Preparedness for clinical practice – perceptions of newly qualified radiographers

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Abstract Purpose: To investigate the perceptions of newly qualified radiographers in the Sydney metropolitan area regarding their preparedness for clinical practice. Methods: Twenty-three newly qualified radiographers (corresponds to a 43% return) from nine public hospitals and nine private practices within the Sydney metropolitan area were surveyed. The questionnaire assessed newly qualified radiographers’ preparedness against a number of items derived from published radiography standards by the Australian Institute of Radiography (AIR) pertaining to knowledge, skills and values radiographers should acquire upon graduation and completion of the Professional Development Year (PDY) programme. Statistical analysis examined differences in preparedness between those who work in public hospitals and those who work in private practices. Results: Significant differences in perceived preparedness between newly qualified radiographers who practice in public hospitals and those who practice in private practices were found in two criteria which include the ability to care for patients with physical or mental disability and equipment manipulation. Positive feedback was given in regards to university degree and PDY programme preparation. Suggestions for degree and PDY programme improvement were provided. Conclusion: Overall, newly qualified radiographers perceived themselves as well prepared for their role as an accredited practitioner.

Keywords: clinical practice, curriculum radiographers, preparedness, professional development year, university.

Introduction

Diagnostic radiography students are deemed qualified healthcare practitioners in their field after fulfilling the requirements set by the universities and the Australian Institute of Radiography (AIR). Professional and educational recognition for Australian radiographers is obtained by an undergraduate or a graduate entry masters degree which includes clinical practice in accredited centres plus a professional development year (PDY) of clinical practice following graduation before accreditation by the AIR. Completion of these requirements provides qualification for graduates to practice. However, formal qualification does not necessarily translate to graduates feeling prepared for practice. This is an important topic that has not been previously investigated in Australia.

Empirical studies have been performed that support positive curriculum outcomes in other healthcare disciplines such as occupational therapy, nursing and dentistry in terms of preparedness for their clinical practice. However, no previous studies were found in the field of radiography in Australia. As no curriculum ever remains static and new graduates entering the workforce are increasingly required to work as autonomous and accountable clinicians, the assessment and evaluation of current curriculum and educational programmes are necessary to validate the outcomes. Moreover, significant feedback to educators which consequently assist the development and review of curriculum and educational programmes should be made. The perceived areas of graduate strengths, weaknesses and areas for curriculum development could be revealed to provide empirical evidence to support the assertion that the current curricula produced professionals who were “fit for practice”.

Therefore, the aim of this study is to survey recently qualified radiographers’ perceptions of their tertiary education and the PDY programme, as well as their feelings on preparedness for clinical practice. As perceptions on preparedness were positive amongst other healthcare disciplines, the hypothesis of this study is that the newly qualified radiographers would be prepared for clinical practice. The objectives are to:

- Investigate how newly qualified radiographers perceived their preparedness for clinical practice.
- Determine the perceived strengths and weaknesses of newly qualified radiographers regarding their clinical performance.
- Compare the differences in perceptions of preparedness for clinical practice between newly qualified radiographers working in public and private health sectors.
- Discuss the perceptions of newly qualified radiographers in regards to their tertiary education and PDY programme.

Methods

Questionnaires with both open-ended and closed format questions were used. Twenty-three items were included in the closed response format section. These items were derived from a list of statements from questionnaires used by a previous similar study conducted by Mackay, Anderson and Hogg. Radiography standards published by the AIR were also incorporated into these items as they indicated the knowledge, skills and values radiographers should acquire upon graduation and completion of the PDY programme. The closed response format items were divided into four categories: professional attributes, communication skills, patient care skills and clinical skills. A 4-point Likert scale was used. Items were scored on the Likert scale, ranging from 4
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The sample group was determined using cluster sampling. The target population for this study was newly qualified radiographers working in Sydney metropolitan areas. The chief radiographers from all the radiology centres in the Sydney metropolitan areas were contacted and asked to distribute the surveys to the newly qualified radiographers. For the purpose of this study, newly qualified radiographers are defined as radiographers who have completed their PDY programme within the last year. The radiology centres were then divided into two sub-populations: public hospitals and private practices.

The collected data was analysed using the Statistical Package for the Social Sciences (SPSS) programme.16.0 (SPSS Australasia, St Leonards, Australia).9 In order to compare the differences between working in public or private health sectors on preparedness, Levene independent groups t-test was performed to test for correlation between variables.9 This test is a non-parametric test and was chosen because of its ability to test variables which are ordinal variables and data which are asymmetrically distributed.6

Results

A total of fifty-three questionnaires were distributed to nine...
public hospitals and nine private practices within the Sydney metropolitan area. Twenty-three surveys were returned, representing a response rate of 43%. Data obtained from information relating to the gender and age group are summarised in Figure 1. It demonstrates a slightly higher proportion of male respondents to female and that most respondents were in the twenty-one to twenty-five age group (78%, n = 18). Figure 2 demonstrates that the majority of the respondents obtained their degree at the University of Sydney (65%, n = 15) and Figure 3 demonstrates that the majority of the respondents are working in public hospitals (70%, n = 16).

**Professional attributes**

Responses to survey questions related to professional attributes is summarised in Table 1. Sixty one percent (n = 14) of the respondents strongly agreed that they were able to work within their limitations and fifty-two percent (n = 12) of the respondents agreed that they could work within the departmental guidelines.

Table 2 shows the mean scores for the closed-ended responses relating to professional attributes. Items were scored on the Likert scale, ranging from four points for strong agreement and one point for strong disagreement. There were no significant differences for any of the items between those who work in public hospitals and in private practices.

**Communication skills**

Table 3 represents responses to survey questions related to communication skills. Seventy percent (n = 16) of the respondents strongly agreed that they could communicate effectively with patients while sixty-five percent (n = 15) of the respondents strongly agreed that they were able to communicate effectively with their colleagues.

The mean scores for the responses relating to communication skills are shown in Table 4. There were no significant differences for any of the items between those who work in public hospitals and in private practices.

**Patient care skills**

The responses to survey questions related to patient care skills is summarised in Table 5. Fifty-two percent (n = 12) of the respondents strongly agreed that they were able to adapt care for patients with physical or mental disability; while only thirty percent (n = 7) of the respondents strongly agreed that they could identify and respond to changes in patient’s conditions.

Table 6 demonstrates the mean scores for the responses relating to patient care skills. When comparing those working in public hospitals and private practices.
hospitals and those working in private practices, significant differences were found for “adapt care for patients with physical or mental disability” ($P = 0.02$) (Levene independent groups t-test) with newly qualified radiographers working in public hospitals rating their ability higher (3.7) than those working in private practices (3.1).

**Clinical skills**

Table 7 represents the responses to survey questions relating to clinical skills. Eighty-seven percent ($n = 20$) of the respondents strongly agreed that they could prioritise examinations according to urgency while seventy percent ($n = 16$) strongly agreed that they were able to perform full range of plain film examinations. Sixty-five percent of the respondents strongly agreed that they were able to plan examinations using the request form and department protocols ($n = 8$).

Table 8 demonstrates the mean scores for the responses relating to clinical skills. Significant differences were found between those working in public hospitals and those working in private practices for equipment manipulation ($P = 0.04$) (Levene independent groups t-test) with the results favouring the private practices group.

Qualitative analysis was carried out for the open-ended questions, which asked the respondents to provide additional comments. The responses were grouped into five categories: (1) plain film examinations; (2) degree preparation; (3) degree improvement; (4) PDY programme preparation; and (5) PDY programme improvement.

**Discussion**

Our results suggest that newly qualified radiographers perceive themselves as prepared for clinical practice, as indicated by the high mean responses (above 3.0 indicating agreement) to the survey questions. The results were found to be consistent with the study conducted by Mackay, Anderson and Hogg which also revealed that the mean response to the questionnaire statements were all above 3.5 suggesting broad agreement that graduates were well prepared.

Further statistical analysis in this study revealed significant differences on perceived preparedness between newly qualified radiographers who practice in public hospitals and those who practice in private practices. Two specific criteria highlight these differences.

Newly qualified radiographers who work in public hospitals scored higher than those who work in private practices when they were asked if they felt prepared to meet the criteria of appropriate care for patients with physical or mental disability. The differences in perceptions between public hospital and private practice radiographers may be due to exposure to a greater range of patient presentations in public hospitals.

Newly qualified radiographers who practice in private practices scored higher when asked if they felt prepared to meet the criteria of equipment manipulation. This could be due to differences in workplace dynamics unique to each sector. Continuous patient turnover in private practices could encourage newly qualified radiographers to adapt to the equipment quicker and hence feel better prepared in equipment manipulation.

The overall comments of the respondents regarding their preparedness in performing plain radiographic examinations were positive. However, there were a few areas of concern identified by the respondents regarding plain film examinations that they did not feel confident in performing. This included temporomandibular joint (TMJ), mastoid, skull and sinus plain film imaging. The open-ended question revealed that infrequent exposure and lack of practical skill were the key contributors to this lack confidence. This result is also consistent with the findings of Mackay, Anderson and Hogg which identified skull and sinus plain film examinations as being the areas where graduates lacked confidence. Our finding could be further explained by the fact that Computed Tomography (CT) of the head has been one of the tests that is ordered for the initial assessment of head trauma as part of the clinical protocol. This decreases the chance for students to have “hands on” experience of these examinations.

One way to solve this problem is by using radiographic technique simulations in university-based practicals, for example, introduce a complete scenario where a patient requires plain film imaging of the skull. The requesting pattern for head CT does not seem to only reflect national standards, but also in other countries such as England and Canada, CT scan has essentially replaced skull x-rays as the modality of choice. An argument could be...
presented here to change the “standard” of curriculum when it comes to skull plain film imaging to reflect this change in clinical practice. This area of radiography might be more appropriate to be learned after qualifying and during the PDY programme and hence making skull radiography as part of Continuing Professional Development (CPD) rather than part of the recommended curriculum.

Nineteen respondents gave positive opinions on how the degree prepared them to meet the criteria for clinical practice. They felt the degree gave them the background knowledge in radiography and also helped build their confidence before practicing in the clinical setting. One respondent who works at a public hospital and studied at the University #1 stated that “my degree definitely prepared me for the working environment as it gave me the knowledge and practical experience I needed to feel confident in my abilities, both radiographically and also with communication and patient handling skills”. Another respondent from the same university further commented that “the degree gave me the knowledge I needed to learn during my PDY year...”. Based on the opinions given by the respondents, this finding demonstrates that universities have successfully delivered the criteria that newly qualified radiographers perceive as useful for clinical practice.

The respondents were also given the opportunity to comment on how the degree could be improved to better prepare them for the clinical practice. One suggestion derived from the responses is the necessity for more practicals with “real patients”. One of the respondents who studied at University #3 commented that “maybe more practical advice per patient presentation and dealing with the variety of people that require assistance or examination i.e. aggressive, dementia and autism patients”. Another respondent from University #1 suggested “more practical sessions like role play so that students can improve their communication, patient care and clinical skills”. This finding is very similar to the study conducted on medical students by Nestel and Tierney14 who reported that role play was valued by students as it provided opportunities for observation, rehearsal and discussion, realistic roles and alignment of roles with other aspects of the curriculum. Another suggestion that was derived from the responses is the need to concentrate more on radiography related subjects. The general comment was that the universities delivered subjects that they perceived as not being very useful in clinical practice. One respondent who studied at University #2 stated that “the degree could be improved by removing all irrelevant material that will in no way help me to become a better radiographer”. Another respondent who studied at University #1 explained that “students at university need to be taught more relevant subjects pertaining to clinical practice e.g. learning how to read ECG monitors so we can better recognise patient condition changes”. This finding seems to be a common occurrence in many studies. A student that was surveyed by Hodgetts, Hollis and Triska2 commented that “give me more practical information that I can go out and use... we just get a lot of stuff that you kind of get lost in...”.

Clinical placement is seen to be a particularly valuable experience because many respondents see it as the best way to learn radiography. One respondent who studied at the University #2 who works at a private practice explained how the clinical placement works in conjunction with the degree, “the degree gave me a basic theoretical understanding of these kinds of skills but clinical placement was the best and only way to develop these skills”. Clinical placement is indeed the essential element to the degree and it provides an opportunity to integrate theory and practice. Hodgetts, Hollis and Triska stated that fieldwork is “the best way to get practical experience. You learn the most and you make good connections”. One student surveyed in the study commented that fieldwork helped in evaluating what is practical and useful and what is extraneous and not needed.

The respondents’ attitudes towards the PDY programme were also positive. Some perceived the PDY programme as a means to develop the skills that they had learned during their tertiary education. One respondent who currently works in a public hospital explained that “[the] PDY was [a] great opportunity to develop all [my] skills. Twenty-four week and 48 week assessment[s] were good for identifying any areas that need[ed] improvement”. This is consistent with the study that was carried out by Beldham-Collins and Agustin14 which concluded that the NSW Radiation Therapy PDY programme had been reported to be

### Table 8: Comparison of responses relating to clinical skills by newly qualified radiographers working in public hospitals and private practices.

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Public hospitals mean (SD)</th>
<th>Private practices mean (SD)</th>
<th>All mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am able to prioritise radiographic examinations according to urgency</td>
<td>3.8 (0.4)</td>
<td>4.0 (0.0)</td>
<td>3.9 (0.3)</td>
</tr>
<tr>
<td>I am able to perform the full range of plain film examinations required in this department</td>
<td>3.7 (0.5)</td>
<td>3.7 (0.5)</td>
<td>3.7 (0.5)</td>
</tr>
<tr>
<td>I am able to plan examinations using the request form and department protocols</td>
<td>3.6 (0.5)</td>
<td>3.7 (0.5)</td>
<td>3.7 (0.5)</td>
</tr>
<tr>
<td>I am able to select correct exposure parameters</td>
<td>3.5 (0.5)</td>
<td>3.6 (0.5)</td>
<td>3.5 (0.5)</td>
</tr>
<tr>
<td>I am able to manipulate diagnostic imaging equipment safely and efficiently</td>
<td>3.8 (0.4)</td>
<td>4.0 (0.0)*</td>
<td>3.8 (0.4)</td>
</tr>
<tr>
<td>I am able to work accurately at an appropriate speed</td>
<td>3.6 (0.5)</td>
<td>3.7 (0.5)</td>
<td>3.6 (0.5)</td>
</tr>
<tr>
<td>I am able to recognise abnormal appearances on radiographs</td>
<td>3.3 (0.5)</td>
<td>3.4 (0.5)</td>
<td>3.4 (0.5)</td>
</tr>
<tr>
<td>I am able to decide on need for further views of a pathology</td>
<td>3.3 (0.5)</td>
<td>3.6 (0.5)</td>
<td>3.4 (0.5)</td>
</tr>
<tr>
<td>I am able to check the quality of my own work and take corrective action</td>
<td>3.6 (0.5)</td>
<td>3.6 (0.5)</td>
<td>3.6 (0.5)</td>
</tr>
<tr>
<td>I am able to perform fluoroscopic examinations required in this department</td>
<td>3.6 (0.5)</td>
<td>3.7 (0.5)</td>
<td>3.6 (0.5)</td>
</tr>
<tr>
<td>I am able to adapt to multiple trauma patients</td>
<td>3.6 (0.5)</td>
<td>3.7 (0.5)</td>
<td>3.5 (0.5)</td>
</tr>
</tbody>
</table>

*P < 0.05, Levene independent groups t-test
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beneficial by the graduate practitioners with the delivery and content to be considered relevant. However, in this study there were several negative opinions regarding the PDY programme. One respondent working in a private practice stated that “as far as the programme offered by the AIR, it was virtually non-existent. No training or benchmarking offered. My employer strove to make sure I was trained appropriately”. This is disconcerting as the whole purpose of the PDY programme is to ensure that all graduates are trained properly and exposed to different modalities. Another respondent also commented that “my PDY training had been ‘hands-on’ working experience and ‘on-the-job’ advice provided by colleagues. No formal PDY training was provided to prepare for the criteria”. This issue needs to be addressed by a study that focuses solely on the PDY programme to further evaluate the structure of the programme.

The respondents also provided suggestions on how the PDY programme could be improved to better prepare them for clinical practice. One of the respondents expressed the need for more rotation through modalities. This could be explained by the skill shortage situation in the Australian healthcare setting. This situation might encourage the employer to place graduates in areas that require greater staffing such as general radiography. As a result, some graduates might receive less exposure in certain imaging modalities such as CT. This situation is also reported by Beldham-Collins and Agustin16 where the work practices seemed to encourage the new graduate to become a team member much sooner than was initially intended due to a shortage of experienced radiation therapists. Another suggestion that was derived from the responses regarding improvement of the PDY programme is the need for ongoing learning. One respondent from a private practice stated that “perhaps some theory to keep the brain ticking and back-up the new things learned. For example, pathology and maybe theory on surgical procedures of relevance”. In order to support ongoing learning, the AIR has run the Continuing Professional Development (CPD) programme for over six years.17 The CPD programme aims to maintain competence and keep radiographers up-to-date by providing them with training in new fields.18 The CPD recognises the idea of mentoring as an important tool as it provides opportunities for practitioners to rethink the ways in which clinical practice is conducted and how practitioners do their work.17

Limitations and future developments

This study has provided an overview of the preparedness of newly qualified radiographers for clinical practice. However, due to the design of this study which only sampled the Sydney metropolitan area, the geographic range is limited resulting in a small sample size. A further development of this study would be a larger scale study, which attempts to gauge the level of preparedness of graduates nationwide. Future comparison could be made between newly qualified radiographers who practice in metropolitan and rural areas, as there could be different workplace dynamics between the two that could influence the level of perceived preparedness.

Minor differences in terms of perceived preparedness between the newly qualified radiographers working in public hospitals and private practices through the correlation study have been identified. However, there were an unequal number of public hospital and private practice respondents and uneven number of respondents representing each university. There should ideally be an equal number of respondents from both sectors to provide a significant and fair representation of each group. Studies in the future should therefore attempt to provide a more demographically balanced sample.

Measuring preparedness at a single point of time might not be desirable as some radiographers might not have had enough experience in some examinations on which to appropriately judge their preparedness. Future studies could be conducted using time-series analysis to yield a more accurate measurement of the radiographers over time.

Conclusion

This study has revealed important results regarding the perceived preparedness of newly qualified radiographers on clinical practice. The respondents do perceive themselves to be well prepared for practice. Eighty-seven percent (n = 20) of the respondents gave positive feedback on how the university degree and the PDY programme prepared them. The university provides the newly qualified radiographers with the basic theoretical knowledge, while the PDY programme allows them to further develop all the practical skills. Clinical placement was seen to be an important aspect where theory could be put into practice. Several areas for curriculum and PDY development were suggested including the need to concentrate more on radiography-related subjects and to provide ongoing learning during the PDY programme. Weaknesses in practical radiographic skills in TMJ, mastoid, skull and sinus plain film imaging were identified.

The methodology used in this study could be used for other healthcare disciplines to assess the perceived preparedness of other graduates. Improvements to the methodology are recommended, such as inclusion of larger sample size and utilisation of interviews to gain more in-depth perceptions.

In conclusion, in order to ensure that the current university curricula and PDY programme are able to produce radiographers who are well prepared, regular audits using valid and reliable tools would be valuable. This would provide confidence to all stakeholders that newly qualified radiographers are meeting the needs of the public and are able to deliver high standards of healthcare to the community.

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