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Original Research Article

Radiography Students' Perceptions and Experiences of their Clinical Placements: A Qualitative Systematic Review

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Abstract: Clinical placements provide opportunities for radiography students to apply theory into practice. Several primary research studies on the perceptions and experiences of radiography students regarding their clinical placements have been conducted. However, no study has systematically brought these studies together to provide a template for educators to develop a set of clinical supervision strategies that are grounded on evidence. The aim of this study was, therefore, to systematically review the evidence relating to radiography students' perceptions and experiences of their placements. In achieving this, a qualitative systematic review was conducted. Electronic databases, radiography and radiotherapy journals, and grey literature were searched for relevant primary studies. Data extraction was performed using the Valderas's extraction form and the National Institute for Health and Care Excellence (NICE) checklist for qualitative studies to critically appraise the studies. Eight themes emerged following thematic data analysis: clinical learning environment, theory- practice gap, hands-on practice, feedback on clinical performance, teaching and learning of professionalism, emotional aspect of working with patients, qualities of an effective and an ineffective clinical supervisor, and the relationship between the schools of radiography and clinical departments. Factors related to these themes positively or negatively impacted the students' learning process. In conclusion, there are many lessons to be learnt in continuing to improve the quality of radiography students' clinical placements. Stakeholders should work together to create a conducive clinical learning environment, whereby radiography students can develop their knowledge, skills and attitudes to become professional radiographers. This can be achieved through developing educational strategies based on evidence, such as provided in this systematic review.

Keywords: Qualitative, Systematic review, Clinical placement, Clinical supervision, Clinical supervisor, Radiographer, Radiography student, Perception, Experience.

INTRODUCTION

Clinical placements are an integral component of the radiography programmes worldwide. Radiography students spend approximately 50% of their training time on clinical placement in hospitals affiliated with the schools of radiography. The College of Radiographers of the United Kingdom (2006) notes that, during clinical placements, students learn by having planned periods of observation, education, reflection, and work alongside their clinical supervisors. This enables them to acquire the necessary knowledge, attitudes and skills of the radiography profession as required by regulators and professional bodies, such as the Health Professions Council of Zambia and Radiological Society of Zambia, respectively.

Clinical placements in radiography are important from many aspects. From a regulatory point of view, practice in clinical learning environment is required to ensure fitness to practice as a radiographer. From an educational perspective, working with a patient provides students with the opportunity to apply theory into practice. Ogbu (2008) points out that clinical placement enhances the development of independent learning skills that are fundamental in producing critical and analytical thinkers. During clinical placement, students have the opportunity to observe role models, practice, and reflect upon what they see, hear and do (Conway *et al.*, 2008; Challen *et al.*, 2016). From a clinical supervisor's perspective, clinical placements assist radiographers develop teaching, management and communication skills. Walsh (2014) adds that a sense

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of personal satisfaction in facilitating the development of students' sharing practice and enhancing learning, may result.

The College of Radiographers of the UK (2012) has emphasised the need to have conducive clinical learning environments for radiography students. However, it is challenging to provide a suitably conducive environment for learning because practice-based learning takes place in a demanding and complex environment where patient care is provided as well as student learning. Radiography students learn in a complex sociotechnical environment, often with critically ill patients, and are themselves at risk from ionising radiation. Learning activities are also unstructured and unplanned. For this reason, radiography students may experience a lot of factors which may facilitate or inhibit their clinical learning process. The Health Department of Australia and Human Services (2016) categorises these factors into internal and external. The internal factors are those which are controlled by the clinical departments, such as equipment, staffing levels, resources, departmental policies and preparations of clinical supervisors. On the other hand, external factors are those not controlled by the clinical department, such as patient case load, levels of funding, accreditation requirements and professional standards.

In view of the above, radiography students experience challenges during their clinical placements. The first challenge reported in the literature relates to departmental workload. X-ray departments are usually busy with limited teaching time. In a study conducted in the UK by Fowler and Wilford (2015), radiography students expressed concern with an increase in the workload. This resulted in radiographers not paying attention to students' learning needs. The second challenge is a lack of trained clinical supervisors. The majority of clinical supervisors in radiography around the world have received little to no training in educational principles (Sutton, 2013; Cunningham *et al.,* 2015). The lack of training in clinical supervision may lead to a trial and error method of teaching, which would hinder students' learning experiences. The third challenge identified in the literature is a lack of planning as teaching and learning in clinical environments is often been opportunistic. In order to provide an effective learning process, clinical supervisors should define the expected learning outcomes and communicate them to students. The fourth challenge is a lack of support to radiography students with learning difficulties. In a study conducted in the UK by Murphy (2010), dyslexic radiography students reported that radiographers do not fully understand what learning difficulties are, resulting in little or a lack of support.

Several research studies have investigated radiography students' perceptions and experiences of their clinical placements. However, no study to date has systematically brought these studies together to provide evidence to educators on which to base their decisions about effective clinical placements. Due to the lack of robust evidence on this topic and with a view to improving clinical training in Zambia, a review of existing research on this subject was deemed of interest to the researcher.

Purpose of the Study

The aim of this study was to systematically review the evidence relating to radiography students' perceptions and experiences of their clinical placements.

The objectives of this study were:

- To search for primary qualitative research studies on radiography students' perceptions and experiences of their clinical placements.
- To collect data on radiography students' perceptions and experiences of their clinical placements.
- To systematically extract data from the included studies for review.
- To critically appraise all relevant primary research studies for review.
- To synthesise the evidence on radiography students' perceptions and experiences of their clinical placements.
- To make recommendations that could improve the quality of clinical placements in radiography.

METHODOLOGY

A qualitative systematic review method was employed in conducting this study. Khan *et al.,* (2011) define a systematic review as a research method that identifies relevant studies, appraises their quality and summarises their findings using a scientific methodology. In this study, the qualitative approach was chosen as the researcher was interested in getting a deeper understanding of students' perceptions and experiences of their clinical placements (Bettany-Saltikov, 2012; Polit & Beck, 2017).

The following inclusion and exclusion criteria were defined in the study protocol (Table 1).

Table 1: Inclusion and exclusion criteria for the study

Inclusion criteria	Exclusion criteria
• Studies focusing on undergraduate radiography students (diagnostic & therapy)	• Studies focusing on radiographers and students from other healthcare professionals
• Studies that focus on radiography students' perceptions and experiences of their clinical placements	• Studies that focus on radiography students' perceptions and experiences of classroom teaching and learning
• Studies conducted by qualitative research design	• Studies conducted by quantitative and mixed methods research designs
• Studies published in English	• Studies not written in English
• Studies published from 2006 onwards	• Studies published before 2006
• Primary research studies carried out all over the world	• Systematic reviews, reports and expert opinions

Systematic reviews, reports and expert opinions were excluded since there are not primary research studies. Due to the continuous advancement in technology and research, studies published before 1st January 2006 were also excluded. Furthermore, non-English studies were excluded, as it was considered costly and time consuming to hire translators.

Searching for Relevant Literature

A literature search was conducted between August and December 2016 using the terms "*radiography or radiotherapy students AND clinical placement or clinical practice AND perceptions or experiences".* This involved both electronic and manual searching. The electronic searches were performed using 4 databases- CINAHL, PubMed/MEDLINE, Scopus and ScienceDirect. Hand searching of radiography and radiotherapy journals, unpublished papers, cited references, as well as the contacting of experts were also performed to avoid missing relevant literature.

Selection of Relevant Studies

The purpose of the study selection process was to identify studies from both electronic and manual searches that definitely addressed the purpose of this review. The process involved the searching of primary studies, selecting them according to the inclusion/ exclusion criteria (Table 1), screening titles and abstracts, and retrieving potential studies in order to obtain the final studies that were included in this review.

A combined initial literature search yielded 659 articles. Amongst the 659 articles, 640 were identified from databases, 8 were studies from journals, 2 were from grey literature, 3 came from contacting experts, and 6 studies from cited references. After removing 18 duplicates, approximately 641 articles were screened based on reading their titles and abstracts. Following the reading of titles and abstracts, 44 studies were selected for retrieval and detailed assessment. 44 of these were selected for detailed assessment, but only 9 met the inclusion criteria for this study. The literature search strategy is illustrated in Figure 1.

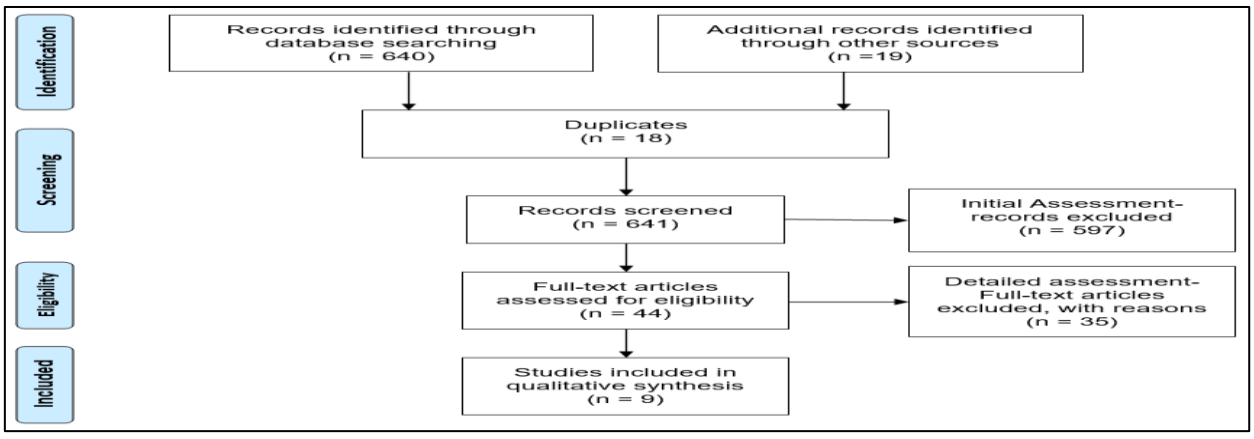

Figure 1: Flow chart showing literature search strategy

The characteristics of the included studies (N=9) are presented in Table 2, while excluded studies (N=35) and reasons for exclusion are presented in the Appendix 1.

Table 2: Characteristics of included studies (N=9)

No	Author	Year	Title	Design and data collection method	Number of participants	Publisher or Journal	Country
1	Conway *et al.,*	2008	Final-year diagnostic radiography students' perception of role models within the profession	Qualitative-Interviews	13	Journal of Allied Health	Australia
2	Dungey	2009	What effect does treating cancer patients have on radiation therapy students' identity development?	Qualitative-Open ended questionnaire	30	The Radiographer	New Zealand
3	Fortsch *et al.,*	2009	Connecting the classroom to clinical practice: A comparison of programs	Qualitative-Interviews, observation and focus groups	9	Radiologic Technology	USA
4	Williams & Decker	2009	Mature students' perspectives of studying radiography	Qualitative-Interviews	12	Radiography	UK
5	Bolderston & Morgan	2010	Global impact: An examination of a Caribbean radiation therapy student placement at a Canadian Teaching Hospital	Qualitative-Focus group discussion	8	Journal of Medical Imaging and Radiation Sciences	Canada
6	Sutton	2013	A focused ethnography of radiotherapy students' learning on their first clinical placement	Qualitative - Interviews and observation	17	Cardiff University	UK
7	Mifsud *et al.,*	2015	Radiography students' clinical placement experiences in MRI: A phenomenological study	Qualitative - Interviews and reflections	5	Radiography	Malta
8	Thanh Le *et al.,*	2015	A study of student radiographers' learning experiences in imaging obese patients	Qualitative -Focus group and reflections	31	Journal of Medical Imaging and Radiation Sciences	Australia
9	Challen *et al.,*	2016	A qualitative study of perceptions of professionalism amongst radiography students	Qualitative -Focus group	17	Radiography	Estonia

Data Extraction and Quality Assessment

The data extraction process involved going back to the selected studies and highlighting the relevant information to meet the objective of this review and extracting data relating to population, exposure and outcome or themes. In order to standardise this process and improve the validity of the results, the reviewer employed a validated data extraction form developed by Valderas *et al.,* (2012). The data extraction form included information relating to the year of publication, study design, participant characteristics, data collection instrument, main findings, the results of the critical appraisal and reference for each study (Appendix 2). The reviewer started extracting the data by reading through the results of all included studies a number of times to become fully immersed with the data. The reviewer then colour-coded the themes into positive (green) and negative (blue) perceptions and experiences manually. The texts highlighted were then entered on the data extraction form for each of the included studies under the themes section. The colour code and page numbers were also entered.

As part of the systematic review process, all included studies were assessed for quality. The quality of a study may be defined as the degree to which it employs the measures to minimise bias and error in its design, conduct and analysis (Khan *et al.,* 2011). The studies were judged with regard to authenticity and trustworthiness. The reviewer employed the appraisal tool for qualitative studies developed by the National Institute for Health and Care Excellence (2013) in order to ensure that studies were assessed in a systematic manner. The NICE appraisal tool (Appendix 3) was chosen because it has been validated and contains only 7 sections, allowing a rapid evaluation of each study. Studies were ranked in three categories of quality (high, moderate and low) according to the proportion of the total items with which they comply with the checklist.

All included studies were found to have had a high quality in methodology.

Data Synthesis

Data synthesis involved combining the findings from the included studies and categorised them on the basis of similarity using thematic analysis. Thematic data analysis was then conducted according to the four steps recommended by Maltby *et al.,* (2010): familiarisation with collected data, identification of themes, clustering, and naming of the themes.

RESULTS

Clinical Learning Environment

All the studies included in this review identified issues relating to a conducive clinical learning environment. According to the studies reviewed, radiography students appreciated radiographers who helped them to settle. This was said to be helpful in building relationships with staff and patients. Students reported being scared and nervous on their first clinical placement, as shared by one student:

> *"When I first started it was very overwhelming as I'd never really had anything to do with sick people and I felt as though I was expected to understand what they were going through. I was quite scared and anxious (Dungey, 2009, p 12)*".

Some students appreciated a clinical learning environment which was supportive, with good working relationships. This was perceived by students to produce positive learning experiences. One student had this to say:

> "*Whenever I have a problem, I feel like I can always go to them and they will listen (Fortsch et al., 2009, p 118).*

Students reported that they felt confident and motivated to learn in an environment where they were accepted as learners. However, some students reported feeling unwelcome which made them uncomfortable:

> "*At times I felt excluded from the rest of the team, which sometimes made me feel out of place. Sometimes they stayed talking together and since there is a long waiting time during magnetic resonance imaging (MRI) scanning…you feel uncomfortable and you stay there listening to them talk. They talked about personal things and you feel uncomfortable because you do not want to interfere in their discussion (Mifsud, 2015, p 18)".*

Some students preferred a clinical learning environment which allowed them freedom whilst simultaneously providing support so that they develop confidence and responsibility. This was best illustrated in the following extract:

> *"I like to be in the room by myself and the radiographers may be just right outside. If I can't figure this out, then I call them in…(Fortsch et al., 2009, p 117)".*

Generally, students were grateful for the supervision received during their clinical placements. However, some students felt unsupervised and this was reported to have impacted negatively on their learning process. One student stated that:

> "*It was the fact that I had to find time to talk to them that was quite annoying from my side because I didn't want to interrupt them, but I would have preferred if someone had given me some more attention instead of having to ask everything myself (Mifsud et al., 2015, p 19)".*

All comments above indicate that the creation of a conductive clinical learning environment was an important factor in the facilitation of students' learning.

Theory-Practice Gap

Three out of the nine studies in this review identified that there was a disparity between the theory taught in the classroom and what is practiced in the clinical environment. This theme had three sub-themes: gaps relating to radiographic techniques, professionalism and infection control. Students understood that learning takes place when they apply theory into the reality of radiography, as it enhances their learning. One student stated that:

> "*I feel like the University is pretty useful though, like you do read a basis from somewhere, but its small tricks that you learn from clinical placements (Thanh Le et al., 2015, p 63)".*

Some students reported that there are differences in radiographic techniques between what is taught and practiced: "*You do learn textbook type patient cases at University, then you go out and it's like wow, this is so different and you have to learn different techniques and adjust your technique (Thanh Le et al., 2015, p 65)".* Other students also indicated that professional behaviour differs between what is taught and practiced. One of the students had this to say:

> *"College is the place where professionalism is taught to us to a large extent, and clinical placement gives us an opportunity to reflect upon all of it and compare with it…and often things are not so professional in hospitals (Challen et al., 2016, p4)".*

Other students witnessed disparity regarding infection control. One student said:

> *"I was scared when I saw a radiographer approached a patient with a skin infection without wearing any gloves. I thought that she might catch*

the infection. It was scary (Challen et al., 2016, p4)".

This study revealed that some radiography students were confused during their clinical placements because of conflict between theory and practice. This was reported as a negative experience because students did not know whom to believe between the academic and clinical staff.

Hands-on Practice

All studies included in this review revealed the importance of hands-on practice. Students appreciated the importance of connecting theory with clinical experiences, as it facilitates the learning process. One student noted that:

"There is so much information… definitely worth having clinical placement. It helps to relate all that stuff so you can put the information somewhere instead of just storing it up in your mind (Fortsch et al., 2009, p 116)".

Some radiography students felt that having a small number of students per clinical supervisor contributed to a positive learning experience. This was expressed by one student who undertook an international clinical experience:

"Back home (Trinidad and Tobago) there are more students to a therapist. It was difficult because you did not have one to one. If there were three of us, we would have to take turns to go in with the patient, whereas here (Canada) it is just one student with all the therapists on your own unit. You get to learn everything. Back home it was more of a fight to learn (Bolderston & Morgan, 2010, p 155)".

All the reviewed studies reported that students were given opportunities to apply theory into practice in general radiography. This was valued by students as a positive clinical learning experience, as it helped them to develop confidence and competence. However, some students described specialised imaging, such as Computed Tomography (CT) and Magnetic Resonance Imaging (MRI), as lacking hands-on practice. One student said:

''*In bone density we scanned patients ourselves. In dental we performed dental X-rays so that when you have these things, you get more hands on and you realise and get to know more about the radiographers' work entails. Whilst when I went to MRI the only thing I had to do was screening, you focus on screening and you might sort of sidelined the rest, because the rest is not as important (Mifsud et al., 2015, p19).*

A lack of hand on practice in CT and MRI was reported to have negatively impacted the students' learning process in specialised imaging modalities during their clinical placements.

Feedback on Clinical Performance

This review found that feedback is an essential element of clinical education. Two studies revealed that students valued timely and frequent feedback given throughout the day by their clinical supervisors. This was said to be helpful in identifying their strengths and weaknesses and to make needed changes before the end of the clinical placement. Unfortunately, some students reported a lack of feedback on their clinical performance. One student complained that:

"They should give us feedback, halfway through or at the end or both…or set aside time just to say 'How's it going? What do you think? (Sutton, 2013, p161)".

However, in a study by Fortsch *et al.,* (2009, p 117), radiography students reported being satisfied with the feedback received from radiographers during their placements as it was timely and constructive. This was reported as a positive experience to students' learning process.

Teaching and Learning of Professionalism

Teaching professionalism to students through role modelling was identified as a powerful force in the development of their professional identities. Students appreciated professional behaviours exhibited by radiographers as it helped them to acclimatise to the profession. One student said:

"The radiation therapist asked the patient whether she knew about the side effects that may be expected from treatment. She answered gruffly, 'Yes, I do! However, I do not want to talk about it'. I was stunned and wondered how a radiation therapist should respond to such an answer. I observed that the therapists politely accepted and respected her decision without further questions and noticed that they remained calm and professional throughout the time. In addition, after her treatment, I found that the patient appeared relaxed and cheerful (Bolderston & Morgan, 2010, p 155)".

Students also appreciated radiographers who provided care and communicated effectively with their patients. This was said to be helpful in learning professional behaviours. One student said:

"*During the procedure they stayed talking to him, they pressed the button to actually stay talking to him and the way they talked to him, the way they placed words and how they calmed the patient down during the examination and also before, allowed me to acknowledge and understand how it had to be done (Mifsud et al., 2015, p 18)".*

However, some students expressed that some radiographers did not have good communication skills. This was said to have impacted negatively on their learning. One student remarked:

"I think there are radiographers along the way that can't really communicate. I find they can't communicate with students or patients. It makes me take a step back and think I don't want to work with that radiographer again (Conway et al., 2008, p 26)".

Some students also witnessed discrimination of patients by radiographers on the grounds of nationality and language spoken: One student said.

"I have seen discrimination on the grounds of nationality/language as my parents are of different nationalities, and I remember one situation in my clinical placement, for example, where all the staff members spoke the official language as they all were native speakers of this language. And then arrived a patient…where are many patients in that area who do not speak the official language…then the radiographers was just pointing with her finger that you should lie down here and that's it…. Your doctor will get the results (Challen et al., 2016, p4)".

The unprofessional behaviours exhibited by some radiographers were reported to have had negatively impacted on the students' learning process.

Emotional Aspect of Working with Patients

Three out of the nine studies identified the emotional aspect of dealing with very ill patients. In a study by Mifsud *et al.*, (2015), students felt that MRI provided the opportunity of building relationships with patients and in some cases these relationships presented with emotional challenges as indicated by the following comment:

"*It is sad to see patients of such young age coming for an MRI for tumours. I was not accustomed to seeing these children at such a young age passing through such a sad period. You feel sorry for them seeing them going through these things. You do not see these types of things in general X-rays. Ok, you do see sometimes children, which come for an X-ray because of a fracture, but you cannot compare a fracture with a tumour, (p 19)".*

The care of patients with terminal cancer affected students outside work. One student commented that:

"I worry much more about the health of my parents, siblings and extended family and friends. Often when mum or dad have complained of some type of pain-my initial reaction is 'oh my goodness it's cancer (Dungey, 2009, p 12)".

In view of the above, some students expressed concern with the lack of support in the clinical learning environment to students traumatised as a result of treating terminally ill patients. This was expressed by one student who said*: "We have no clinical supervision in terms of compulsory counselling with people outside the department, although I think I would find this really useful (Dungey, 2009, p 13)".*

In the reviewed studies, some students faced emotional and technical challenges with the imaging of obese patients, especially those on life support machines. One student said:

"It also depends on the state they are in. Like, say there are in ICU, but they have got too many tubes coming out of them…then you are more worried as well (Thanh Le el al., 2015, p 64)".

These emotions were reported to have impacted negatively on students' clinical learning experiences, especially with a lack of special support in the clinical learning environment.

Qualities of an Effective and an Ineffective Clinical Supervisor

From the reviewed studies, three qualities of an effective clinical supervisor were identified: clinical competence, teaching skills and personal qualities. Students valued radiographers who were knowledgeable and competent in radiography. This was said to be helpful in developing their competence. One student had this to say:

"*Someone who is highly skilled in radiographic techniques and patient care (Conway et al., 2008, p 24)".*

Students also appreciated radiographers who demonstrated teaching skills. This was best stated in the following extract:

"*I didn't know the radiographer …… was a teacher at first but she is one of the better ones, she would take it slowly with me and explain how it is done…She was giving more of a chance than anyone else really… (Sutton, 2013, p190)."*

The last quality of a clinical supervisor identified in this review related to personal qualities, as best illustrated in the following extract: "*They need to be approachable, friendly and seem willing to help and communicate (Conway et al., 2008, p 22)."* Other students in a study by Challen *et al.*, (2016, p 4) described a radiographer who exhibits poor time management as an ineffective clinical supervisor as it results in carelessly performing examinations due to hurrying, thus compromising image quality and the quality of patient care.

Relationship between the Schools of Radiography and Clinical Departments

Four out of the nine studies identified issues relating to the training of radiographers in supervisory skills, communications and preparations of clinical supervisors. According to the reviewed studies, there was a lack of communication between schools of radiography and clinical departments and these negatively affected students' learning experiences. This was evident in a study by Fortsch *et al.,* (2009, p 118), where radiography students noted a lack of communication between the school of radiography and radiographers regarding clinical learning outcomes. However, some students experienced satisfaction with the communication between the faculty and clinical departments. This is because radiographers adhered to the tasks prescribed by the school, which only allows students to screen the patient and not to undertake the MRI scanning. This is seen from the following extract:

> *"Whilst when I went to MRI the only thing I had to do was screening, you focus on screening and you might sort of sidelined the rest, because the rest is not important for the competence (Mifsud et al., 2015, p 19)".*

This review also found misunderstanding and conflict between academic and clinical staff in setting goals and learning outcomes for students (Williams & Decker, 2009, p 83). This negatively affected the learning process of students during their clinical placements.

DISCUSSION

This discussion focuses on the eight main themes which emerged from this review. These are the clinical learning environment, theory-practice gap, hands-on practice, feedback on clinical performance, teaching and learning of professionalism, emotional aspect of working with patients, qualities of an effective and an ineffective clinical supervisor, and the relationship between the schools of radiography and clinical departments. These themes could be the basis for establishing a quality clinical placement for radiography students.

The clinical learning environment (CLE) can have a profound impact on students' learning, be it positively or negatively. The CLE encompasses all that surrounds a student, such as equipment, clinical supervisors, clinical staff and patients. Fenton (2005) report that a conducive CLE is one that is supported by a good department atmosphere and relationships. Students feel confident and motivated to learn in an environment where they are respected, supported and regarded as part of a team (Ohagwu *et al.,* 2016). In this review, some radiography students reported establishing good working relationships with clinical staff. However, some reported that the environment was unwelcoming. It would be beneficial, therefore, for managers of X-ray departments to work with clinical supervisors of radiography students on creating clinical environments which are conducive to learning.

This review found that there are gaps between theory and practices in radiography training. This resulted in radiography students being confused, stressed and anxious. It should be noted that learning takes place when students apply what is learned in the classroom into the reality of radiography. Therefore, schools of radiography should work with radiographers on bridging the theory-practice gap using approaches suggested in the literature. Firstly, schools of radiography should integrate simulation into the curriculum (Cunningham *et al.,*2015).Harden and Laidlaw (2017) point out that the use of simulation can provide students with an active learning experience closely modelled on real situations that creates a bridge between the theory and practice. Secondly, lecturers who teach the theory should be part of the clinical placement team as they are familiar with the learning outcomes (Kyei *et al.,* 2015). Thirdly, clinical supervisors should be trained in educational theories related to clinical supervision for them to acquire appropriate knowledge, attitudes and skills for effective facilitation of practice-based learning to radiography students.

This review revealed that hands-on practice allows students to develop competence and confidence in radiography practices. There is an old saying that "practice makes perfect". This means that students require repeated practice to reach a competent level. Clinical supervisors should, therefore, create learning opportunities and give students time to practice. A study by Ohagwu *et al.,* (2016) found the clinical supervisor to be a key person in creating learning opportunities. Furthermore, hands-on practice helps students to learn new skills, and interact with clinical staff and patients. This is the reason why radiography students describe a radiographer who provides them with opportunities to practice their skills as the "best" clinical supervisor (Ingrassia, 2011). Generally, this review found that radiography students had good hands-on practice in the areas of general radiography. Unfortunately, some students experienced a lack of hands-on practice due to the increasing number of students per clinical supervisor. An increased number made it difficult for some students to demonstrate their skills effectively. This finding should serve as a reminder to schools of radiography to enroll only enough students as can be sufficiently handled by clinical departments. It was also found that the hands-on practice was lacking in specialised areas, such as MRI and CT. Although radiography students should be exposed to specialised diagnostic imaging modalities in

the undergraduate programme, it is considered as a part of postgraduate education.

It was found in this review that radiography students valued radiographers who gave them timely and frequent feedback. Harden and Laidlaw (2017) defines feedback as information communicated to a student that is intended to modify his or her thinking or behaviour to improve learning. A survey conducted by Ingrassia (2011) indicated that radiographers who provide constructive feedback to radiography students are the 'best' clinical supervisors. Therefore, radiographers should ensure that the feedback given to students is constructive; specific, timely and frequent. Furthermore, radiographers should be aware that if little or no feedback is given to students, good performance is not reinforced, and poor performance is not corrected (Walsh, 2014; Harden & Laidlaw, 2017). This is a reminder to the schools of radiography to provide clinical supervisors with knowledge and skills on how to give feedback to students on their clinical performance.

In this review, teaching professionalism to students through role modelling was identified as a powerful force in the development of students' professional identities. It is important to teach professionalism to radiography students, as evidence from the medical profession shows that certain unprofessional behaviours observed in students during training continue in their professional careers. In a study by Papadakis *et al.,* (2005), it was found that disciplinary action among practicing doctors by medical boards was strongly associated with unprofessional behaviours identified in medical school during training. In response to this, radiographers should be vigilant in noticing unprofessional behaviours from students and offer remediation programmes. This review found that the most common way students learnt about professionalism was through role modelling. Radiography students look to radiographers for demeanour and professional conduct to which they aspire and emulate (Fenton, 2005; Conway *et al.,* 2008; Challen *et al.,* 2016). This finding serves as a timely reminder for radiographers to constantly reflect upon their professional behaviours as radiography students emulate their conduct. Everything a clinical supervisor does, whether positive or negative, is likely to be regarded by students as acceptable behaviour or practice.

This review found that imaging and treatment of very ill patients are demanding and stressful. Although radiographers do not actually give palliative care in end of life stages, they are responsible for providing imaging and therapy services to cancer patients and sometimes can witness a dying patient. This review found that working with very ill and cancer patients presented with emotional challenges to students. Some students expressed shock at how ill some of the patients were and how unprepared they had felt themselves to be. This finding is not unique in healthcare. The literature reports that nursing students experience the same feeling when nursing critically ill patients (Huang *et al.,* 2009; Charalambous & Kaite, 2013). In "worst case scenarios" these experiences can be traumatic, and can leave the student, hopeless and disappointed in themselves and in many cases can "scar" their subsequent career (Charalambous & Kaite, 2013). Therefore, radiography students should be adequately prepared by the lecturers before their first clinical placements. Support in the form of counselling should also be available within the clinical environment. The main purpose of counselling is to help a student with traumatic experiences to develop better coping skills.

This review revealed three attributes of an effective clinical supervisor: clinical competence, clinical teaching skills and personal qualities. Firstly, clinical competence encompasses professional knowledge and clinical skills, clinical reasoning, and decision making (Cruess *et al.,* 2008). In this review, students described radiographers who demonstrated knowledge and skills of radiography as effective clinical supervisors. This helped them to develop confidence and competence. Secondly, clinical teaching skills involve understanding and applying the educational principles relating to clinical supervision of students. This review also found that students valued radiographers who had teaching skills because they explained the concept clearly, gave them the opportunity to practice their skills, provided constructive feedback, and gave an objective and fair assessment. Thirdly, the personal qualities of a clinical supervisor deal with non-cognitive attributes such as interpersonal skills and relationship building (Cruess *et al.,* 2008). This review found that students gravitate towards radiographers who are good communicators and approachable. This helped students to freely ask questions and was reported as a positive learning experience. It is therefore important for radiography managers to allocate radiographers who are experienced, and have teaching and good interpersonal skills, to supervise students during clinical practice.

In this review, the relationship between the schools of radiography and clinical departments were found to be crucial for the development of a conducive learning environment. The relationship issues identified include the training of radiographers in clinical supervision and communication of learning outcomes to the clinical departments. In this review, some radiographers understood their role regarding supervision of students as evidenced in a study by Mifsud *et al.,* (2015), where radiographers adhered to the MRI tasks prescribed by the school of radiography. However, some radiographers were not prepared in their role as clinical supervisors of radiography students due to a lack of support from the Schools of

radiography in terms of training. In addition, there was a lack of communication regarding the learning outcomes of students during clinical placements. The College of Radiographers (2006), point out that the fundamental to clinical placement is the quality of the relationships between clinical departments and schools of radiography. This finding highlights the importance of an effective relationship and communication between the academic and the clinical staff in order to optimise the quality of clinical placements.

CONCLUSION

This review revealed that clinical placements take place in a complex environment where patient care is provided at the same time as students' training. It can be concluded that clinical placement can be beneficial to radiography students when a conducive learning environment is created; where there are good working relationships, good relationship between the academic and clinical staff, students are given opportunities to apply theory into practice, constructive feedback is provided, a culture of professionalism is promoted, and clinical supervisors possess clinical competencies, teaching skills and personal attributes. Therefore, clinical supervisors of radiography students should strive to provide a clinical environment which is conducive for learning. To achieve this, it is recommended that radiography managers provide teaching and learning resources and identify radiographers who are interested in the facilitation of learning, and who should be given a responsibility of supervising students. In addition, designated radiographers should undertake a preparatory training programme before taking up the role of a clinical supervisor. This is because facilitation of learning is effectively delivered when there is an understanding of the educational principles (Walsh, 2014; Harden & Laidlaw, 2017). These strategies will ensure that clinical placements are organised and managed in the ways that facilitates the impact of positive learning experiences and minimises the impact of negative ones.

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REFERENCES

Appendix 1: Excluded studies and reasons for exclusion (N=32)

No	Author (s)	Year	Title	Design	Reason for exclusion
1	Mason	2006	Radiography student perceptions of clinical stressors	Quantitative	Research design
2	Wyrley-Birch	2006	The multilingual radiography classroom and the world or clinical practice	Qualitative	Population
3	Chapman & Oultram	2007	Enhancing the clinical experience: Newcastle Mater Hospital Radiation Oncology Department.	Quantitative	Research design
4	Palmer & Naccarato	2007	Differences in radiation therapy staff and students' perceptions of clinical teaching characteristics	Quantitative	Research design and population
5	Peggy	2007	How the clinical settings of radiography programs affect learning perceptions	Qualitative	Population
6	Bolderstone *et al.*,	2008	The experiences of English as second language radiation therapy students in the undergraduate clinical program: perceptions of staff and students.	Qualitative	Population
7	Foster	2008	Enhancing the learning experience of student radiographers with dyslexia	Quantitative	Research design
8	Lingenfelter	2008	A Student's reflection on her first clinical practicum	Report	Research design
9	Ogbu	2008	Radiography students' perceptions of clinical placements- A Nigerian perspective.	Quantitative	Research design
10	Castle	2009	Defining and assessing critical thinking skills for student radiographers	Quantitative	Research design
11	Murphy	2009	The clinical experiences of dyslexic healthcare students	Quantitative	Research design and population
12	Dumbleton	2010	Analysis of student clinical placement experience survey	Mixed study	Research design
13	Murphy	2010	On being dyslexic: Student radiographers' perspectives	Mixed study	Research design
14	Ward & Makela	2010	Radiography students' clinical learning styles	Quantitative	Research design and population
15	Halkett *et al*	2011	Improving students' confidence levels in communicating with patients and introducing students to the importance of history taking	Quantitative	Research design

16	Hussain *et al*	2011	An analysis of the experiences of radiography and radiotherapy students who are carers at one UK University	Quantitative	Research design. Not clinical related
17	Ingrassia	2011	Effective radiography clinical instructor characteristics	Quantitative	Research design
18	Strudwick *et al.,*	2012	Ready or not? How prepared are diagnostic radiography students for their first practice placements. A small-scale study in one university	Mixed study	Research design
19	Ngo *et al.,*	2013	The attitudes of Australian radiography students towards the use of assistive transfer devices to reduce biomechanical stress in the clinical setting	Mixed study	Research design
20	Bradley & Schofield	2014	The undergraduate medical radiation science students' perception of using the e-portfolio in their clinical practicum	Mixed study	Not relating to topic of study
21	Bridge & Carmichael	2014	Factors influencing radiation therapy student clinical placement satisfaction	Quantitative	Research design
22	Hyde	2014	A critical evaluation of student radiographers' experience of the transition from the classroom to their first clinical placement	Mixed study	Research design
23	Lee	2014a	The perception of radiation therapy students on a clinical specialist radiation therapist-led breast workshop	Quantitative	Research design
24	Lee	2014b	"Relevant and current": Radiation therapy students' perception of clinical credibility in the CSRT as lecturer	Quantitative	Research design
25	Kyei *et al.,*	2014	Impact of clinical placement on radiography students in Ghana	Quantitative	Research design
26	Cunningham *et al.,*	2015	Managing clinical education through understanding key principles	Literature review	Research design
27	Donovan	2015	Knowledge and attitudes of radiation therapists and undergraduate students towards older people	Quantitative	Research design and population
28	Fowler & Wilford	2015	Formative feedback in the clinical practice settings: What are the perceptions of student radiographers?	Mixed study	Research design
29	Kada & Booth	2015a	Student radiographers' attitudes towards the older patient: Six- and twelve-months post intervention	Quantitative	Research design
30	Kada & Booth	2015b	Student radiographers' attitudes towards the older patient: An intervention study	Quantitative	Research design
31	Kyei *et al.,*	2015	Challenges faced by radiography students during clinical training	Quantitative	Research design
32	Naylor *et al.,*	2015	Exploring the transition from students to practitioner in diagnostic radiography	Qualitative	Population. The study included radiographers

Appendix 2: Data extraction form

Extraction item	Details
Date of data extraction	
Bibliographical details of the study	
Aims or Research question	
Eligibility criteria of the participants	
Sample (participants) characteristics	
Recruitment context (e.g. where people were recruited from)	
Sampling method	
Theoretical background	
Qualitative or mixed method	
Data collection	
Data analysis	
Findings	
Recommendations	

Outcomes 1 –Positive experiences **Radiography students' clinical placement perceptions and experiences**			
Page	**Colour code**	**Main themes extracted**	**Sub-themes**
Outcomes 2- Negative experiences **Radiography students' clinical placement perceptions and experiences**			
Page	**Colour code**	**Main themes extracted**	**Sub-themes**

Appendix 3: NICE methodology checklist: Qualitative studies

Study identification Include author, title, reference, year of publication	
Guidance topic:	**Key research question/aim:**
Checklist completed by:	

	Circle or highlight 1 option for each question	
Section 1: Theoretical approach		
1.1 Is a qualitative or mixed approach appropriate? *For example:* Does the research question seek to understand the processes or structures, or illuminate subjective experiences or meanings (in social care this would apply to how care and support is organised and service user or carer experience)? Or could a quantitative approach better have addressed the research question?	Appropriate Inappropriate Not sure	Comments:
1.2 Is the study clear in what it seeks to do? *For example:* Is the purpose of the study discussed – aims/objectives/research question(s)? Are the values/assumptions/theory underpinning the purpose of the study discussed?	Clear Unclear Mixed	Comments:
Section 2: Study design		
2.1 How defensible/rigorous is the research design/methodology? *For example:* Are there clear accounts of the rationale/justification for the sampling, data collection and data analysis techniques used?	Defensible Not defensible Not sure	Comments:
Section 3: Data collection		
3.1 How well was the data collection carried out? *For example:* Are the data collection methods clearly described? Were the data collected appropriate to address the research question?	Appropriate Inappropriate Not sure/ inadequately reported	Comments:
Section 4: Validity		
4.1 Is the context clearly described? *For example:* Are the characteristics of the participants and settings clearly defined? Were observations made in a variety of circumstances and from a range of respondents?Was context bias considered (that is, did the authors consider the influence of the setting where the study took place)?	Clear Unclear Not sure	Comments:
4.2 Were the methods reliable? *For example:* Were data collected by more than one method? Were other studies considered with discussion about similar/different results?	Reliable Unreliable Not sure	Comments:
Section 5: Analysis		
5.1 Are the data 'rich'? *For example:* How well are the contexts of the data described? Has the diversity of perspective and content been explored? Has the detail of the data that were collected been demonstrated? Are responses compared and contrasted across groups/sites?	Rich Poor Not sure/not reported	Comments:
5.2 Is the analysis reliable? *For example:* Did more than one researcher theme and code transcripts/data? If so, how were differences resolved? Were negative/discrepant results addressed or ignored? Is it clear how the themes and concepts were derived from the data?	Reliable Unreliable Not sure/not reported	Comments:
5.3 Are the findings convincing? *For example:* Are the findings clearly presented? Are the findings internally coherent (that is, are the results credible in relation to the study question)? Are extracts from the original data included (for example, direct quotes from participants)? Are the data appropriately referenced so that the sources of the extracts can be identified? Is the reporting clear and coherent?	Convincing Not convincing Not sure	Comments:
5.4 Are the conclusions adequate? *For example:* How clear are the links between data, interpretation and conclusions? Are the conclusions plausible and coherent? Have alternative explanations been explored and discounted? Are the implications of the research clearly defined? Is there adequate discussion of any limitations encountered?	Adequate Inadequate Not sure	Comments:
Section 6: Ethics		
6.1 Was the study approved by an ethics committee?	Yes No	Comments:

	Not sure/not reported/not applicable	
6.2 Is the role of the researcher clearly described? *For example:* Has the relationship between the researcher and the participants been adequately described? Is how the research was explained and presented to the participants described?	Clear Not clear Not sure/not reported	Comments:
Section 7: Overall assessment		
As far as can be ascertained from the paper, how well was the study conducted (see guidance notes)	++ + –	Comments

REFERENCES

1. College of Radiographers (2006). Clinical education and training: Guidance and strategies for effective relationships between education providers, placement providers and learners. London: College of Radiographers.
2. Ogbu, S.O. I. (2008). Radiography students' perceptions of clinical placements-A Nigerian perspective. *Radiography*, 14 (2), 154-161.
3. Conway, A., Lewis, S. & Robinson, J. (2008). Final-year diagnostic radiography students' perception of role models within the profession. *Journal of Allied Health*, 37 (4), 214-220.
4. Challen, V., Laanelaid, Z. & Kukkes, T. 2016. A qualitative study of perceptions of professionalism amongst radiography students. *Radiography*, 1-7.
5. Walsh, D. (2014). The nurse mentor's handbook-supporting students in clinical practice (2nd edition). Berkshire: Open University Press.
6. College of Radiographers (2012). Quality standards for practice placements. London: The College of Radiographers.
7. Health Department of Australia and Human Services (2016). Best practice clinical learning environment framework. Melbourne: The Health Department of Australia and Human Services.
8. Fowler, P. & Wilford, B. (2016). Formative feedback in the clinical practice settings: What are the perceptions of student radiographers? *Radiography*, 22 (1), 16-24.
9. Sutton, R. (2013). A focused ethnography of radiotherapy students' learning on their first clinical placement (Doctorate thesis). Cardiff: Cardiff University.
10. Hyde, E. (2015). A critical evaluation of student radiographers' experience of the transition from the classroom to their first clinical placement. *Radiography*, 21 (3), 242-247.
11. Cunningham, J., Wright, C. & Baird, M. (2015). Managing clinical education through understanding key principles. *Radiologic Technology*, 86 (3), 257-273.
12. Murphy, F. (2011). On being dyslexic: Student radiographers' perspectives. *Radiography*, 17 (2), 132-138.
13. Khan, K.S., Kunz, R., Kliejnen, J. & Antes, G. (2011). Systematic reviews to support evidence-based medicine. How to review and apply the findings of healthcare research. London: Royal Society of Medicine Press Limited.
14. Bettany-Saltikov, J. (2012). How to do a systematic literature review in nursing-A step by step guide. Berkshire: Open University Press.
15. Polit, D.F. & Beck, C.T. (2017). Essentials of nursing research: appraising evidence for nursing practice (9th edition). London: Lippincott Williams and Wilkins Ltd.
16. Dungey, G.M. (2009). What effect does treating cancer patients have on radiation therapy students' identity development? *The Radiographer*, 56 (1), 10-15.
17. Fortsch, P., Hennings, J.E. & Nielsen, L.E. (2009). Connecting the classroom to clinical practice: A comparison of programs. *Radiologic Technology*, 81 (2), 112-121.
18. Williams, M. & Decker, S. (2009). Mature students' perspectives of studying radiography. *Radiography*, 15 (1), 17-85.
19. Bolderston, A. & Morgan, S. (2010). Global impact: An examination of a Caribbean radiation therapy student placement at a Canadian Teaching Hospital. *Journal of Medical Imaging and Radiation Sciences*, 46 (3), 152-158.
20. Mifsud, C.P., Castillo, J. & Portelli, J.L. (2015). Radiography students' clinical placement experiences in MRI: A phenomenological study. *Radiography*, 21 (1), e17-e20.
21. Thanh Le, N.T., Robinson, G. & Lewis, S.L. (2015). A study of student radiographers' learning experiences in imaging obese patients. *Journal of Medical Imaging and Radiation Sciences*, 46 (3), s61-68.
22. Valdera, J.M., Ricci N., Sarah, C. & Campbell, S. (2012). Patient experiences of patient safety in primary care. A systematic review of qualitative studies. Retrieved May 13, 2016, from www.phc.ox.ac.uk/.. ./patient-experiences-of-patient-safety-in-primary-care.
23. National Institute for Health and Care Excellence (2013). Methodology checklist: qualitative studies. Retrieved April 13, 2016, from https://www.nice.org.uk/article/ pmg10/ chapter /appendix-g-methodology-checklist-qualitative-studies.

24. Maltby, J., Williams, G., McGarry, & Day, L. (2010). Research methods for nursing and healthcare. Essex: Pearson Education Limited.
25. Fenton, P. (2005). Student perception of a quality clinical experience: Findings from the literature and their application to radiation therapy. *The Radiographer Journal*, 52 (1), 30-33.
26. Ohagwu, C.C., Ochie, K., Eze, C.U., Ezugwu, Barde, J.C. & Umeano. (2016). Challenges of training and clinical skill acquisition in radiography education: perceptions of students in resource-poor southeastern Nigeria. *The South African Radiographers*, 52 (2), 7-14.
27. Harden, R.M. & Laidlaw, J.M. (2017). Essential skills for a medical teacher-An introduction to teaching and learning in medicine (2nd edition). London: Elsevier.
28. Kyei, K. A., Antwi, W.K., Bamfo-Quaicoe, K. & Offei, R.O. (2015). Challenges faced by radiography students during clinical training. *Clinical Medical Research*, 4 (3), 36-41.
29. Ingrassia, J. M. (2011. Effective radiography clinical instructor characteristics. *Radiologic Technology*, 82 (5), 409-420.
30. Papadakis, M.A., Teherani, A., Banach, M.A., Knettler, T.R., Rattner, S.L., Stern, D.T., Veloski, J. J. & Hodgson, C.S. (2005). Disciplinary action by medical boards and prior behaviour in medical school. *New England Journal of Medicine*, 353 (25), 2673-2682.
31. Huang, X.Y., Chang, J.Y., Sun, F.K. & Ma, W.F. (2009). Nursing student′s experiences of their first encounter with death during clinical practice in Taiwan. *Journal of Clinical Nursing*, 19 (15-16), 2280-2290.
32. Charalambous, A. & Kaite, C. (2013). Undergraduate nursing students caring for cancer patients: hermeneutic phenomenological insights of their experiences. *BMC Health Services Research*, 13, 63-65.
33. Cruess, S.R., Cruess, R.L. & Steinet, Y. (2008). Role modelling-making the most of a powerful teaching strategy. *British Medical Journal*, 336 (7646), 718-721.