other staff but maybe more of an ability to lead the magnet more. Because it’s a business.

*Leigh*

Whilst all four interviewees have been a Charge MRI-MRT at some stage, only one remains a Charge technologist in clinical practice. When asked what attracted them to a Charge position, two respondents indicated the fact that taking on a Charge position was
for them, at least partly, due to circumstance rather than any particular ambition to pursue a higher level:

I think we’ve got to discuss the fact that sometimes these things are offered before you’re actually attracted to them (*laughs*). So I was offered the role and it worked with the timing and you consider every role that you’re doing around your personal circumstances at the time.  

*Leigh*

I think it’s one of those situations sometimes that someone presents you with an opportunity and you think, “Oh that’s good.”  

*Maree*

Nevertheless, three respondents identified the opportunity to have input into decision-making situations, and having the responsibility and authority to make changes:

I wanted the opportunity to see if I could, I guess, make improvements to the service that we were offering, the operational structure of the service. I guess it’s the same in a lot of situations where if you’re the person who’s standing back, sometimes it’s easier to see what can be changed or what can be improved upon rather than if you’re the person in there doing the job at the time. And I had ideas that I thought could help the business and the staff.  

*Ann*

Autonomy. Being enabled to institute changes. Being able to run a department the way you want to run it. I think that’s it, you know, like implement things that work, not having to answer to somebody else’s ideas. It’s actually nice to be able to put your own ideas into it.  

*Jane*

I guess personally I’m the sort of person that likes to take responsibility and so I guess it was probably relatively inevitable as long as a position was available and they wanted to employ me, but I enjoyed the fact that I was part of the making up of protocols and developing and tweaking sequences… and being sort of part of the definitive decision-making process.  

*Maree*
However it was acknowledged that, in the most part, these extended duties as Charge-MRT were related more to management and operational running of the department rather than advanced clinical skills:

“I think from a clinical point of view your flexibility is somewhat limited in that you are dictated to by the radiologists and what they want …your autonomy is limited in that. It’s just the way that you run the department, the way you will do rosters, the way that you organise things…so it’s more management, people management.”

Jane

Certainly, when asked to describe any disadvantages of the Charge role compared with a Senior role, interviewees identified operational aspects of the role rather than clinical responsibilities:

“Well you carry the responsibility of when staff don’t come to work or there are problems with the staff. Normally you’re the one who has to deal issues with staff which is the difficult side of it. But I think that would be the only point that would sort of put you off it…”

Jane

The buck sort of stops more with you when you’re in Charge. Things like making sure the equipment is functioning…it’s very easy as a senior just to leave a note for the Charge or you’ve called the engineer once but no-one follows up with them…so for a lot of the stuff, you’re the one that makes sure that it’s finished off.

Leigh

One interviewee is currently a Senior MRI-MRT. With not quite ten years experience in MRI, she has previously been a Charge MRI-MRT but chose to reduce her clinical hours in MRI to pursue a related field. When asked if she would want to be in a Charge MRI-MRT position again, her response was:

“I wouldn’t be in a hurry to because, although there were aspects of the job I enjoyed, I found that the managerial level above, that didn’t necessarily understand the implications of certain decisions, were, I guess frustrating.”

Ann
Although this is only one example, it could be suggested that operational difficulties rather than extended clinical practice complications present the greatest challenge to retaining experienced staff in higher positions that are currently available for experienced MRI-MRTs to pursue. This would therefore support the introduction of a more clinically-oriented career progression pathway for experienced MRTs to follow.

**Leaving the Profession**

The NZ questionnaire respondents clearly indicated that they intend to remain in MRI for a significant length of time, with more than 70% indicating intent to remain for more than 10 years. This is a positive response for implementing role extension as it is probable that long-term technologists would be more likely to want future challenges to maintain job satisfaction (Henwood, Benwell & Palarm, 2002). Approximately half of the respondents (45) indicated that they had no intention to pursue another career (see Figure 16).

Those that responded that they did have intentions (23), or possibly had intentions (23), to pursue another career, or who were currently practicing in a field other than MRI were asked to answer two further questions to clarify what other career they planned to pursue or were currently practicing, and what reasons they had for leaving MRI. These questions turned out to be slightly ambiguous, as they implied that pursuing another career meant leaving MRI. However, it demonstrated that some MRTs intended to pursue other careers, whether or not they would also remain within MRI, particularly in other fields of medical imaging (21), teaching or lecturing (10), management (8), and clinical applications specialist (6) (see Figure 17). Reasons given for wanting to reduce or leave their MRI career included management issues (14), postgraduate study requirements (10), and wanting to pursue different challenges (6).

It is concerning to note from the NZ questionnaire responses that the single highest reason for wanting to pursue other careers is because of management issues. One NZ MRI-MRT commented that “I do not like the way my company is managed and do not feel valued”, while another experienced a “lack of respect from fellow colleagues-
doctors/management.” This is an issue that MRTs at all levels commented on and, in one case, resulted in an experienced MRT forfeiting their Charge position:

When I completed my postgraduate study, I had the opportunity to investigate an education role. Now I didn’t want to give up my charge role or to change my job in any way at that time because I didn’t know whether I’d like it, but I thought that it was an interesting avenue to explore… I realised fairly early on that the workload would be too high to sustain that long-term but I did enjoy the change and I thought it did help benefit me personally and by benefiting me, then the business because those basic principles that I was teaching were becoming more consolidated in my own mind and I could therefore pass them on to other staff members and people that I helped to train. Unfortunately they (clinical management) said that I could remain on staff at four days a week and take up my one day teaching but I would have to relinquish the Charge position. At the time I wasn’t ready to, I still felt that I had work that I wanted to achieve in that Charge role and so I decided to think about it for a bit longer and just carry on as I was. I had things going on in my personal life…and I decided to readdress the thought when I came back. When I returned, I found that I had really not got the support and the backup of the management … and I chose to look elsewhere.  

Ann

Low job satisfaction has been shown to be directly linked to intentions to leave the profession even amongst those in innovative roles (Collins et al., 2000). So too has a perceived lack of organisational support (Akroyd, Jackowski & Legg, 2007; Makanjee, Hartzer & Uys, 2006). Conversely, it has been stated that higher levels of organisational commitment may be associated with increased levels of retention, attendance and productivity (Akroyd, Jackowski & Legg, 2007). In a study of the effect of perceived organisational support on the organisational commitment of a group of South African radiographers, a number of recommendations to improve radiographer retention were made (Makanjee, Hartzer & Uys, 2006). It was suggested that management procedures need to be reviewed to create a positive working environment and that the management approach needs to change from an authoritative to participative management style. They further recommended that radiographers should be encouraged to undertake postgraduate
studies and CPD, and that organisations should reward accomplishments and provide the opportunity for extra knowledge to be applied (ibid.).

The second most common reason given for considering leaving the profession was postgraduate study requirements. Questionnaire respondents identified issues related to better working conditions overseas with comments such as “considering returning to the UK to work in MRI as I do not wish to study for two years to continue working here” and “financial rewards are better in the UK, I cannot see my current employer increasing pay to reflect postgraduate study.” In addition, family commitments were a barrier to some MRTs undertaking postgraduate study, an example being: “at this stage, my family needs to take priority over compulsory postgraduate study, the workload is high and I feel I need time with family when they are at a young age.” However, as discussed previously, autonomy is generally regarded as one pre-requisite for professional status, and it appears that the changing role of the MRI-MRT may be affording greater opportunities for technologists to gain increased professional standing with continuing education and advanced levels of education all adding up to promoting a stronger professional image. When asked their opinion on whether they thought that there are different characteristics required of people entering MRI now, interviewees also identified the potentially negative impact of the postgraduate study requirements, and the influence that this has had on attracting potential new trainees to MRI:

Postgraduate requirements impact quite a lot on the type of person that will take the job and the type of person that we would offer the job. I just discussed this with an interviewee today, that we’ve got some staff who would be fantastic in MR but who do not feel that the study commitment is right for them at this time or maybe never, and therefore are turning down MR positions because of it.

Leigh

This last statement acknowledges the important fact that not everyone would be interested in pursuing extended roles and supports the idea of having several levels within the MRI-MRT practitioner framework. In addition, it could be suggested that the current role of MRI-MRT is not enough incentive for people to undertake further study at
postgraduate level as they can not relate the extended educational requirements to the existing responsibilities of the position. Indeed, Yielder (2007a) referring to the undergraduate medical imaging programme, questions whether or not it is ethical to educate highly intelligent students through a rigorous degree course only for them to become disillusioned on qualification because of inadequate career progression opportunities. This same issue could be directly related to the postgraduate requirements for MRI-MRTs and is cause for additional concern as Yielder further claims that when expectations are not met, job satisfaction will decrease and there will be consequent issues with staff retention.

In summary, while MRTs usually move into MRI in search of increased challenge, interest and job satisfaction, the current career progression options for experienced MRI-MRTs in New Zealand involve either sideways movement into management roles such as Charge MRT rather than advancing clinical expertise, or leaving the profession to pursue related careers such as management, teaching or clinical applications specialist. Although job satisfaction of MRI-MRTs has been reported to be high, it is acknowledged that role extension opportunities are perceived as catalysts for increasing job satisfaction. Currently, Senior MRTs are reported to be the least recognised group within most MRI departments, lacking both recognition and remuneration for such positions. In addition, the Charge MRT position has been shown to consist primarily of increased operational duties. These issues are not confined to the public sector with its long waiting lists. As discussed in Chapter Two, whilst public hospitals may consider role extension opportunities and formalised advanced practice roles for radiographers because they are interested in reducing radiologists’ workloads and improving reporting turnover times, private practices must ensure that their staff satisfaction is high to encourage organisational commitment. Otherwise private practices may find that if advanced practitioner positions are offered only in the public sector, they may lose their experienced technologists. Clearly therefore, there is a need for advanced practice positions to be introduced into New Zealand for MRI technologists in order to support a formal, clinically-oriented career progression pathway, and to promote retention of experienced staff.
CHAPTER EIGHT

Advanced Practice: An Alternative Option for Experienced MRI-MRTs

Currently, because of the single level of registration for MRTs in New Zealand, radiology services are structured in a hierarchical manner with a distinct gap between the skills and knowledge of MRTs and radiologists. By restructuring this framework to an escalator approach, the gap may be lessened and a continuum of skills across radiology professionals could potentially be provided by mid-level ‘advanced practice’ positions. The effect would be two-fold. First the radiologists would be relieved of their more routine duties, freeing them up to perform more complex tasks. Secondly, MRTs would have a career pathway opened up for them to pursue higher end duties. Generally, the NZ questionnaire respondents were supportive of the introduction of a formalised ‘advanced practice’ role as a nationally recognised step in clinical career progression, with 68 respondents (75%) indicating some degree of agreement (see Figure 50). Similar results were demonstrated from the UK experience with survey respondents indicating comparable levels of support for the advanced practice role (75%) (see Figure 97). Supporting comments from the NZ MRTs included:

Acknowledgement of skills already existing and perhaps increasing the profile of the profession.

Progression of MRT career, more structured and recognition of experienced MRTs with clear pathway for additional skills.

MRI in NZ requires development both in clinical expertise and in management to reach its potential.
The Four-Tier Career Progression Framework

If a tiered structure such as that currently in use in the UK were to be introduced into New Zealand, not only would there be the potential for forward movement for those practitioners wishing to undertake extended roles, there would be the opportunity for new staff to be employed as assistant practitioners to assist with the more routine tasks and to relieve the MRT workload at the lower end. Opinion on the introduction of assistant practitioners was not sought from the questionnaire respondents so it is unclear whether or not there would be support for this role.

In practical terms, a number of different staffing arrangements under the four-tier framework in the UK were identified (see Figures 72-83). Of the 12 responses received, the department with the least staff (department 3) indicated that they had only two MRI staff comprising of one practitioner and one advanced practitioner (see Figure 74). At the opposite end of the scale, the department with the most staff (department 1) consisted of two assistant practitioners, twelve practitioners and one advanced practitioner (see Figure 72). Only five respondents (41.67%) indicated that their MRI department was utilising the assistant practitioner position. Also, two departments (6 and 12) specified that all of the staff were classified as practitioners with the reporting radiographer having the title of ‘Service Lead’ (department 6) or ‘Superintendent Radiographer’ (department 12). To date, there appear to have been no appointments to Consultant Radiographer in MRI.

Assistant Practitioner

In the UK, the role of assistant practitioner has been supported educationally by courses such as the one developed by the Anglia Ruskin University (Anglia Ruskin University, 2007). Initially in 2002 the University introduced a Diploma of Higher Education in Medical Imaging Practice for assistant practitioners within general radiography. This was followed in 2005 with the introduction of Certificates in Higher Education in mammography and MRI. It is unclear in the Course Information documents why the general radiography qualification for assistant practitioners is a two-year diploma, while the MRI and mammography qualifications are only one-year certificates. However, it is stated that the rationale for the introduction of the MRI assistant practitioner (AP)
programme was to train APs to scan routine examinations thus freeing up radiographers to report MRI scans. APs are trained to scan routine brains, spines and knees within strict protocols.

In New Zealand this role has not been formally adopted and is therefore not currently endorsed. However, from my own experience, the role of an MRI assistant can be extremely useful. Whilst NZ is not yet at the stage of allowing non-registered practitioners to scan, this person may be utilised in a number of other ways particularly with respect to patient care issues. Workflow pressures may be eased by having an appropriately trained person to change patients into gowns, thoroughly check safety checklists with the patient and any accompanying people, collate films, set up the room with the correct coils and possibly even position the patient on the table. The MRI practitioner is then freed up to scan the patient, complete filming and post-processing, liaise with the radiologist on complex cases, perform venepuncture and contrast media administration.

One of the MRI-MRTs interviewed also had had experience with MRI assistants:

Talking from my own experience, I actually went along the lines of getting one of my admin staff trained to be able to position the coil, position the patient and all the initial side of things, so we sort of got that far. We didn’t get to the point where she was actually pressing the button, but she certainly did all the safety checks which I think is half of the battle with MRI…and that worked very well when we were in times of staff shortages, so I’m not actually anti- it and I think that could be developed further. So we have to work out what we’re trying to do and how much they need to know to do that job… and I guess that’s why personally when I sort of went through this process, I sort of stopped at the point where the patient was on the table and in position and in the magnet and that was as far as they went, because then I didn’t want to have a button-pusher so I decided that that was the level of assistant that I was happy to go to.

Maree
In addition to improving workflow, and departmental efficiency, the assistant role means that the more menial, task-driven aspects of the MRI technologists’ role may be delegated to a less-qualified person, thus freeing up the registered practitioner’s time to undertake the more interesting and challenging aspects of the role. Potentially this could increase the job satisfaction of MRI technologists as well as allowing them the time to take on higher-end duties such as routine reporting, as evidenced in the UK. Further evaluation of this position is outside the boundaries of this study, but I believe it to be a very important avenue to investigate further, particularly in relation to the use of assistant practitioners in the MRI department.

**Practitioner**

The level of practitioner would encompass the MRI-MRT role as it stands today. Progression to higher levels will not be aspired to by all MRTs. One questionnaire participant responded that: “I think role extension should be available but not compulsory.” The current role is more than challenging and interesting enough for many MRI-MRTs and several questionnaire respondents noted concern regarding the potential loss of the traditional MRI-MRT role if advanced practice was to be introduced. Examples of this are: “I would be concerned that some role extensions could take the focus off the MRT’s traditional role. At the end of the day I believe the MRT’s job is providing support for the patients and outputting the best quality diagnostic images that circumstances allow”, and: “In general I would prefer to be fully knowledgeable in the anatomy, sequences and the pathology before considering any other clinical advancement as in film reporting.” This stance is supported by one of the interviewees who noted that: “You know, there’s nothing wrong with being able to do good bread and butter work” (Leigh). Again, these statements support the introduction of a tiered-system to acknowledge and encourage advanced practice whilst also recognising the importance of the current role.

**Advanced Practitioner**

Differences between role extension and role advancement have been discussed in the literature (Hardy & Snaith, 2006) and it has been suggested that undertaking role
extension is not necessarily adequate justification for claiming the title of advanced practitioner. On the other hand, the advanced practitioner by definition is required to be “autonomous in clinical practice, defines the scope of practice of others and continuously develops clinical practice within a defined field” (Department of Health, 2003, p.11). Snaith and Hardy (2007) define eight categories of achievement that they deem necessary for advanced practice: knowledge, services and practice development, research, decision making skills, leadership, education and training, service management and planning, recognition of expertise. Therefore, while being involved in role extension tasks may demonstrate increased knowledge, practice development, advanced decision-making skills, and expertise in their field, MRTs would also need to be actively engaged in research, leadership, management, and training of other staff to formally be considered advanced practitioners. The more task-orientated or protocol-driven activities such as venepuncture or performing routine scans unsupervised, although now generally integrated into the role of MRI-MRT, were until recently considered role extension. However, unlike the reporting role, these role extension activities do not necessarily lend themselves to involvement in the supplementary areas identified above. The pursuit of more cognitive extensions such as reporting do however require a different commitment from practitioners and the opportunity is therefore more likely available for these MRTs to be considered for advanced practice positions. The UK reporting radiographers indicated that eight of them (67%) were recognised as Advanced Practitioners (see Figure 60).

The results of this research have clearly indicated that not only do MRI technologists in New Zealand want opportunities to extend their role particularly in reporting, but that in the UK a number of those already undertaking advanced practitioner roles have reported increased job satisfaction and professional recognition. The implementation of a career progression framework for medical imaging in New Zealand is therefore highly recommended and discussion later in this chapter will focus on requirements to consider when developing this.
Consultant Practitioner

Hardy and Snaith (2007) state that despite the UK government support and the professional desire to move ahead with consultant radiographer positions, by the end of 2005 only 15 were in post. More specifically, the information collected from the UK online questionnaire in this research has indicated that to date there have not been any appointments of MRI technologists to this position. One respondent specifically addresses this issue with the following words of caution:

The four-tier working practice is widely viewed as a success. However the top tier – consultant radiographers – is consistently overlooked. Advanced practice is all management will concede despite significant role extension. You need to clearly define where role extension and advanced practice begin and end. Then define where consultancy role starts. The original idea of the four-tier system was to reward those who remain in clinical practice rather than drive a desk. That has not proved to be the case, since management resent radiographers earning more than they do after extending their practice. I have fallen foul of this, since my salary has not increased despite taking on reporting MRI.

In light of this, it may seem unrealistic that this would be a viable option in New Zealand, considering the fact that the population here is so much smaller and consequently the number of MRI technologists overall is considerably less. Furthermore, even in the UK with its much greater population and therefore potential to provide appropriate training and educational support, it has been argued that the proposed infrastructure has yet to be developed (Price & Paterson, 2002) With more limited available resources in New Zealand, it could be implied that if such a role is to be proposed in any new career pathway model, training for such may need to be undertaken overseas. Nevertheless, strong and appropriate professional leadership is essential, particularly in times of change and development such as those being experienced now (Yielder, 2006). Therefore, a consultant practitioner level is an important position to include in any proposed medical imaging career progression framework, as this is where industry leaders could be positioned to ensure that the profession as a whole is moved forward.
Requirements to Consider

In setting up any area of role extension, it is essential that a strong framework, including specific policies and procedures, is in place to support the MRTs and ensure effective delivery of quality healthcare. In a policy and practice guide developed for reporting radiographers in the UK, a number of issues that need to be addressed are identified (Paterson, Price, Thomas & Nuttall, 2004). These include recommendations that clearly defined scopes of practice must be developed, education and clinical training must be available, a supporting career framework with appropriate remuneration and recognition of each level must be developed, and an on-going audit system of competence and continuing professional development must be implemented (ibid.).

Similar issues were identified by Prime, Paterson and Henderson (1999). They suggest that in order for radiographers to report, there must be training, definition of anatomical regions, radiologists in a tutoring role, and audits. Reed (2002) supports this with his recommendations including a selection process so that only suitable radiographers are considered for such duties, adequate training and education, assessment of competence, protocols, audit, and co-operation of all parties involved including radiologists, referring clinicians, professional bodies, imaging departments and academic institutions. Keenan, Muir and Cuthbertson (2001) further suggest that these requirements should be supported within a framework of audit and research based upon evidence-based practice. These issues would need to be addressed in any proposed area of role extension including reporting. Certainly, it will be necessary to consider all of these elements when making any recommendations that may arise from this study of role extension for MRI-MRTs in New Zealand.

The MRI reporting radiographers from the UK surveyed for this study were asked to rate the importance of a number of suggested requirements to ensure best practice and support for reporting radiographers. Eight areas were identified, all of which had 100% agreement that they were, at a minimum, somewhat important. Clinical training was rated as the most important requirement with 11 respondents (92%) indicating that it is very important, and one respondent (8%) stating that it was important (see Figure 100). Of
next highest importance were postgraduate academic qualifications (see Figure 98) and CPD (see Figure 99) which both had eight (67%) respondents indicating them to be very important and four (33%) respondents stating them to be important. Following them, in order of ranked importance, were clearly defined scopes of practice (see Figure 104), ongoing supervision/mentorship by radiologists (see Figure 102), continuous audit of competence (see Figure 103), a formal supporting career progression framework (see Figure 105), and specific short courses (see Figure 101).

Training and Education

Friedenberg (2000) asserts that the training of technologists is of primary importance and this is clearly supported by the MRI-MRTs from the UK. Just how this could be developed and implemented in a small country such as New Zealand remains to be seen and is worthy of further research. Although the expertise is there to support appropriate courses, the feasibility of such a programme would need to be further investigated with regards to funding and resourcing. Currently in New Zealand, the only postgraduate programme of study in MRI is offered at Unitec in Auckland. Recently a postgraduate programme in trauma image interpretation has been introduced at Unitec. However, it has struggled to remain viable due to a lack of supporting positions in clinical practice (personal communication, Fred Murphy). Again, this lends support to the introduction of a formalised career progression pathway, as more students would potentially be attracted to such courses in support of formal clinical roles. In addition, greater departmental support would be required for participation, resulting in appropriate numbers of students being available to sustain such courses.

The majority of respondents to the NZ questionnaire indicated that they would be willing to complete further academic requirements to enable extension to their current role (see Figure 45). Since the type of role extension was not defined, some respondents may have answered this question related to technical role extension activities such as venepuncture. Therefore, there may have been even greater support of further academic requirements, if reporting images had been stated. Since further study would obviously be a requirement
for MRTs to report, a certain amount of motivation to undertake this study could identify possible candidates for this role.

All four interviewees were initially selected because they either are or were Charge MRI-MRTs, and they had either left MRI altogether or reduced their clinical hours to pursue associated career pathways. These technologists would, I believe, be very strong candidates for pursuing role extension opportunities, as they are highly experienced and motivated technologists. Interestingly, it was later noted that three of the four had undertaken study in a Postgraduate Diploma (MRI) programme prior to it becoming a compulsory requirement for registration, indicating a high level of personal intrinsic motivation.

I spent six months and basically learnt MRI on-the-job, but I didn’t have any theory knowledge. They sent me on a study day that was really good but when I came back to New Zealand and I knew that I wanted to carry on in MRI, I found it really interesting and challenging, I found that I just wanted to know more. I realised my limitations because although, OK I could push the buttons and get some kind of image, I didn’t understand what I was doing and why I was doing it or how to change anything to make it any better, so I knew that I needed to learn some theory and so the first thing I did when I got back was look for an MRI course...  

Ann

Mainly because I felt that even though I had done enough hours to do a CBA (competency-based assessment), I thought that if other people were going to be doing that sort of study, that I shouldn’t be the one that shouldn’t do it, and that I should have the same amount of education as those people that I was going to be working with and I also thought that there were some interesting papers within it and so, yeah, I sort of thought well, why not do it?  

Maree

Two of these three interviewees continued on to attain further postgraduate qualifications. The fourth interviewee, whilst acknowledging that she initially only did the study because it was a prerequisite for registration, discovered a new interest and subsequently also went on to further postgraduate study.
The requirements of the MRT Board…I think that was the initial motivation. I never thought of doing additional study but because it was a requirement of the Board I did it and it was good. It opened up for me to do more study which I wouldn’t actually have done unless I had been prompted into doing it. So it forced me to do something which in the end has been a good thing.

Jane

Selection Process

It was highlighted by one respondent to the UK survey that it is important to have a suitable selection process in place when choosing radiographers to fill reporting positions. They stated that: “there is scope for reporting radiographers but care must be taken in that the right people are selected.” While a number of studies also allude to the fact that suitable candidates for radiographer reporting need to be carefully selected, it is difficult to determine exactly what criteria have been used to determine this suitability (Brealey et al., 2005b; Cook, Oliver & Ramsay, 2004; Hardy & Culpan, 2007; Sonnex, Tasker & Coulden, 2001). Enthusiasm, training and experience are all suggested qualities and it would seem probable that a certain pre-requisite amount of experience both as an MRT and a MRI technologist would be essential. In fact, of the twelve respondents to the UK questionnaire who are reporting MRI scans, their time since initial qualification as a radiographer ranged from ten to 32 years with an average time of 19.25 years post qualification (see Figure 59). In addition to this, 50% had between five and ten years experience in MRI, and the other 50% had more than ten years experience in MRI (see Figure 61). One respondent states: “Advise it for radiographers interested in MRI with established MR experience. Very rewarding!” Several of the interviewees also identified experience, in addition to undertaking further education and training, as the most important factors to look for:

…because it’s such a fragile role that is going to be challenged and what we don’t need is two or three people who are not skilled, stuffing it up … So I think the role is there and I think it’s a worthwhile thing to try, but very carefully selected because if you give the radiologists the opportunity to prove that you’re not capable of doing it, they’re going to rub their hands in delight and say “…we knew you weren’t good enough….told you so…”. So it’s got to be handled very professionally. So you’d need
experience, training, education. So we’re looking at someone with a minimum of a Masters.

I don’t think that you could expect, or would want, a MR technologist with minimal experience, even if they have a postgraduate qualification, to be reporting. I don’t think that makes up for all the knowledge that the radiologist has that we haven’t got, because at the end of the day, the radiologist has all those years at med school… whereas we have our knowledge from going through a radiography degree and years of accumulated experience at looking at MRI images as an experienced MRI technologist. I think that experience in addition to additional training and education could mean that we would be able to do the routine reporting but not just the training and education. I think it has to have both components.

Ann

**Limited and Well-defined Scopes of Practice**

The Royal College of Radiologists (RCR) defines the purpose of an imaging report as being:

…to provide a specialist interpretation of images and relate the findings, both anticipated and unexpected, to the patient’s current clinical symptoms and signs in order to diagnose or contribute to the understanding of their medical condition or clinical state. It often incorporates advice to the referring clinician on appropriate further investigation or management (2006, p.6).

Although the College is cautiously supportive of radiographers reporting on some images, two different types of report have been defined, a medical report and a non-medical report. The first is a descriptive report which may be provided by a radiographer. The second is a medical report to include an opinion on the further medical management of the patient, and this type of report is generally provided by a radiologist (RCR, 1998). In fact, the College goes on to suggest that examinations best suited for radiographers to report are those that involve a single organ, with a single suspected pathology and a yes/no answer (RCR, 2006). These characteristics support the view of Donovan and Manning (2006) that radiographers are only capable of delivering a certain style of report. Based on evidence from the UK where radiographer reporting has already been
implemented, it is therefore recommended that the introduction of MRI-MRT reporting should be developed within clearly defined scopes, to be determined by the relevant professional bodies in NZ.

**Audit**

In order to ensure quality in clinical practice, it is essential that new practices are evaluated and that individual performance is monitored to ensure that practitioners undertaking these new roles are competent. Brealey (2001a) suggests that a systematic approach to audit involves a continuous cyclical process consisting of four steps. These steps are:

1. identifying a need for change,
2. defining criteria and standards,
3. collecting data on performance, and,
4. assessing performance against criteria and standards
   (Brealey, 2001a, p.264).

By implementing a structured approach to such evaluation, it can be verified whether or not beneficial change is achieved, and existing guidelines may then be built upon and improved. Brealey further suggests that quality thrives in departments that foster a working environment encouraging participative involvement in clinical audit.

**Radiologist Support**

Radiologist support for role extension such as MRT-reporting is essential. A number of studies have identified the importance of radiologist support to ensure input from them in the training, support and monitoring of radiographer progress (Brealey, 2001a; Forsyth & Robertson, 2007; Smith & Lewis, 2003). Although it has been generally accepted that this is not always forthcoming, in 1992 when radiographer reporting was in its infancy, Loughran (1994) questioned whether or not radiologists in the UK would accept reporting radiographers. Results of a limited survey of 84 consultant radiologists indicated that approximately half of them (51.8%) would accept reporting of extremity
films by radiographers if the radiographers had suitable training (ibid.). The College of Radiographers declared in 1997 that, reporting by technologists is not an option for the future, it is a requirement, thus clearly indicating their support for MRT-reporting (Friedenberg, 2000). A report by the RCR in 1996 however, was less direct but did acknowledge that there had been a marked increase in radiological demand and consequent increases in radiologist workloads (ibid.). They supported delegation of medical tasks and in doing so, as interpreted by Friedenberg, gave tacit approval to MRT-reporting. However, in some countries such as the United States, where fee-for-service reimbursement is prevalent, radiologists may be less than happy to give away reporting duties. Friedenberg suggests that because of this, and legal considerations, the literature from the US has to date, only gone as far as supporting double reading by technologists. However, the formalised advanced practice role of Radiologist Assistant in the US does not include image interpretation of any type (ASRT, n.d., b).

A recent study of radiologists’ perceptions of radiographer role development in Scotland has reported support of the radiologists with 82% of 129 respondents to their questionnaire indicating support for further role extension of MRTs. Perceived advantages for pursuing this were recognition of increased professional standing for the radiographers, best use of manpower resources, reduced pressure on the service, and improved recruitment and retention (Forsyth & Robertson, 2007). Conversely, the results reveal a number of reservations including a negative impact on radiology registrar training, lack of clear medico-legal responsibilities, and the necessity for radiographers to be able to recognise their own limitations (ibid.). However, overall, the support of 82% of respondents reflects over half of the total Scottish consultant radiologist population.

Preliminary results of a similar study conducted of NZ radiologists (yet to be published) suggest only limited support from radiologists for MRI reporting by MRTs (NZIMRT, 2008). Of the 26 respondents to the question regarding MRI reporting, only four indicate support. Of these, only two indicate that MRI-MRT reporting of routine scans could be carried out completely independently while the other two indicate that it should be an assistance role only (ibid.). There was slightly more support for MRTs to provide a
provisional report (8/26). In contrast, 13/27 radiologists approved of provisional reporting of conventional images by MRTs. In addition, 10/28 agreed with MRTs issuing a full report on conventional images with varying levels of supervision.

The experiences of the UK MRI technologists who are reporting are varied. Several describe radiologist resistance with comments such as: “I think some of our radiologists are threatened by radiographers taking on reporting roles”, and “I think to be frank, that role extension has not greatly helped the radiologists and thus what they say to our faces rather than to each other are two completely different things”. Conversely another identified very supportive radiologists with the comment: “I have worked in MRI for approximately 17 years and jumped at the chance to report the scans I produce. The Radiologists in my department are strongly supportive in my new role.”

The Reporting MRI-MRT: Experiences from the UK

The UK reporting MRI radiographers who responded to the questionnaire were predominantly working full time (see Figure 62). Five had been reporting for more than two years, two between one and two years, three between six and 12 months, and two less than six months (see Figure 63).

Reported job satisfaction of the majority of respondents to the UK MRI-MRT questionnaire was positive (75%, n=9), with two respondents being neutral, and only one exception who indicated that he/she tended to disagree with the statement about being satisfied in his/her job (see Figure 89). On closer examination of this particular radiographer, it was found that although he/she had decided to begin reporting MRI scans because more of a challenge was needed, and to increase job satisfaction, this person appeared to have little departmental support and was currently not reporting scans. He/she strongly disagreed with the statement that ‘radiologists at my department support radiographers reporting routine MRI scans’ and remained neutral on the statement ‘management of my practice/department are supportive of role extension opportunities’. When asked to identify advantages that had been witnessed as a result of the introduction
of role extension opportunities for MRI technologists, this person states that there are: “few as radiologists are against it”. When asked to identify disadvantages, he/she indicates that: “as a line manager it is difficult to combine two roles” (Respondent 1). Interestingly, it is noted that another radiographer is training to report MRI scans at this practice.

Conversely, two of the respondents strongly agreed with the statement that they were satisfied in their job (Respondents 3 and 7). Respondent 3 describes a completely different scenario to Respondent 1, strongly agreeing with both statements regarding management and radiologist support. In addition, they comment on the positive aspects of the role extension opportunities, indicating: “rapid turnaround of reports to enable the trust to achieve new targets required for patient waiting list reduction”. However they also identify a disadvantage that they have seen is the “reduction in availability of staff for scanning if there is no back-fill when the Advanced Practitioner is reporting. This makes it difficult for the Advanced Practitioner to actually report” (Respondent 3). Also, this radiographer has personally experienced “no recognition for reporting radiographers by the trust. I do not get paid extra for reporting. I am in the same pay band as I was as MRI manager”. Clearly this person’s job satisfaction is intrinsically motivated as he/she is not receiving any extrinsic reward.

Respondent 7, whilst also strongly agreeing with the statement that they were satisfied in their job, was neutral regarding management support, and tended to disagree with the statement that ‘radiologists at my department support radiographers reporting routine MRI scans’. This may however be due to divided support amongst the radiologists themselves as the respondent states that the advantages that he/she has seen are: “increased expertise, increased throughput of patients, better team working with consultant radiologists”, while indicating that a disadvantage of the role extension opportunities is that it is “not accepted by some consultant radiologists” (Respondent 7).

Similar results were found in an investigation in the UK into the impact of innovative roles on job satisfaction and retention of staff, 452 nurses and 162 professionals allied to
medicine (PAMs) including radiographers (Collins et al., 2000). It was concluded that the majority of innovative post-holders believed that the role provided increased job satisfaction. Twenty-two percent of respondents indicated that working independently contributed to this satisfaction. They did note however that it is essential that post-holders are adequately prepared for the new role, and that the boundaries of their practice are well-defined.

Collins et al. (2000) also found that there are a number of important factors which assist effective working in these new roles. These factors include: “…support, respondents’ own qualities, effective communication, the autonomous nature of the roles, adequate resources and access to appropriate education/training” (ibid., p.7). Conversely, a number of factors were identified that may hinder effective working in these roles. These were “…inadequate resources, time constraints, problems with relationships with staff, poor management, poor communication and excessive workload” (ibid., p.8).

The UK questionnaire respondents who are now working in innovative, advanced practice MRI roles identified similar issues. Overall, the main advantages identified by the group included improvements to service such as increased patient throughput (4) and quicker turn around times for reports (3); personal rewards such as increased job satisfaction (3), and increased expertise (2); benefits for the profession such as increased professional status (3) and improved career progression (3); and greater team work with radiologists (2). The main disadvantages identified by the group were related to lack of pay (5), lack of time and money to support continuing education (3), shortages of radiographers (3), lack of radiologist acceptance (2), and lack of acceptance by referring specialists (1).

It is concerning that almost half of the respondents indicated that they were not receiving appropriate remuneration for their increased responsibilities. Comments included:
My main area of concern revolves around the financial recognition of the extended role. A reporting radiographer is making critical decisions that have a direct effect on patient management but the regrading does not necessarily reflect this extra risk.

Remuneration for the added professional expertise and risk has not been as forthcoming as I anticipated.

It is evident from these remarks that appropriate remuneration needs to be clearly established when creating roles within any new framework.

Ultimately however, MRI radiographers already reporting in the UK describe increased job satisfaction directly related to their extended roles (see Figure 93), and more than half indicated that they believed that extending their role had encouraged them to remain in the profession (see Figure 70). All six respondents who chose to offer extra comments at the end of the survey were generally supportive of the advancement that they had pursued. Comments identified personal, departmental and patient benefits. Examples are:

I have been very lucky – I have had a lot of support from my colleagues, my managers and my radiologists but I’m likely to be the only reporting MR radiographer/advanced practitioner in our Trust for a long time – it’s lonely, it can be hard but I’ve learnt an awful lot.

Radiographer reporting is a great challenge yet is hugely rewarding professionally. I currently feel that some of the older radiographer/radiologist boundaries have been broken down and I continually find that the radiologists accept our new role and are starting to realise the departmental benefits of radiographer reporting.

This is the way more radiographers should progress their careers – there is a wealth of knowledge that is un-tapped that would be of benefit for patient care.
Summary

In summary, NZ MRI-MRTs are supportive of a formalised ‘advanced practice’ role and recognise the need to complete further academic requirements to pursue these positions. Such a role could support the introduction of further role extension activities, including image reporting. NZ MRI-MRTs have indicated that these opportunities would potentially increase their job satisfaction, and it has been suggested that experienced MRI-MRTs may be encouraged to remain within the profession if such roles were available. Evidence from the UK questionnaire supports these perceptions, with the results indicating that role extension activities have a direct impact on MRT job satisfaction, and on retention of experienced staff. Importantly, to further develop an ‘advanced practice’ role, a number of requirements have been identified as essential components of any supporting career framework. These include adequate training and education, selection of appropriate candidates, well-defined and limited scopes of practice, on-going audits of competence, and radiologist support. In particular, reporting radiographers from the UK describe a lack of appropriate remuneration relative to the increased risk and responsibility that they have taken on and this needs to be specifically addressed in the setting up stage of any career framework in New Zealand. Recommendations from this study have evolved from these issues, and will be presented in the following chapter.
CHAPTER NINE

Conclusions

This study has investigated the attitudes of MRI-MRTs in New Zealand towards role development and the possible introduction of a supporting career progression framework. Using a case study approach, data was collected from three sources in order to maximise the validity of the results. Questionnaires were mailed to all MRTs with either a scope of practice in MRI, or a training scope of practice in MRI, as identified by the MRTB register in December 2006. Questions were designed to gain a general impression of the motives of MRTs for specialising in MRI, their perceptions on current job satisfaction and potential role extension, and their aspirations (or otherwise) for future career progression. Of the 122 questionnaires sent out, 91 were returned representing a response rate of 75%. In addition, four experienced MRI-MRTs were interviewed to provide: more in-depth information about the current role of MRI technologists in New Zealand; insights regarding the historical development of this role; issues specifically relevant to the retention of experienced technologists; and the potential impact of further role extension and advanced clinical practice opportunities.

In order to provide further evidence to support the findings of this study, a third group was included. UK radiographers already involved in MRI reporting were sent an online questionnaire. We are in the fortunate position in New Zealand of being able to draw from the UK experience, and to use both the positive aspects and the concerns, as lessons to guide our own development.

In line with the objectives of this study, the data supports the introduction of a new career progression framework within medical imaging in New Zealand, to promote role extension opportunities, including image reporting. Supporting comments from NZ MRI-MRTs included: “Further roles for MRI technologists would provide job satisfaction especially with reading and reporting of cases. This area of role expansion would add a new and challenging dimension to the technical requirement.” It is suggested that the
introduction of a formalised, clinically-orientated, career progression pathway, may aid in the attraction and retention of high-quality staff in MRI by increasing job satisfaction, raising the professional profile and offering the possibility for higher salaries. In addition, evidence suggests that changes such as these can also provide assistance in alleviating the workload of radiologists, with the on-flow effects of increased service to referring practitioners and patients.

**Key Findings**

This study has demonstrated that the role of the MRI technologist has changed considerably over the last ten years, and that these changes are continuing to occur at a steady pace. Information from the questionnaires to NZ MRI-MRTs revealed that whilst the introduction of technical or protocol-driven extended roles such as venepuncture and scanning of routine examinations unsupervised has been widespread in MRI departments throughout New Zealand, more cognitive tasks such as the authorisation and protocolling of request forms are not as widely practiced.

In addition, the questionnaires showed that NZ MRI-MRTs are keen to pursue more advanced role extension opportunities that are not currently undertaken by MRTs in NZ, particularly image reporting. With evidence from the UK supporting the introduction of MRT-reporting, this is an opportunity worthy of further consideration. While it should be expected that there will be resistance to it particularly from radiologists, this is an important field to pursue in order to increase the job satisfaction of MRI-MRTs and to promote the retention of experienced and highly-qualified staff. Comparison with the similarly qualified sonographers, and the acceptance by radiologists of their extended role into image reporting, may lend weight to supporting clinical progression opportunities such as these.

It has been demonstrated that advanced roles can have a positive impact on four distinct groups: the patient, the MRT, the profession and the radiology service. Examples of improved patient service have included comments from NZ MRI-MRTs particularly related to their experiences of venepuncture such as: “Increased involvement in the
examination, new skills and enhancement of MRT/patient relationship.” Interviewees also support this assertion with comments such as:

I think the patient rapport is better because one small team of just say maybe one or two MRTs are dealing with that patient and it gives you a little bit more of an opportunity to bond with that patient because otherwise you’re just getting them on and off the table…  

Leigh

I think also that it adds to the patient contact, like the patient sees the same person over and over again, so they don’t have some scary doctor coming in… “oh my goodness, why am I getting contrast?”… so I think that’s also helped…  

Maree

UK reporting radiographers also identified improvements for the patient associated with role extension, with one stating that: “I have my own session, I scan my patients and then report them, that has to be great for the patient ‘cos I can ask relevant questions when they attend. Patient centred or what!”

As far as MRTs are involved, it has been revealed that MRTs working in MRI in New Zealand report high levels of interest and challenge inherent in their career, and although they express associated high levels of job satisfaction, many of them are motivated to pursue higher level tasks. However, when commenting on whether or not their expectation of MRI had been met, one experienced technologist differentiated between the modality and the profession with the following comment:

I think that expectations of MRI and expectations of MRI as a profession are two different things. Certainly MRI as a modality is all that I expected and more because the technology is evolving so rapidly…MRI as a profession is a different story and I think that it’s really in its infancy in New Zealand.  

Ann

Accordingly, while MRI as a modality provides challenge and interest for the technologists, as supported by both the NZ MRI-MRTS and the UK MRI reporting radiographers, the professional profile of the career is still relatively low in New Zealand.
While current role extension activities that have already been widely introduced, such as venepuncture and performing routine scans unsupervised, have been reported to have an associated effect on increasing job satisfaction, it will require higher end activities such as image reporting to have an impact on the professional profile. In the UK, while internal conflict within the radiology community regarding radiographer reporting was occurring, radiographers seized their chance to move the profession forward. One UK reporting MRI radiographer asserts that: “Our opportunities arose out of the constant infighting between the radiologists. Whilst they squabbled, the world moved on.” As a result, the professional profile of radiographers in the UK has increased with one questionnaire respondent stating that: “professionally the role extension has raised the profile of radiographers within the AHP (allied health professional) community, increasing ties with other AHPs, in particular the physiotherapists.” Perhaps it is timely for NZ MRI-MRTs to consider similar opportunities.

The evidence supports the use of MRTs in reporting, including MRI scans, as it has been shown to reduce patient waiting times, free up radiologists for other duties, and improve MRT retention (Smith & Baird, 2007). While a number of barriers to role extension activities such as image reporting have been identified, including radiologists’ resistance, MRT resistance, and legal implications, these arguments have been extensively debated in the literature, and have not ultimately prevented change in the UK. This study therefore proposes the development of an ‘advanced practice’ position for MRI-MRTs in New Zealand, to be supported by a tiered career progression framework, and to include opportunities for role extension including MRI-MRT reporting. This all needs to be provided within the context of adequate training and education, selection of appropriate candidates, well-defined and limited scopes of practice, on-going audits of competence, and radiologist support.

**Recommendations**

*Introduction of ‘advanced practitioner’ role*

Based on the results of this study, it has been identified that there is a need for extended roles to be introduced into the MRI-MRT remit. In addition, it has been asserted that
extended roles should not be undertaken by all MRI-MRTs, thus suggesting a need for the introduction of a career progression framework to support an advanced level of practice. A formalised advanced practice role is supported by the NZ MRI-MRTs, and it is therefore recommended that a tiered system supporting career progression for MRI-MRTs is introduced into New Zealand.

In addition, it has been demonstrated that one of the key reasons involved in lack of retention of experienced MRI-MRTs is lack of management acknowledgement and support. An interviewee highlights the importance of a formalised advanced role to distinguish between and acknowledge different technologists’ skills and abilities:

…for my level of skill, my experience, my ability at scanning, I don’t really want to be put in the category of someone who’s just newly qualified, has got two, three years experience, has never done CT scanning in their life, their knowledge of anatomy is pretty basic. To put me in the same category as them isn’t a fair reflection on me or a fair reflection on them because you would expect them to do what I can do, or you expect me to just be the same as everyone there. There’s definitely a requirement for an advanced role.

Jane

As revealed in this study, appropriate remuneration to support advanced practice roles is essential. This was acknowledged as a potential concern by the NZ MRI-MRTs with comments including:

Gaining sufficient remuneration for our extra qualifications etcetera from employers…this could be a major drawback. It is all very well having a warm feeling from extra responsibility and knowledge but at the end of it all dollars count.

For the work required to achieve/maintain these standards we must ensure that MRTs are rewarded accordingly.

Indeed, this was clearly the area of most concern for those MRI reporting radiographers in the UK as it would seem that pay has not necessarily been increased in line with increased responsibilities. It is essential therefore that the matter of appropriate
remuneration is specifically addressed in the development of any career progression framework in New Zealand.

**Development of a supporting career progression framework**

While it has been identified that at least one higher level of ‘advanced practice’ is required in the immediate future, the career progression framework should also include the potential to introduce higher levels of advancement at a later stage. This may mean that a four-tier framework is developed to include positions similar to the UK with advanced practitioner and consultant practitioner levels, although I believe that appointments to the highest level would not be of immediate priority. The need and acceptance of higher level positions is essentially outside the boundaries of this study but is worthy of further research.

It is important that the level of practitioner that essentially encompasses the present role of MRI-MRT is acknowledged and retained for those MRTs not willing or able to pursue the higher end duties related to advanced practice. Not all MRTs will necessarily want to pursue extended roles and advance to higher levels.

If MRTs are provided with time to undertake extended roles, there will be a necessity for increased numbers of MRI technologists to fill the gaps in scanning time and potentially, some of these positions could be filled by assistant practitioners. In addition, while also outside the boundaries of this study, it could be suggested that there is a necessity for introducing advanced roles at the same time as, or prior to, the introduction of assistant practitioner roles to ensure the profession is not perceived as being devalued or the role of MRT being ‘dumbed-down’. Further research is required into the assistant practitioner role in MRI in NZ.

**Reporting of MRI images by MRTs**

It is further recommended that, using a formalised advanced practitioner position as support, MRI-MRTs are provided with both educational and clinical opportunities to pursue reporting of images, either in a double-reading or sole reporting capacity. This
should be contained within a limited scope, possibly based on the one already implemented in the UK whereby MRTs report on brain, spine and knee MRI scans. In addition, the NZIMRT and MRTB would need to work in conjunction with the RANZCR to develop appropriate policies and procedures to support such practice, both legally and ethically, from the perspective of both MRTs and radiologists.

Educational support needs to also be developed and adequately resourced. With Unitec, Auckland currently providing the MRTB benchmark postgraduate qualification required by NZ MRI-MRTs to be registered, it is further recommended that Unitec is resourced to extend the current postgraduate diploma and Masters programmes to provide Image Interpretation courses specific to MRI similar to those already available in the UK. It has been suggested elsewhere that image interpretation short courses could be a pre-requisite for postgraduate study (NZIMRT, 2008), and further study is suggested to determine the need for such courses relevant to MRI. In addition, such courses could provide relevant and useful opportunities for CPD. Several questionnaire respondents in this study identified these areas as being very important to them with one stating:

Before role extension, all MRTs must be fully versed in all aspects of scanning. Role extension in pathology, pathological processes, peer reviews of sequences and scans is of more importance to me than reporting scans.

Areas worthy of further research

A number of issues were identified in this research that are worthy of further investigation. These include:

Implications for private practice

Issues specific to private practice were raised by questionnaire respondents and interviewees. These included specialist referrer expectations, radiologists’ income, and pressures related to patient throughput. In addition, private practice MRI scanners do not have the long waiting lists associated with the public sector. Price (2005) states that he is unaware of radiographers undertaking extended roles in the private sector in the UK.
However, as identified in this research, if public hospitals introduce advanced roles for MRI-MRTs, these positions may attract experienced and highly skilled technologists away from the private sector. Factors associated with the organisational commitment of private practice technologists in particular, need to be researched to provide information for managers to make decisions related to workforce structure in their workplace.

**Assistant practitioner role in MRI**

Another area requiring further research is the implementation of assistant practitioner programmes in MRI. As pointed out by Tennant (2000), arguments by MRTs in the UK against the introduction of assistant practitioner roles sound remarkably like those used by radiologists against the introduction of advanced practitioner roles. However, as he further notes, “what is sauce for the goose is sauce for the gander!” (p.150), and the key issue for both roles is that of training.

**Comparative study of sonographer and MRI-MRT role and job satisfaction**

As discussed in Chapter Six, radiologists are generally accepting of sonographer reporting. Based on the fact that sonographers and MRI-MRTs have comparable levels of education as a pre-requisite for registration, further research into the development of sonographer reporting and a comparative investigation of sonographer and MRI technologist job postgraduate satisfaction, would be useful evidence for supporting the implementation of MRI-MRT reporting.

**Conclusion**

Clearly, we have a dichotomy in New Zealand; to advance our professional image, we need to increase our autonomy but in order to obtain more autonomy, we need to be raising our professional image. By pursuing and accepting the right to extend our role into the area of image reporting, we may have the opportunity to improve both areas simultaneously. McConnell (2007) suggests that New Zealand MRTs are at a point where the UK radiographers were 10-15 years ago.
In general, the majority of MRI-MRTs in New Zealand are supportive of formalised role extension and are particularly interested in image reporting opportunities. There was however, concern expressed that pay would not reflect the additional responsibility and workload, legal accountability would increase, and exploitation by management to get cheap labour could occur. In contrast, others saw the benefits both personally in increased job satisfaction, respect and salary, and for their practice/department overall through increased productivity.

MRI-MRTs are a highly educated group of individuals who have a lot to offer to a patient-centred healthcare team. It is important that we recognise this opportunity as a chance to improve our professional standing and to increase our contribution to the health services. NZ MRI-MRTs acknowledge the fact that we are currently an under-valued and under-utilised resource with comments such as:

With the correct training and recognition I feel MRI-MRTs will be able to help make ANY MR service more efficient and bring about advances to the service at a faster rate. In my experience, MRI-MRTs are dedicated to producing an extremely high standard of work and improving their service as much as possible. They offer much valued advice and opinions to their radiologists and this should not go unrecognised.

We already hold the place together, doctors often hard to find - we do extra scans if we feel they are necessary. We need more recognition for responsibilities taken!

Further roles for MRI techs would provide job satisfaction especially with reading and reporting of cases. This area of role expansion would add a new and challenging dimension to the technical requirement.

While it has been demonstrated that MRTs usually initially move into MRI in search of increased challenge, interest and job satisfaction, the current career progression options for experienced MRI-MRTs in New Zealand involve either sideways movement into management roles such as Charge MRT, or leaving the profession to pursue other careers
such as management, teaching or clinical applications specialist. Although job satisfaction of MRI-MRTs has been reported to be high, it is acknowledged that role extension opportunities are perceived as potential catalysts for increasing job satisfaction. Senior MRTs are reported to currently be the least recognised group within most MRI departments, lacking both recognition and remuneration for such positions. In addition, the Charge MRT position consists primarily of increased operational duties. Clearly from these results there is a need for advanced practice positions supporting role extension activities to be introduced into New Zealand for MRI technologists in order to support a formal, clinically-oriented career progression pathway.

This issue is not confined to the public sector with its long waiting lists. As discussed in Chapter Three, whilst public hospitals may consider advanced practice roles for MRTs because they are interested in reducing radiologists’ workloads and improving reporting turnover times, private practices must ensure that their staff satisfaction is high to encourage organisational commitment. Otherwise private practices may find that if advanced practitioner positions are offered only in the public sector, it may be difficult to retain their experienced technologists. In addition, with the number of MRI scanners in New Zealand steadily increasing, recruiting experienced technologists to workplaces that do not support advanced practice roles may prove more difficult.

In conclusion, while much of the literature related to MRT reporting has focussed on the negative relationship between radiologists and radiographers based on the medical dominance theme, Forsyth and Robertson (2007) emphasise the strengths of this partnership, highlighting “complementary knowledge and skills, shared vision of quality in patient care and shared commitment to clinical excellence” (p.55). They further claim that although the relationship has changed and will probably continue to transform as role development continues, the basic partnership of “mutually dependent professional colleagues” stays the same (ibid.). If role development can be promoted as mutually beneficial rather than an attack on the radiologists’ domain, resulting in ‘turf-protection’, radiologists may be better utilised in the performance of their higher end tasks. In addition, MRI-MRTs will have opportunities to extend their duties with the added
advantages of increased job satisfaction, higher pay, and increased professional respect and value within the healthcare team environment. These benefits may then subsequently lead to more far-reaching improvements related to patient service and to the attraction and retention of staff to the profession of MRI technologist, addressing the problems of long waiting lists and MRT shortages.
List of References


Donovan, T., & Manning, D.J. (2006). Successful reporting by non-medical practitioners such as radiographers, will always be task-specific and limited in scope. *Radiography, 12*, 7-12.


Reeves, P. (2002). Diagnostic radiography in the new Millennium: where have we come from and how did we get here? *Journal of Diagnostic Radiography and Imaging, 4* (2), 95-102.


Royal College of Radiologists. (1998). *Inter-professional roles and responsibilities in a radiology service*. Retrieved August 6, 2006 from the Royal College of Radiologists website: 
http://www.rcr.ac.uk/index.asp?PageID=310&PublicationID=72


Appendix One

Ethical Procedures
Participant Information Form (NZ Questionnaire)

An investigation into formal role extension opportunities for MRI technologists in New Zealand

My name is Adrienne Young and I am a MRI technologist at Auckland Radiology Group. I also co-ordinate the postgraduate MRI courses at Unitec in Auckland. I am currently enrolled as a student in the Master of Health Science programme at Unitec and, as part of this, I am about to embark upon the thesis component of this course.

The anticipated objectives of my thesis

1. to provide recommendations to support the introduction of a new career progression framework within New Zealand medical imaging,
2. to aid in the attraction and retention of high-quality staff in MRI by increasing job satisfaction and offering the possibility for higher salaries, and,
3. to potentially provide assistance in alleviating the workload of radiologists with the on-flow effects of increased service to referring practitioners and patients.

What it will mean for you

The following questionnaire is designed to gather your opinion as an MRI technologist. As the results may eventually directly affect your working practices, it is important that you take the time to have your say. However, your participation is voluntary.

Please note you are not asked to identify yourself in any way on the questionnaire and that all information received will remain completely confidential. You may note that there is a number on the reply-paid envelope. However, there is no way that you may be identified by this number as a third party is going to separate the questionnaire from the envelope. The number will be used purely to indicate who not to send reminders to.

Please attempt to answer every question. Extra comments would be greatly appreciated but, if time is limited, I would appreciate return of questionnaires filled out in as much detail as you are able.

Preliminary results of this questionnaire will be submitted for publication in ‘Shadows’ in the early part of 2007. If you would like a summary sent directly to you, please feel free to email me at that time.
If you have any questions regarding this questionnaire, you may contact either me (ayoung3@unitec.ac.nz) or my supervisor, Dr Jill Yilder, School of Health Science, Unitec (jyielder@unitec.ac.nz).

I would be extremely grateful for your input and thank you in anticipation. A stamped envelope is included for the return of your questionnaire. I would appreciate return of the questionnaire by Friday 5th January 2007.

UREC REGISTRATION NUMBER: 2006:662
This study has been approved by the UNITEC Research Ethics Committee. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 7248). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Participant Information Form (Interview)

An investigation into formal role extension opportunities for MRI technologists in New Zealand

My name is Adrienne Young and I am a MRI technologist at Auckland Radiology Group. I also co-ordinate the postgraduate MRI courses at Unitec in Auckland. I am currently enrolled as a student in the Master of Health Science programme at Unitec and, as part of this, I am about to embark upon the thesis component of this course.

The anticipated objectives of my thesis

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3. to potentially provide assistance in alleviating the workload of radiologists with the on-flow effects of increased service to referring practitioners and patients.

What it will mean for you

The proposed interview is designed to gather your opinion as an experienced MRI technologist. I would like to discuss:

- your experiences as an MRI technologist; and,
- your perceptions of role extension for MRI technologists in New Zealand.

I would appreciate it if you could meet with me for approximately 1 hour to talk about these topics. I will come to either your place of work or your home at a time convenient to you. I will tape the interview and will be transcribing it later. All features that could identify you will be removed and the tapes used will be erased once the transcription is done.

If you agree to participate, you will be asked to sign a consent form. This does not stop you from changing your mind if you wish to withdraw from the project. However, because of my schedule, any withdrawals must be done within 2 weeks after I have interviewed you.

Your name and information that may identify you will be kept completely confidential. All information collected from you will be stored on a password protected file and only you, myself and my supervisors will have access to this information.
If you have any questions regarding the interview, you may contact either me (ayoung3@unitec.ac.nz) or my supervisor, Dr Jill Yelder, School of Health Science, Unitec (jyielder@unitec.ac.nz).

I would be extremely grateful for your input and thank you in anticipation.

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Participant consent form (Interview)

**An investigation into formal role extension opportunities for MRI technologists in New Zealand**

I have had the research project explained to me and I have read and understand the information sheet given to me.

I understand that I don't have to be part of this if I don't want to and I may withdraw at any time prior to the completion of the research project.

I understand that everything I say is confidential and none of the information I give will identify me and that the only persons who will know what I have said will be the researchers and their supervisor. I also understand that all the information that I give will be stored securely on a computer at Unitec for a period of 5 years.

I understand that my discussion with the researcher will be taped and transcribed.

I understand that I can see the finished research document.

I have had time to consider everything and I give my consent to be a part of this project.

*Participant Signature*: ………………………….. *Date*: ………………………………..

*Project Researcher*: ………………………….. *Date*: ………………………………..

**UREC REGISTRATION NUMBER: 2006:662**

This study has been approved by the UNITEC Research Ethics Committee. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 7248). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
My name is Adrienne Young and I am a MRI technologist at Auckland Radiology Group in New Zealand. I also co-ordinate the postgraduate MRI courses at Unitec Institute of Technology in Auckland. I am currently enrolled as a student in the Master of Health Science programme at Unitec and, as part of this, I am about to embark upon the thesis component of this course.

The anticipated objectives of my thesis

1. to provide recommendations to support the introduction of a new career progression framework within New Zealand medical imaging,
2. to aid in the attraction and retention of high-quality staff in MRI by increasing job satisfaction and offering the possibility for higher salaries, and,
3. to potentially provide assistance in alleviating the workload of radiologists with the on-flow effects of increased service to referring practitioners and patients.

What it will mean for you

The on-line questionnaire is designed to gather your opinion as an MRI technologist and your experiences of role extension. As there are very few people in the world with experience such as yours, I would be extremely grateful if you could take the time to return the questionnaire to me. However, your participation is voluntary. Please note you are not asked to identify yourself in any way on the questionnaire and that all information received will remain completely confidential.

Please attempt to answer every question. Extra comments would be greatly appreciated but, if time constraints are pressing, I would appreciate return of questionnaires filled out in as much detail as you are able.

Results of this thesis will be available at the end of 2007. If you would like a summary sent directly to you, please feel free to email me at that time.

If you have any questions regarding this questionnaire, you may contact either me (ayoung3@unitec.ac.nz) or my supervisor, Dr Jill Yielder, School of Health Science, Unitec (jyelder@unitec.ac.nz).

I would be extremely appreciative of your input and thank you in anticipation.
UREC REGISTRATION NUMBER: 2006:662
This study has been approved by the UNITEC Research Ethics Committee. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 64 9 815-4321 ext 7248). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix Two

NZ Questionnaire
About you

1. Are you:
   - Female
   - Male

2. Age:
   - 20-29
   - 30-39
   - 40-49
   - 50+

3. Where did you train/qualify as a medical radiation technologist?
   - New Zealand
   - Australia
   - UK
   - South Africa
   - USA
   - Other (please specify) ________________________________

4. In what year did you qualify? ________________________________

5. What is your highest medical imaging qualification?
   - Diploma
   - Degree
   - Postgraduate Certificate
   - Postgraduate Diploma
   - Masters Degree
   - Other (please specify) ________________________________

6. Have you completed, or are you currently studying in a postgraduate MRI course?
   - Yes
   - No (go to question 8)
7. What motivated you to enrol in a postgraduate MRI course (tick as many as appropriate)

- [ ] Requirement for registration
- [ ] Personal fulfilment
- [ ] Increased pay
- [ ] To increase knowledge
- [ ] Other (please specify)________________________________________

8. Do you have any other tertiary qualifications? If yes, please state:
_________________________________________________________________

9. How many hours per week do you work in MRI?

- [ ] 8 hours or less
- [ ] 8-16 hours
- [ ] 16-24 hours
- [ ] 24-32 hours
- [ ] 32 hours or more

10. What other areas of medical imaging do you currently work in?

- [ ] None
- [ ] General radiography
- [ ] CT
- [ ] DSA
- [ ] Ultrasound
- [ ] Other (please specify)________________________________________

11. In what countries have you worked in medical imaging? (tick as many as appropriate)

- [ ] New Zealand
- [ ] Australia
- [ ] UK
- [ ] USA
- [ ] South Africa
- [ ] Other (please specify)________________________________________
12. In what countries have you worked as a MRI technologist? (tick as many as appropriate)

☐ New Zealand
☐ Australia
☐ UK
☐ USA
☐ South Africa
☐ Other (please specify) ________________________________

13. How long have you worked in MRI?

☐ < 1 year
☐ 1-5 years
☐ 5-10 years
☐ > 10 years

14. At this stage, how long do you anticipate working in MRI?

☐ < 1 year
☐ 1-5 years
☐ 5-10 years
☐ 10-15 years
☐ 15-20 years
☐ > 20 years

15. Do you have intentions to pursue, or are you currently practicing, any other career (other than MRI technologist)?

☐ Yes
☐ Possibly
☐ No (go to question 18)

16. Please indicate what career you plan to pursue/ are currently practicing:

☐ Medical Radiation Technologist (non-MRI)
☐ Management
☐ Teaching/Lecturing
☐ Clinical Applications Specialist
☐ Other (please specify) ________________________________
17. What reasons do you have for wanting to leave your MRI career?

☐ Not challenging enough
☐ Compulsory postgraduate study, registration requirements
☐ Ongoing CPD requirements
☐ Feel undervalued by patients
☐ Feel undervalued by other staff
☐ Not enough staff for workload
☐ Management issues
☐ Other (please specify) _____________________________

Please comment:

About your workplace

18. Which of the following best describes your workplace? (tick as many as appropriate)

☐ Public hospital scanner
☐ Private practice scanner situated within public hospital
☐ Private practice scanner situated within private hospital
☐ Private practice scanner situated outside hospital environment
☐ Other (please specify) _____________________________

19. How many MRI scanners does your practice/department have?

☐ 1
☐ 2
☐ 3
20. For each scanner, please specify the following:

<table>
<thead>
<tr>
<th></th>
<th>Scanner 1</th>
<th>Scanner 2</th>
<th>Scanner 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnet strength</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturer</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hours of business</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Average number of</td>
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<td></td>
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<tr>
<td>examinations per day</td>
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<td></td>
</tr>
<tr>
<td>Total number of</td>
<td></td>
<td></td>
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<tr>
<td>MRI-MRTs who work at</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>scanner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of MRI-MRTs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>working per day</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

21. Is your scanner(s) located in a:

- Large metropolitan centre
- City (>20 000)
- Town

22. How many MRTs are rostered **full-time** in MRI at your practice? _______
   (if your practice has more than one magnet, please indicate the number for the whole practice rather than any individual magnet)

23. How many MRTs are rostered **part-time** in MRI at your practice?

   (if your practice has more than one magnet, please indicate the number for the whole practice rather than any individual magnet)

24. Do you have recognised levels (e.g. charge, grade, senior, staff, trainee MRTs)?

- Yes (please specify) ____________________________
- No (go to question 28)
25. Are these levels formally recognised by your employer? If so, how?

☐ Not recognised
☐ Title only
☐ Remuneration
☐ Title and remuneration
☐ Other (please specify) ______________________________

26. What do you perceive your current position to be in MRI?

☐ Trainee MRT
☐ Staff MRT
☐ Senior MRT
☐ Grade MRT
☐ Charge MRT
☐ Other (please specify) ______________________________

27. Is this position recognised by your employer? If so, how?

☐ Not recognised
☐ Title only
☐ Remuneration
☐ Title and remuneration
☐ Other (please specify) ______________________________

28. What factors are considered when appointing charge or senior MRT positions in your department? (tick as many as appropriate)

☐ Experience in MRI
☐ Length of service within practice/department
☐ Postgraduate qualifications in MRI
☐ Qualifications in management
☐ Leadership qualities
☐ Willingness
☐ Limited choice
☐ Other (please specify) ______________________________
29. On average, approximately what proportion of your scanner(s) working hours has a radiologist in attendance?

- [ ] < 25%
- [ ] 25-50%
- [ ] 50-75%
- [ ] >75%

30. Please indicate, with a tick in the appropriate boxes, the types of MRI that are performed at your workplace and the level of MRT responsibility:

<table>
<thead>
<tr>
<th></th>
<th>Not performed at your workplace</th>
<th>MRTs always or usually perform unsupervised</th>
<th>MRTs sometimes or often perform unsupervised</th>
<th>MRTs always perform with supervision of radiologist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Spine</td>
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<tr>
<td>Routine musculoskeletal</td>
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<tr>
<td>Complex musculoskeletal</td>
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<tr>
<td>Abdominal</td>
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<tr>
<td>MR angiography (non-contrast)</td>
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<tr>
<td>MR angiography (Gad-enhanced)</td>
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<tr>
<td>Breast</td>
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<tr>
<td>Pelvis - male</td>
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<tr>
<td>Pelvis - female</td>
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<tr>
<td>Cardiac</td>
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<tr>
<td>Spectroscopy</td>
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<tr>
<td>Functional MR</td>
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<tr>
<td>Paediatric</td>
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<tr>
<td>Anesthetised</td>
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<tr>
<td>Research</td>
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</table>
**Job satisfaction and Career perceptions**

31. What factors contributed to your decision to enter medical imaging? (tick as many as appropriate)

- □ Challenging profession
- □ Technology based profession
- □ Allied medical profession
- □ Caring profession
- □ Well-paid
- □ Paid to train
- □ Other (please specify) ____________________________

32. Why did you choose to enter MRI? (tick as many as appropriate)

- □ Needed more of a challenge
- □ Opportunity arose
- □ Interesting
- □ Increase job satisfaction
- □ Other (please specify) ____________________________

33. Please indicate the most appropriate response to the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Tend to agree</th>
<th>Neutral</th>
<th>Tend to disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI is extremely challenging</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>I am satisfied in my job</td>
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<td>My skills and knowledge are used to their full potential</td>
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<td></td>
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<tr>
<td>In general, patients are aware of my expertise and professional knowledge</td>
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<td></td>
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<tr>
<td>The radiologists respect my opinion</td>
<td></td>
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<tr>
<td>Role extension opportunities would increase my job satisfaction</td>
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<tr>
<td>I would be willing to complete further academic requirements to enable extension to my current role</td>
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<tr>
<td>I would be willing to complete further clinical requirements to enable extension to my current role</td>
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<tr>
<td>Management of my practice/department would be supportive of role extension opportunities</td>
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<tr>
<td>Radiologists would support MRTs reporting routine MRI scans e.g. knee, lumbar spine, IAMs</td>
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</table>
I would prefer to progress my career in MRI by advancing my clinical expertise rather than taking on a management role.

A formalised ‘advanced practice’ role as a nationally recognised step in clinical career progression, would be good for the profession.

<table>
<thead>
<tr>
<th>34. Please comment below if you have further views on any of the above statements</th>
</tr>
</thead>
</table>

### Role Extension in MRI

35. Please indicate the current duties of MRI technologists at your scanner and who is expected to do these duties:

<table>
<thead>
<tr>
<th>Duties</th>
<th>Performed by all MRI technologists</th>
<th>Performed by some MRI technologists including yourself</th>
<th>Performed by some MRI technologists but not yourself</th>
<th>Not performed by MRI technologists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venepuncture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine patients requiring contrast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration of contrast</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Administration of other required drugs (e.g., hypnovel)</td>
<td></td>
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<tr>
<td>Protocolling request forms</td>
<td></td>
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<td>Performing routine protocolled scans unsupervised</td>
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<td>Giving verbal opinion to radiologist</td>
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<td>Giving verbal opinion to referring specialists</td>
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<td>Giving written opinion to radiologist</td>
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<tr>
<td>Giving written opinion to referring specialists</td>
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<tr>
<td>Informing patients of results</td>
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<tr>
<td>Provisional reporting/ Double reading scans</td>
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<tr>
<td>Reporting routine scans</td>
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<td>Post-processing images (basic)</td>
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<tr>
<td>Post-processing images (complex)</td>
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</table>
36. What are the criteria used for selecting those MRI technologists who perform tasks that are not performed by all MRI technologists? (tick as many as appropriate)

- Extra on-the-job training
- Seniority of position
- Experience in MRI
- Postgraduate academic qualifications
- Willingness
- Specific training such as a related short course
- Other (please specify) ____________________________

37. Would you be interested in extending your role?

- Yes
- Possibly
- No (go to question 39)

38. What areas of role extension that you are not already involved in, could you be interested in? (tick as many as appropriate)

- Venepuncture
- Selecting patients for contrast media
- Administration of contrast media
- Administration of other required drugs eg hypnovel
- Protocolling request forms
- Performing routine scans unsupervised
- Providing verbal reports to radiologists/referring specialists
- Providing written opinions to radiologists/referring specialists
- Informing patients of results
- Provisional reporting/ Double reading scans
- Reporting routine MRI scans
- Post-processing
- Other (please specify) ____________________________

39. Do you think that extending your role would encourage you to remain in the profession?

- Yes
- No
- Not intending to leave the profession
40. Which of the following groups in your practice/department do you think would support role extension for MRI-MRTs? (tick as many as appropriate)

- Radiologists
- Management
- All MRI-MRTs
- Some MRI-MRTs
- Non-MRI MRTs (if applicable)

Please comment:

41. Which of the following requirements do you think would be necessary to ensure ‘best practice’ in role extension

- Postgraduate academic qualification
- On-the-job training
- Specific short courses
- On-going supervision by radiologists
- Continuous audit
- Other (please specify) _______________________________

42. What do you think would be appropriate recognition of MRI technologists participating in role extension activities? (tick as many as appropriate)

- More pay
- Title e.g. advanced practitioner
- Other (please specify) _______________________________
43. What advantages can you see for providing further roles for MRI-MRTs?

44. What disadvantages can you see for providing further roles for MRI-MRTs?

45. Are there any areas of concern that you can envisage with extending MRT roles in MRI?
46. Do you have any other comments regarding this topic?

Thank-you for participating in this survey.
Please return it as soon as possible in the self-addressed reply-paid envelope to:

Adrienne Young
98 George Deane Place
Greenhithe
Auckland

Or fax to 09 413 8601

Your answers will be treated in the strictest confidence.
Appendix Three

Interview Question Guide
Sample Interview Question Framework

(Interviews semi-structured and therefore adapted to each individual interviewee and their responses)

1. How long have you worked in MRI?
2. In what countries have you worked as a MRI technologist?
3. How many MRI practices/departments have you worked in?
4. What is your highest medical imaging qualification?
5. When did you begin and end your postgraduate qualification in MRI?
6. What motivated you to enrol in a postgraduate MRI course?
7. Are you currently working in MRI? (full-time/part-time/other duties or roles)
8. Why did you choose to enter MRI?
9. Have your expectations been met with regards to the profession of MRI technologist?
10. What do you perceive your current position in MRI to be and is it formally recognised? (e.g. Charge, senior, staff MRT technologist)
   a. Charge – what attracted you to a charge position
   b. Ex-charge – why did you move away from charge position/ would you want to be a Charge MRT again?
   c. Senior – do you want to be a charge MRT (why/why not)
11. Describe your perceptions relating to how you believe the following groups recognise/respect your experience/expertise in comparison to less experienced MRI-MRTs:
   • Management
   • Radiologists
   • Administrative staff
12. Has the role of the MRI-MRT changed in the time that you have been working in MRI and, if so, how? (Describe an average day in MRI 10 years ago compared to an average day in MRI today).
13. Do you think that these changes have had an effect on those MRTs currently doing MRI and/or those wishing to do it?

14. Do you believe that your skills and knowledge are used to their full potential in your MRI role(s)?

15. Do you think that extending your role in MRI would increase your job satisfaction?

16. Venepuncture
   - Is this being done currently in your department?
   - What impact has this had on MRI-MRTs, department, other?
   - Do you think that it is feasible to pursue? Why/why not?
   - What requirements would there be to implement?
   - Would you be interested?

17. Authorisation of request forms
   - Is this being done currently?
   - What impact has this had on MRI-MRTs, department, other?
   - Do you think that it is feasible to pursue? Why/why not?
   - What requirements would there be to implement?
   - Would you be interested?

18. Performing routine scans unsupervised
   - Is this being done currently?
   - What impact has this had on MRI-MRTs, department, other?
   - Do you think that it is feasible to pursue? Why/why not?
   - What requirements would there be to implement?
   - Would you be interested?
19. Supervising complex scans
   - Is this being done currently?
   - What impact has this had on MRI-MRTs, department, other?
   - Do you think that it is feasible to pursue? Why/why not?
   - What requirements would there be to implement?
   - Would you be interested?

20. Double reading
   - Is this being done currently?
   - What impact has this had on MRI-MRTs, department, other?
   - Do you think that it is feasible to pursue? Why/why not?
   - What requirements would there be to implement?
   - Would you be interested?

21. Reporting routine scans
   - Do you think that it is feasible to pursue? Why/why not?
   - What requirements would there be to implement?
   - Would you be interested?

22. Do you think that establishing a formalised ‘advanced practice’ role in the profession as a nationally recognised step in clinical career progression, would be good for the MRT profession? Why/ why not?

23. You have pursued another career other than your MRI career. Why?

24. What aspects of your other role are more satisfying than your MRI role?

25. What aspects of your other role are less satisfying than your MRI role?
26. Do you think that if there had been role extension opportunities in MRI, your decision to move into other areas of medical imaging could have been influenced?

27. Do you have any other comments regarding this topic?
Appendix Four

UK On-line Questionnaire
**About You**

1. In what year did you qualify as a radiographer? ____________

2. What is your current job title?
   - [ ] Practitioner
   - [ ] Advanced Practitioner
   - [ ] Consultant Practitioner
   - [ ] Other (please specify) _____________________________

3. How long have you worked in MRI?
   - [ ] < 1 year
   - [ ] 1-3 years
   - [ ] 3-5 years
   - [ ] 5-10 years
   - [ ] > 10 years

4. On average, how many hours per week do you work in MRI?
   - [ ] a. Less than 8 hours
   - [ ] b. 8-16 hours
   - [ ] c. 16-24 hours
   - [ ] d. 24-32 hours
   - [ ] e. More than 32 hours

5. How long have you been reporting MRI scans?
   - [ ] < 6 months
   - [ ] 6-12 months
   - [ ] 1-2 years
   - [ ] > 2 years

6. On average, how many hours per week do you spend reporting MRI scans?
   - [ ] Less than 8 hours
   - [ ] 8-16 hours
   - [ ] 16-24 hours
   - [ ] 24-32 hours
   - [ ] More than 32 hours
   - [ ] Nil (please specify reason/s why you are not reporting) ____________________________________________
7. On average, how many MRI examinations do you report per week?

- Nil
- < 10 per week
- 10-19 per week
- 20-29 per week
- 30-39 per week
- 40-49 per week
- 50-59 per week
- 60+ per week

8. What areas are you reporting (select as many as appropriate)

- Knee
- Lumbar Spine
- IAMs
- Other (please specify) ________________________________

9. Approximately what percentage of your reporting is unsupervised by a radiologist?

- None
- < 25%
- 25-50%
- 50-75%
- 75-99%
- 100%

10. At this stage, how long do you anticipate working in MRI?

- < 1 year
- 1-5 years
- 5-10 years
- 10-15 years
- 15-20 years
- > 20 years

11. Do you have intentions to pursue any other career (other than MRI technologist) in the future?

- No
- Possibly
- Yes (please specify) ________________________________
12. Do you think that extending your role has encouraged you to remain in the profession?

- Yes
- No
- Was not intending to leave the profession

13. On average, how many MRI examinations are performed in your department/practice per week?

- < 20 per week
- 20-39 per week
- 40-59 per week
- 60-79 per week
- 80-99 per week
- 100-119 per week
- 120-139 per week
- 140+ (please specify) _________________________________

14. How many radiographers are rostered in MRI at your practice?

- Assistant practitioners _________
- Practitioners __________________
- Advanced practitioners__________
- Consultant practitioners _________

15. How many radiographers are reporting MRI scans at your practice? _________

16. How many radiographers are training to report MRI scans at your practice? ___

17. What factors contributed to your decision to enter radiography? (tick as many as appropriate)

- Challenging profession
- Technology based profession
- Allied medical profession
- Caring profession
- Well-paid
- Other (please specify) _________________________________
18. Why did you choose to enter MRI? (tick as many as appropriate)

- [ ] Needed more of a challenge
- [ ] Opportunity arose
- [ ] Interesting
- [ ] To increase job satisfaction
- [ ] Other (please specify) __________________________________

19. Why did you choose to begin reporting MRI scans? (tick as many as appropriate)

- [ ] Needed more of a challenge
- [ ] Opportunity arose
- [ ] Interesting
- [ ] Increase job satisfaction
- [ ] Other (please specify) __________________________________

20. Please indicate the most appropriate response to the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Tend to agree</th>
<th>Neutral</th>
<th>Tend to disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI is extremely challenging</td>
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<td>I am satisfied in my job</td>
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<td>My skills and knowledge are used to their full potential</td>
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<td>In general, patients are aware of my expertise and professional knowledge</td>
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<td>The radiologists respect my opinion</td>
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<td>Role extension opportunities have increased my job satisfaction</td>
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<tr>
<td>Management of my practice/department are supportive of role extension opportunities</td>
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<td>Radiologists at my department support MRTs reporting routine MRI scans e.g. knee, lumbar spine, IAMs</td>
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<td>I would prefer to progress my career in MRI by advancing my clinical expertise rather than taking on a management role</td>
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<td>The formalised ‘advanced practice’ role as a nationally recognised step in clinical career progression, has been good for the profession</td>
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21. From your experience, how important do you think the following requirements are to ensure ‘best practice’, and to provide appropriate support to the reporting radiographers?

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Very Important</th>
<th>Important</th>
<th>Somewhat Important</th>
<th>Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgraduate academic qualification</td>
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<tr>
<td>Continuing Professional Development (CPD)</td>
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<tr>
<td>Clinical training</td>
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<tr>
<td>Specific short courses</td>
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<tr>
<td>On-going supervision by radiologists</td>
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<tr>
<td>Continuous audit of competence</td>
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<tr>
<td>Clearly defined scopes of practice</td>
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<tr>
<td>Formal supporting career framework</td>
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</table>

22. What advantages have you seen by providing further roles for MRI-MRTs?


23. What disadvantages have you seen by providing further roles for MRI-MRTs?


24. Are there any areas of concern that you have experienced with extending MRT roles in MRI?

25. Do you have any other comments regarding this topic?

_Thank-you_

Thank-you very much for your time and interest in completing this survey for me. Your experiences of role extension as a MRI technologist will be invaluable in the decision-making process for the New Zealand group of technologists who are keen to explore this further.

If you are happy that you have completed the questionnaire, click on the ‘Done’ button below. If you wish to review and/or change any of your answers, click on the ‘Prev’ button below.

Kind regards,
Adrienne Young