

# An investigation of advanced practice carried out by radiographers in New South Wales

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**Abstract Purpose:** This study investigated advanced practices carried out by radiographers in New South Wales (NSW). **Background:** Due to a chronic shortage of radiologists, radiographers in the United Kingdom have extended their clinical roles. These additional responsibilities have increased professional accountability, as well as improved the quality of care provided to patients. While it is likely that such professional role extension occurs in Australia, no known study has been performed to date on this topic. **Methods:** Questionnaires were mailed to Chief Radiographers of medical imaging departments (MIDs) across NSW. Questions related to MIDs demographics and advanced practices of radiographers including triage systems, formal and informal reporting, cannulation, intravenous contrast media administration, roles during diagnostic enemas, and involvement in research. Returned questionnaires were analysed. **Results:** A total of 69 questionnaires were returned from 115 distributed (60%). Seventeen percent of MIDs with an Emergency department had radiographers involved in the triage process; 39% of MIDs utilised a radiographer-reported abnormality detection system, whilst 30% provided a verbal report. Radiographer-performed cannulations and intravenous contrast media administration occurred in 77% and 79% of MIDs respectively. A total of 40% reported radiographers performing roles other than image acquisition during diagnostic enemas, radiographers participated in research in 13% of MIDs while radiographer clinical presentations, journal club participation and conference organisation occurred in 45%, 7%, and 38% of MIDs respectively. **Conclusions:** This exploratory study provides important baseline information on the extended roles of radiographers in NSW. The results could be used for future planning of radiographer roles and health service delivery techniques.

**Keywords:** advanced practice, cannulation, enemas, IV contrast injections, radiography, radiographer reporting, role extension, triage systems.

## Introduction

Healthcare professionals should aim to develop their skills by pursuing extended roles in the workplace.<sup>1</sup> In medical imaging departments (MIDs), role extension has been impacted upon by the continual development of technology and changes to healthcare delivery, thereby broadening the boundaries of roles required in diagnosis.<sup>2</sup>

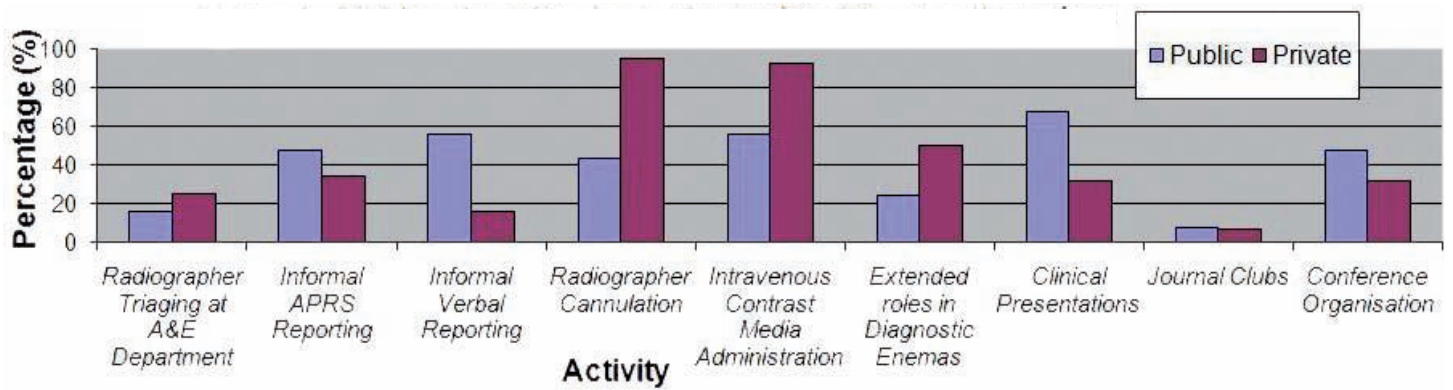
Combined with an increasing population, factors such as ageing and the decrease in likelihood of a disability-free life, the demand for diagnostic imaging procedures is expected to grow rapidly in Australia.<sup>3,4</sup> The extra workload will inherently increase the requirement for multi-skilling by professionals in MIDs, improving the capability of healthcare to adjust to the ongoing needs of the population. Without designing and implementing plans to combat these variables in the future, disproportionate stresses may be put on an already an overstretched healthcare system.<sup>3</sup>

Due to a chronic shortage of radiologists, radiographers in the United Kingdom (UK) have extended their clinical roles within MIDs.<sup>1,2,4-7</sup> It has been speculated previously that as part of a multi-disciplinary team, Australian radiographers are performing more duties than traditional image acquisition.<sup>8</sup> This can result in a more timely service, and subsequently improve the level of patient care provided.<sup>9</sup>

The importance of extended roles to the profession was emphasised when in 2007 the Board of Directors of the Australian Institute of Radiography (AIR) took the decision to establish the Advanced Practice Working Group (APWG) to follow-up on the foundation work done by the Professional Advancement Working Party (PAWP).<sup>10</sup> The board established the terms of reference of the APWG with the overall aim of defining an “advanced practitioner” model.<sup>10</sup>

The APWG interpreted the term “advanced practice” to mean circumstances in which a diagnostic radiographer or radiation therapist performs a clinical practice, duty or task on a regular basis that is beyond the established core practice boundaries of their profession. They proposed that advanced practitioners in the medical radiation professions occupy the positions titled “Clinical Specialist” with a list of tasks that could potentially fall under each role.<sup>10</sup>

If healthcare professionals can benefit the healthcare system and the patient by adopting new roles, then redefining professional tasks should be assessed.<sup>3</sup> An example of successful role adoption is demonstrated in nursing by the added responsibilities in the emergency department,<sup>11</sup> critical care setting,<sup>12</sup> and with the introduction of the nurse practitioner role.<sup>8</sup> The proactive approach to additional responsibilities performed by nurse



**Figure 1:** MID participation in radiographer advanced practices (public/private).

practitioners has been shown to be of a comparable quality,<sup>8</sup> thereby providing benefit by decreasing waiting time without comprising patient care.

While the current Australian experience in MIDs does not reflect the UK model, the Australian Government's Productivity Commission and media reports have identified dissatisfaction in timeliness of the service.<sup>13,14</sup> To address these concerns, the Productivity Commission recommended the potential extension of the role responsibility of other health professionals, namely the extension of the radiographer into plain film reporting. Through the extension of roles in Australian radiography, expected benefits include enhancing patient care and decreasing patient mismanagement, increased radiographer value in the multi-disciplinary team, and value adding to the scope of practice of the profession.<sup>15</sup>

### Purpose

The aim of this study was to investigate the advanced practices carried out by radiographers in NSW. The objectives to be achieved included determining radiographer involvement in; triage, informal and formal reporting, cannulation, intravenous contrast media administration, roles during diagnostic enemas and research by radiographers in NSW.

### Methodology

#### The Questionnaire

The study used a cross sectional survey design.<sup>16</sup> Following clearance from the University of Sydney Human Research Ethics Committee, questionnaires were posted to 115 MIDs identified from the University of Sydney, Discipline of Medical Radiation Science website as clinical centres involved in the education of radiography students. Questions were asked to obtain a description of the MID, identifying public/private ownership, geographical location,<sup>17</sup> professional development year radiographer (PDY) accreditation and number of full time radiographers.

Information was sought by a review of the literature on advanced practices being performed by radiographers predominantly from the UK but also Australia. From the results of this, open and close ended questions were designed to examine advanced practices in the context of triage systems,<sup>18</sup> informal<sup>11,19</sup> and formal reporting,<sup>5,6</sup> cannulation,<sup>5,6,8</sup> intravenous contrast media administration,<sup>5,6</sup> roles during diagnostic enemas<sup>7</sup> and research<sup>20</sup> performed by radiographers in NSW.

#### Data collection and analysis

Each centre was mailed a pack consisting of; a letter to the Chief Radiographer, a letter to the Principal of the practice, information sheet, a self report questionnaire, and reply paid envelope. Inclusion was voluntary. The letter introduced the research team,

while the Information Sheet answered frequently asked questions regarding the study. Upon consenting to the study the Chief Radiographer, or their delegate, were asked to complete the self report questionnaire. Identifying information on MIDs was not collected, thus assuring anonymity and enabling an unbiased opinion of radiographer roles to be obtained. Returning the questionnaire indicated consent.

Data were collated, quantified and analysed with SPSS 15.0<sup>®</sup> (SPSS Australia, St Leonards NSW, Australia) followed by suitable statistical tests for the individual cases. A significance level for rejection of the null hypothesis (no association) was set at 5%, which has been used in a previous study into extended radiographer roles.<sup>6</sup>

### Results

Sixty-nine questionnaires were returned from the 115 distributed to MIDs across NSW (60% response rate). Twenty-five MIDs were identified as public hospitals (36.2%), 38 as private practices (55.1%), and six as private hospitals (8.7%). MIDs located in major cities of Australia included 60 (87%), while nine were from inner regional areas of Australia (13%). A total of 68 (98.6%) MIDs had AIR PDY accreditation. Fifty (72.5%) MIDs had 14 or less full time radiographers, compared to 19 (27.5%) MIDs with 15 or more full time radiographers.

Accident and Emergency Department informal and formal reporting

A total of 29 MIDs were identified as having an Accident and Emergency Department (A&E) at their site (100% Public ( $n = 25$ )/ 9% Private ( $n = 4$ )). Of the MIDs with an A&E, 17% ( $n = 5$ ) reported some participation in the triage process (Figure 1). Radiographer triaging included prioritising imaging requests on the basis of clinical need ( $n = 2$ ), and assessing clinical information on requests for appropriate imaging ( $n = 1$ ).

Radiographer abnormality detection systems (RADS)<sup>19</sup> were in place in 39.7% of MIDs ( $n = 27$ ) (see Figure 1). A single MID used electronic "sticky notes" to pass the radiographers' written opinions to the radiologists. There were no cases of radiographers issuing formal plain film reports.

Verbal plain film reporting was performed by radiographers when required at 30.4% ( $n = 21$ ) of MIDs (Figure 1). Only one MID provided an explanation for this. It identified circumstances where radiologist reporting was consistently delayed, due to limited attendance onsite. This provided the referring physician an option to call for an opinion based on the study performed.

#### Radiographer cannulation, contrast media administration and diagnostic enema participation

Of the sites involved, 77% ( $n = 53$ ) of MIDs reported that

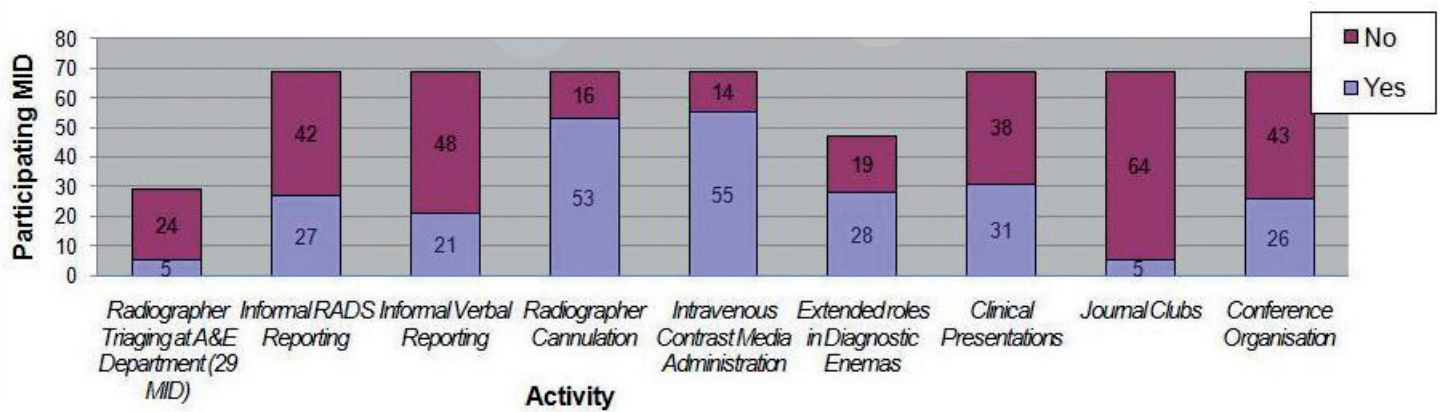


Figure 2: MID participation in radiographer advanced practices (yes/no).

radiographer cannulation occurs (Figure 2). A further 79.7% of MIDs ( $n = 55$ ) reported radiographer performed intravenous contrast media administration (see Figure 1).

In total, 47 MIDs (68.1%) in the study were currently carrying out diagnostic enema examinations from which 59.6% of MIDs ( $n = 28$ ) reported performing tasks other than image acquisition during the examination (33.3% Public ( $n = 6$ ), 75.9% Private ( $n = 22$ )). Common among these were setting up for the procedure ( $n = 24$ ), inserting the enema tip ( $n = 7$ ), and removing the enema tubing ( $n = 4$ ). A single private practice located within a major city of Australia noted provision of a radiographer verbal report at the conclusion of a diagnostic enema (2.1%).

**Research, clinical presentations, journal clubs and conferences**

A total of nine MIDs (13%) reported having radiographers undertaking research. Six were located within major cities of Australia, while the remaining three were from inner regional areas of Australia. Six of these MIDs had 15 or more radiographers while three had 14 or less. Common fields of research included MRI ( $n = 8$ ), CT ( $n = 4$ ), mammography ( $n = 3$ ), as well as ultrasound ( $n = 1$ ), angiography ( $n = 1$ ), fluoroscopy ( $n = 1$ ), image interpretation ( $n = 1$ ), and remote operators ( $n = 1$ ).

Clinical presentations were performed at 44.9% ( $n = 31$ ) MIDs (Figure 1). 7.25% ( $n = 5$ ) MIDs participated in journal clubs, while a further 37.7% MIDs ( $n = 26$ ) had radiographers involved in organising conferences (see Figure 1).

**Public v. private**

An analysis was carried out on the type of department and the frequency of radiographer participation in; triage systems, formal and informal reporting, cannulation, administration of intravenous contrast media, roles during diagnostic enemas and research (Figure 2).

Statistical testing was performed for relationships between activities performed and type of department (public/private). The chi square test was used for this investigation due to the two types of categorical data<sup>16</sup> and the resulting significant correlations ( $P \leq 0.05$ ) are observed in Table 1. If the activity was not alluded to in Table 1, it may be assumed the null hypothesis was accepted (no difference between variable and activity).

**Discussion**

This study has identified some advanced practices which are similar to those being performed within the UK.<sup>5</sup> Previous studies of informal radiographer reporting have concluded whilst it is utilised extensively overseas, it can only be referred to as sporadic in Australia.<sup>1,19</sup> This study is broadly in agreement

Table 1: Significant differences from variable by activity.

Variable	Activity	P value
Public/private MID	Verbal plain film reporting	0.001
Public/private MID	Extended roles during diagnostic enemas	0.040
Public/private MID	Clinical presentations	0.040

with this statement with 42% of MIDs providing some type of informal reporting. Evidence regarding the performance of radiographer formal and informal reporting in the UK has been well reviewed,<sup>1,19,21,22</sup> concluding that specially trained radiographers can report accident and emergency films to a high level of accuracy. Furthermore, a separate survey concluded other healthcare groups found radiographer reporting on selected body areas acceptable.<sup>9</sup>

However, views still exist that there is a lack of flexible knowledge by radiographers to associate the relevant radiological findings to clinical conditions for a medical report.<sup>23</sup> To address this concern the Australian Governments' Productivity Commission identified radiographers have the potential to perform this task if they have additional training, clear protocols and a few other conditions regarding patient care were met.<sup>14</sup> This is acknowledged by the AIR and the future directions proposed by their PAWP concurred.<sup>15</sup> Despite the fact that this has been supported for implementation in Australia, this study has shown that reporting continues to be performed on an informal basis only (39.7% with RADS and 30.4% informal verbal reporting).

Studies observing advanced practices in the UK,<sup>5,6</sup> found cannulation and contrast media administration by radiographers could permit significant monetary savings to the healthcare provider.<sup>24</sup> While it has been previously speculated that cannulation and contrast media administration is performed by radiographers in Australia,<sup>8,25</sup> the results of this study support this view within NSW. Cannulation and contrast media administration is identified as prevalent amongst NSW radiographers, thereby appearing as a widely regarded acceptable practice (77% and 79.7% of MIDs respectively).

In a recent study into advanced practices undertaken by radiographers in the UK, 82% of managers responded that radiographer conducted barium enemas occurred within their department.<sup>5</sup> A further study found that when compared to radiologists, there was no statistically significant differences between UK radiographers and radiology registrars, with regard to; displaying the colon, screening time used, and number of exposures.<sup>7</sup> Experienced radiographers in the UK have been shown to report on self performed double contrast barium enemas with a high level of accuracy.<sup>26</sup>



It is recognised that to safely perform barium enema tasks, further education and training are required. However this study shows some MID's (24% of those in the study) in NSW are already involved in these examinations; setting up for the procedure, inserting the enema tip, and removing the enema tube. If further autonomy was to occur within this role, it is suggested the majority of the formal training would involve clinical based assessment techniques.

The chi-square test utilised in this study, revealed a statistically significant relationship between the type of MID's (public or private), and the likelihood of performing roles other than image acquisition during a diagnostic enema ( $P = 0.04$ ). The chi-square test is non directional and is only able to predict likelihood of association other than chance.<sup>16</sup>

When investigating research performed by NSW radiographers, the results appear to show an area of deficiency. The increasing requirement for evidence based practice within NSW as the founding principle for health gain,<sup>27</sup> would suggest that research should be an area of high activity in MID's. While limited in Australia, previous UK studies have suggested that the conducting of research and disseminating of results is an area where the development of the profession is needed.<sup>20</sup> There is clearly a deep need for the development of research focused post graduate courses offered by the universities designed to respond to the ever changing requirements and staffing profile and of the radiographic profession in Australia as a priority. Other areas where research could be encouraged and showcased include clinical presentations, journal clubs and organising conferences, although, the involvement of NSW radiographers in these activities is presently sporadic and irregular, occurring in 44.9%, 7.25% and 37.7% MID's respectively.

The results of this study may be used for future planning of health service delivery. While the precise definition of the role of the modern radiographer in NSW is difficult, NSW MID managers can identify areas in which radiographers are being utilised elsewhere across the state. Important questions for researchers and managers to investigate in future are to what extent do NSW radiographers already perform advanced practice and are advanced practices widespread across Australia? The extent to which implementation of radiographer advanced practice will help to alleviate pending multidisciplinary workforce issues needs to be further explored. However this study does illustrate the abilities and versatility of modern radiographers.

### Limitations of the study

One potential limiting factor of this study is identified in the response rate of 60%. Although this figure was adequate for a postal survey, increasing the response rate would give more data on radiographers advanced practice in NSW.

As the questionnaire assured anonymity, the ability to follow-up on participants who had not responded was impaired. To rectify this, after being approved through an appropriate ethics committee, future studies should have a reminder phone-call or follow up letter to all MID's to increase participation rate.

In response to two questions, the variables utilised failed to divide MID's for demographical analysis. PDY accreditation was acknowledged in 98.6% MID's, and as identified in the Australian Bureau of Statistics 87% of responses were received from major cities in Australia.<sup>17</sup> Due to the limitations of these variables, significant statistical analysis was not possible and thus, conclusions were unable to be drawn from the data received.

The fact that this study was directed to Chief Radiographers of MID's across NSW may identify bias in responses provided. It is possible different conclusions would be made if individual radiographers were approached.

### Future research

A broader study of all Australian MID's should be undertaken before national conclusions can be drawn. It is not possible to project these findings nationally, as differences may be apparent from demographical variables not identified or included in this study.

Potential research could also look at ways in which specific extended roles by radiographers are enhancing the healthcare system, including the quality of performance. Alternatively, potential roles that could be undertaken to further improve health care service delivery should also be investigated.

### Conclusions

Significant baseline information concerning the current extended roles of radiographers in NSW have been collated, quantified and analysed through this study. The findings suggest that the role of radiographers in NSW MID's is diverse and inconsistent. It is perceived that this is caused by the ongoing rapid development of technology in MID's, and that this will continue to transform the skill mix required within the multi disciplinary team. Therefore radiographers will need to further adapt to the changing demands facing the profession and the associated delivery of healthcare services that will need to be facilitated with a greater acceptance of the importance of further education. This will ultimately be to the benefit of patients.

The adoption of new roles should only occur where benefits can be realised to the healthcare system, and more importantly to the patient directly. Efficacy of this future direction will only be possible with greater dedication and research into the transfer of responsibilities, incorporating mitigation of possible detrimental consequences. If the transfer of responsibilities is determined viable and patient care is improved, then its implementation should be seriously considered.

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