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ORIGINAL RESEARCH

The Supervisees' Perspectives Concerning the Clinical Supervision of Radiologic Sciences Students at Clinical Sites: Implications and Future Directions

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Introduction: Clinical supervision (CS) is essential to practice-based learning in radiology. The assessment of the effectiveness of CS is essential to ensure the success of the process and to provide high-quality patient care.

Purpose: This study aimed to evaluate the CS of both Diagnostic Radiography (DR) and Nuclear Medicine (NM) technology students studying at Kuwait University.

Methods: The Manchester Clinical Supervision Scale-26 (MCSS-26©) was distributed electronically to 90 third and fourth year students from Radiologic Sciences department. Ethical approval was obtained from the Health Sciences Centre (HSC) Ethical Committee and all the participants provided electronic informed consent. Data are presented as mean ± SD.

Results: Seventy responses were collected from DR and NM (response rate 78%, DR: n= 51, NM: n=19). Overall, the mean CS score from the MCSS was 67.7±11.3, n=70. CS in NM scored more effective than that in DR with a p=0.037 (72.3±10.1, 66.0±11.3, respectively).

Conclusion: The effectiveness of CS has been evaluated in third and fourth year students across the two divisions of RS the department at Kuwait University. This study showed that students value the impact of CS in their professional role and 70% reported being satisfied with the overall CS experience. Limited studies are available that focuses on students' perceptions about clinical supervision; therefore, more studies are needed to evaluate the effectiveness of CS among RS students. Implications for interprofessional education are presented.

Keywords: clinical supervision, MCSS-26, radiography, education, practice-based learning, student's perception

Introduction

The education programs of radiologic sciences (RS) degree involve two integral components, the academic studies within the University and the clinical practical training within health care settings under clinical supervision (CS).[1] CS is an essential component of RS programs in allied health (AH) professions curricula. It is the process by which a supervisee (student) and an experienced healthcare practitioner work together to benefit from the knowledge and experiences of the supervisors, with the goal of improving the student's clinical competencies and skills. CS is to practice-based learning. The main aims of CS in radiology are to safeguard standards of practice, develop individuals personally and professionally, and promote excellence in health care.[2] It allows students to translate their knowledge from academic studying into practice by closing the gap between textbook knowledge and clinical training.

Many factors might influence the quality of clinical supervision in clinical fieldwork, such as the length and the frequency of the sessions, and the competency of supervisors.[3] Many challenges have been reported in studies of AH students regarding CS, eg, increased number of students, limited clinical supervision time, lack of communication between academic and clinical staff, and

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limited resources.[4–6] In addition, many factors can affect the clinical learning process for RS students like the availability of clinical supervisors, workload demands, and the supervisor/student ratios.[7–9] Moreover, written and oral feedback from clinical supervisors has been identified to be critical in supporting the student's learning experiences in radiography.[10] Therefore, the assessment of the effectiveness of CS is essential to ensure the success of the clinical supervision process and thus students can provide a high-quality patient care.

The Radiologic Sciences department at the Faculty of Allied Health Sciences, Kuwait University, offers two undergraduate programs: Diagnostic Radiography (DR) and Nuclear Medicine (NM) technology. The main goal of these programs is to produce competent and skilled practitioners who will improve health services and deliver high-quality patient care. DR is a focused curriculum to become a radiologic technologist, whose professional role is to produce medical radiographs of various body parts for diagnostic interpretation. The goal of the DR program is to produce a competent, skilled practitioner who can undertake positions in hospitals, clinics, research laboratories, industry, and government agencies. To achieve this, students are enrolled in a course of study that includes basic biological, physical, computer, and radiation sciences, in addition to certain number of clinical training hours in the teaching government hospitals and clinics in Kuwait. The NM technology program prepares the students to become a qualified NM technologist who can perform different imaging procedures, prepare radiopharmaceuticals, use sophisticated equipment efficiently, and apply proper patient care. To achieve this, the curriculum is designed to include basic biological, physical, computer and radiation sciences in addition to clinical practicum courses that require scheduling the student to different clinical rotations in government hospitals and clinics in Kuwait.

In this study, the Manchester Clinical Supervision Scale-26 (MCSS-26©)[11] was used as a research tool. MCSS-26 is a research questionnaire consisting of 26 questions, designed to measure the effectiveness of CS from a perspective of a supervisee. It was developed based on the Proctor Model of CS. The Proctor Model is the most used model within the health field, which consists of three main components: the normative, the restorative, and the formative domains.[12] The normative domain relates to maintaining professional standards, complying with policies and standards, and contributing to clinical audit. The restorative domain deals with the ability to manage the emotional burden of the practice and the development of supportive relationship with supervisors to help in dealing with the emotional impact of clinical practice. The formative domain relates to professional and skill development and to understanding of own abilities through reflection.

There is a lack of research on the clinical supervision received by DR and NM technology students in Kuwait. Therefore, the aim of this study was to evaluate the effectiveness of clinical supervision of both DR and NM technology students studying at Kuwait University and to identify any possible improvements in the clinical education regarding CS.

Materials and Methods

Study Design

This cross-sectional design included third and fourth year RS students at the Faculty of Allied Health Sciences (FAHS), Kuwait University. MCSS-26 was used to capture the students' perspectives on their clinical education experience. Ethical approval was obtained from the Health Sciences Centre (HSC) Ethical Committee (VDR/EC-4006) and all the participants provided electronic informed consent for their participation in the study. All participants were invited to complete the survey between May 2022 and June 2022.

Subjects

The survey was distributed electronically to 90 RS students at FAHS at Kuwait University. To be eligible to be recruited in the study, the inclusion criteria were as follows: 1) being actively enrolled as a student at FAHS at Kuwait University, 2) be at least 18 years of age, and 3) have passed at least one clinical education course that involved fieldwork hours.

Procedure

The research team used a PowerPoint presentation to explain the study to the students. This was followed by sharing the study quick response (QR) code, which directed them to the Microsoft Form™ sheet to submit the electronic consent form and to answer the MCSS-26 survey.

Outcome Measures

MCSS-26 has 26 items reflecting three main domains and their subdomains of the Proctor Model of CS (summarised in Table 1). The survey uses a 5-point Likert scale range from 0 for strongly disagree to 4 for strongly agree. The total MCSS-26 has a score between 0 and 104 with larger scores presenting a higher level of effective CS. The main domains are

1- The normative domain with subscales about the importance/value of CS and finding time to attend.
2- The restorative domain with subscales about the trust/rapport with the supervisor and the supervisory advice/support received.
3- The formative domain with subscales about improving the care that they give, their skills, and their reflective practice.

Data Analysis

Data are presented as mean ± SD values. Statistical data analysis was carried out using statistical software SPSS version 28 (IBM-SPSS, Armonk, NY, USA) at $p < 0.05$ level. Differences between groups were analysed with independent-samples *t*-test (*t*).

Results

Demographics

Out of 90 eligible students to participate in the study, 70 responses were collected electronically (response rate 78%). Out of 70 participants, 66 were females and 4 were males (age 21.8 ± 1.9 years). Out of 70, 51 students were from the Diagnostic Radiography (DR) division and 19 were from the Nuclear Medicine division (NM).

Table 1 Table Presenting the Relationship Between the Manchester Clinical Supervision Scale-26 (MCSS-26) Subscales and the Proctor Domains

MCSS-26 Subscales and Proctor Domains	Number of Items	Interpretation
Importance/value of CS	5	A measure of the importance of receiving CS and whether the CS process is valued or necessary to improved quality of care.
Finding time	4	A measure of the time available for the supervisee to attend CS sessions.
Normative domain summary score	9	
Trust/rapport	5	Level of the trust. Rapport with the supervisor during the CS sessions/ability to discuss sensitive/confidential issues.
Supervisor advice/support	5	Extent to which the supervisee feels supported by the supervisor and a measure of the level of advice and guidance received.
Restorative domain summary score	10	
Improved care/skills	4	The extent to which the supervisee feels that CS has affected their delivery of care and improvement in skills.
Reflection	3	A measure of how supported the supervisee feels with reflecting on complex clinical experiences.
Formative domain summary score	7	

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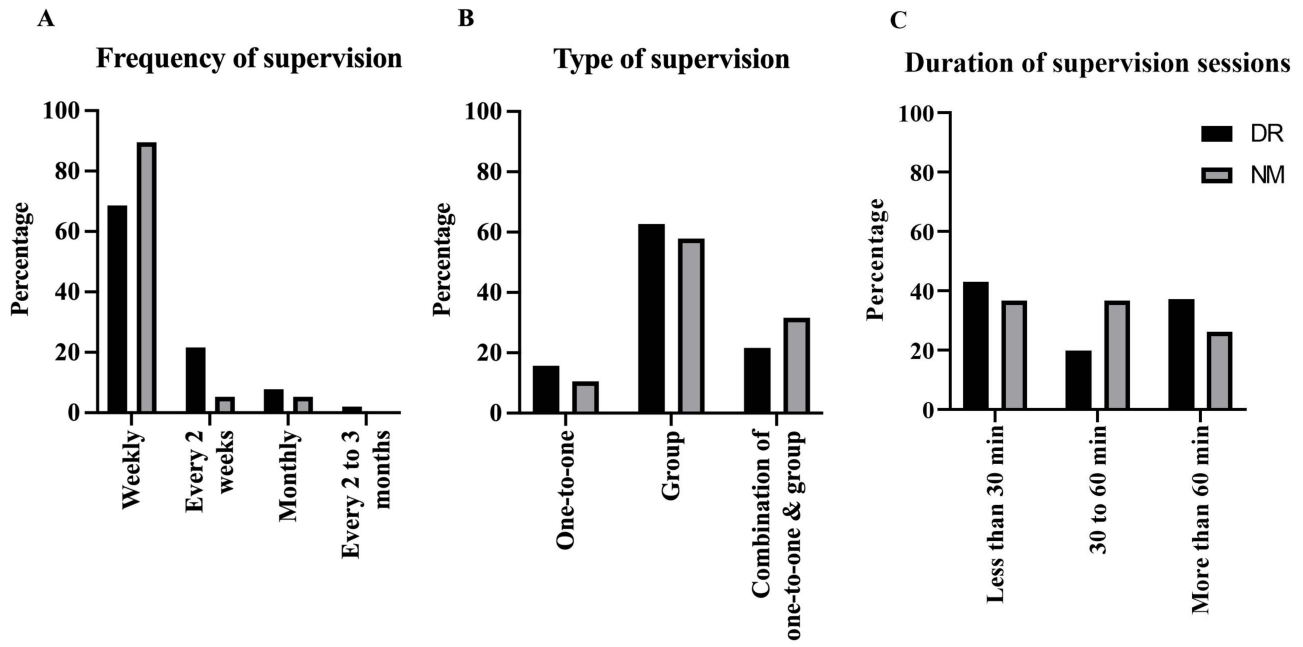

Figure 1 Characteristics of supervision sessions for DR and NM divisions. In (**A**), the graph presents the percentage of the frequency of clinical supervision for DR and NM students, (**B**) presents the percentage of the type of clinical supervision for DR and NM students and (**C**) presents the percentage of the duration of clinical supervision for DR and NM students.
Abbreviations: DR, Diagnostic Radiography; NM, Nuclear Medicine.

Supervision Sessions

Most of the DR and NM students indicated that they had weekly clinical supervision sessions (DR: 69% and NM: 89%) (Figure 1A). Both divisions had their sessions mainly in groups (DR: 63% and NM: 58%, Figure 1B) with most of the sessions last for less than 30 minutes for DR (43%, Figure 1C) and NM demonstrated that they had sessions less than 30 minutes and between 30 and 60 minutes (37%, Figure 1C).

MCSS-26 results

Overall, the mean CS score from the MCSS was 67.7±11.3, 95% CI [65.0–70.4], Table 2. The result of the formative domain was slightly lower than the normative and the restorative domains (19.3±3.1, 21.6±6.1, 26.8±4.2, 95% CI [18.6–20.1, 20.2–23.1], respectively, Table 2).

Table 2 Scores of MCSS-26 Sub-Scales and Proctor Domains

MCSS-26 Scores	All (n=70)	DR (n=51)	NM (n=19)	*p* value	3rd Year (n=46)	4th Year (n=24)	*p* value
Total	67.7±11.3	66.0±11.3	72.3±10.1	0.037 *	66.9±10.6	69.4±12.8	0.380
Normative domain	21.6±6.1	20.8±6.1	23.9±5.9	0.057	21.9±5.8	21.0±6.7	0.576
Importance/value of CS	11.8±2.0	11.8±1.9	11.8±2.3	0.979	11.7±1.9	12.1±2.2	0.399
Finding time	8.5±3.3	8.0±3.2	9.8±3.4	0.041*	8.5±3.3	8.4±3.3	0.921
Restorative domain	26.8±4.2	26.1±4.4	28.6±2.9	0.025*	26.2±4.1	27.9±4.1	0.093
Trust/support	11.9±2.3	11.6±2.4	12.6±1.7	0.112	11.6±2.2	12.5±2.4	0.119
Supervisor support/advice	14.9±2.7	14.5±2.8	16.5±2.1	0.037*	14.6±2.7	15.5±2.7	0.209
Formative domain	19.3±3.1	19.2±3.0	19.8±3.4	0.415	18.8±3.0	20.4±3.1	0.035*
Improved care/skills	13.1±3.3	12.8±3.4	14.1±2.8	0.134	13.4±3.0	12.6±3.7	0.342
Reflection	7.5±1.8	7.4±1.9	8.1±1.5	0.146	7.1±1.8	8.3±1.4	0.006*

Notes: Data given as mean ± SD. *Significant difference at p<0.05.
Abbreviations: DR, Diagnostic Radiography; NM: Nuclear Medicine; MCSS-26, Manchester Clinical Supervision Scale-26.

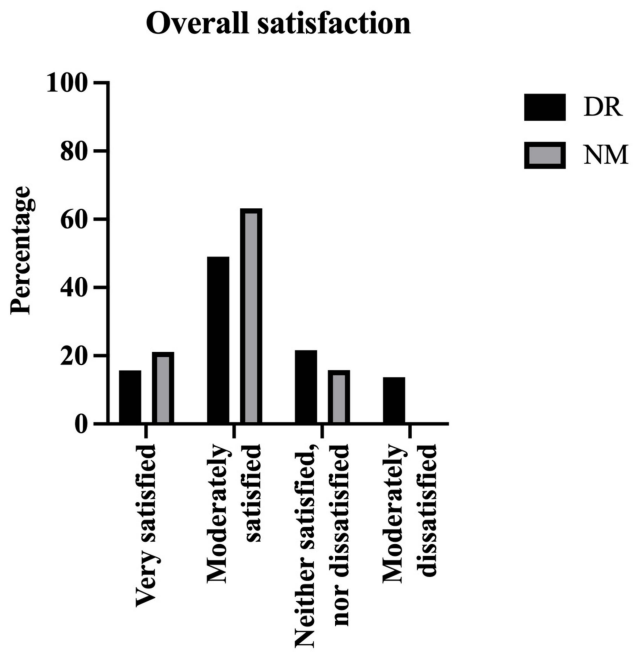

Figure 2 The percentage of the overall satisfaction scores with the clinical supervision received by the DR and NM divisions.
Abbreviations: DR, Diagnostic Radiography; NM, Nuclear Medicine.

The comparison between the two divisions showed that CS in NM is more effective than that of the DR with a p=0.037 (72.3±10.1, 66.0±11.3, 95% CI [67.4–77.2, 62.8–69.2], respectively, Table 2). Additionally, NM scored statistically significantly higher (p=0.025, 95% CI [27.2–30.0, 24.9–27.3], Table 2) in the restorative domain compared to DR with a significantly higher supervisor support/advice subscale scores (p=0.037, Table 2).

The total mean CS scores of third year students and fourth year students were similar. However, fourth year students scored significantly higher (p=0.035, 95% CI [19.1–21.7, 17.9–19.7], Table 2) in the formative domain compared to third year students, with significantly higher reflection subscale scores (p=0.006, Table 2) within the formative domain.

After completing the survey, participants were asked about the best term to describe their overall level of satisfaction with their CS. The overall satisfaction scores received by each division are shown in Figure 2. Most students (70%) were moderately satisfied or very satisfied with their CS (65% of DR students and 84% of NM students, Figure 2).

Discussion

To the researchers' knowledge, this is the first study to assess the Clinical Supervision for RS students at Kuwait University. In line with other AH studies,[12–14] this study shows that RS students value the impact of CS in their professional role. In this study, the effectiveness of CS has been evaluated in two divisions of the Radiologic Sciences using the MCSS-26. Furthermore, the differences in the CS between third and fourth year radiography students in the department have been assessed.

The results have shown a variety of concepts in relation to CS. Overall, the total score of the MCSS-26 for all the participants was 67.7±11.3. Moreover, one of the key results in this study is that NM technology division reported significantly higher MCSS-26 score compared to DR division. NM also reported significantly higher scores in the restorative domain and in the subscale of supervisor support/advice. The NM students believed that they have a supportive relationship with their supervisors, and they are able to discuss sensitive issues with them Such results are expected here as the nature of profession differs between the two divisions. Radionuclide imaging procedures are relatively long due to special patient preparation and longer acquisition time related to longer imaging procedures, plus relatively few cases are done compared with radiological examinations; therefore, students will spend much more time with their clinical supervisor to complete the whole case. This will allow the students to observe and ask many questions

and will give the supervisor the time to explain different protocols. It is worth mentioning that in the clinical site, the ratio of the supervising technologist and student can reach to 1:1 due to fewer number students being enrolled in NM technology program. The traditional one-to-one model and peer-assisted learning models, which involve two or more students concurrently working with one supervisor, are both favoured in the Kuwaiti context. In this light, the supervision model adopted in the fieldwork context has been identified as an important factor in the successful learning experience of students. As pointed out by Beveridge and Pentland,[15] there is no clear consensus as to the ideal model of supervising. Some participants have suggested, for example, that the 2:1 model is effective because it provides a reasonable balance between having a certain degree of autonomy and peer learning opportunities and being supported by the supervisors with adequate feedback.[16] In their review, Beveridge and Pentland[15] identified the advantages of the 1:1 approach as having a consistent and accessible supervisor, safe learning spaces for individualised feedback and facilitation, and tailored learning opportunities being more available. Nevertheless, the limitations of the traditional approach include the risk of limited learning if student–supervisor relationships are suboptimal, and an over-dependence by students on the relationship. It is also the case that one-to-one models require a larger dedication of resources and a focus on appropriate training and support of placement supervisors to focus on and be responsible for monitoring the student and share his expertise.

On the other hand, DR students might be exposed to more than 30–40 cases per day in a busy department, therefore many protocols cannot be explained by the supervisor during the clinical time. In these high-pressure workload departments, written feedback on the student practice performance from clinical supervisors are essential, which can indicate the areas for development.[10] Clinical supervisors are usually aware of the importance of providing timely feedback to students but limitations including staff shortages, together with increasing patient waiting lists and other administrative work responsibilities may impact on their ability to find adequate time. Feedback should, however, be delivered in a timely way and in quantities that students can digest easily. However, it is also a student's responsibility to make clinical supervisors aware if feedback was ill-timed.

In the comparison between the two cohorts of third and fourth year students, the total mean CS scores of third year students and fourth year students were similar. However, with regards to the formative domain, fourth year students scored significantly higher CS score compared with third year students with a significant difference in the reflection subscale. The results clearly demonstrate that fourth year students preserve more clinical experience than the 3rd year students because the former spend more hours of clinical training than the latter, which might reflect the positive impact of supervising technologist on student's performance.

In terms of supervision sessions, results revealed that most of the participants in both divisions had weekly clinical supervision sessions. Thus, it would ensure the implementation and the application of different theories and practical procedures and skills on patient studies. However, the main drawback is that most participants (41%) reported that these sessions lasted for less than 30 minutes. As a clinical teaching environment, more time and longer practical sessions are needed to ensure the highest competency level among the graduates. This finding is in line with other AH studies where finding time has been identified to be a barrier to effective CS.[13,17,18] Another drawback is the type of supervision sessions. Figure 1 shows that group supervision is more dominant (61%) compared to one-to-one session. This could be due to the large number of students in RS mainly in DR; thus, maintaining one-to-one sessions might be difficult, especially in busy clinical settings. Furthermore, one-to-one sessions require assigning more clinical supervisors in clinical settings, which might be difficult to implement in certain specialised clinical centres. This can be resolved by pre-planned clinical programs[19] and the application of 3D virtual reality (VR) simulation in education.[20–22] The VR tools can be helpful in clinical education as a supplement resource to enhance the confidence of the students and to gain clinical skills without risking the patients by the extra radiation dose.

In a profession in which students deal with hazardous radioactive materials (NM) and different amount of radiation doses for different radiological procedures (DR), students in both divisions agreed that time is an essential factor for effective CS. The repetition of radiological procedures will result in patients being exposed to extra radiation doses. Therefore, extra time given here to CS would reduce the chances of errors and reduce the dose to the patients having these examinations. Additionally, the implementation of imaging procedures laboratories and sessions on critiquing x-ray images can be beneficial, especially to increase third year students' skills and knowledge. This highlights the vital role of

the clinical supervisors in the CS; however, literature is limited in assessing their role in the process of supervision in radiography. Future studies are needed to assess the roles of clinical supervisors in the CS of RS students.

One of the limitations of the study was the relatively small number of participants (n=70). The sample size differed considerably between the two divisions (DR=51 and NM=19) which was not comparable. Moreover, the main methodological limitation of this study was that the only data collection method was a quantitative questionnaire. This method is undoubtedly a valuable technique for obtaining information from participants to answer the research question and achieve the aims of the study. However, relying exclusively on a questionnaire may limit the conclusions of this research as the findings rely on the data from one type of data source (ie, the questionnaire), where triangulating methods of data collection may have resulted in richer data. Including observation data of participants or collecting student and supervisors' perceptions through learning diaries, for example, as additional methods of data collection would have enabled a deeper analysis of the accounts given by the participants.[23] Therefore, qualitative assessment is also required to capture the students' perspectives of CS in future research. Moreover, researchers are planning to conduct a similar study in the future that could consider using focus groups as a method of data collection. Future research conducted in different settings, such as larger fieldwork settings with substantially more students, could benefit from focus group data collection methodologies as has been employed in previous fieldwork research (eg, Naidoo & Van Wyk).[24]

The findings suggest it would be worthwhile to analyse the DR and NM training curriculum and its theoretical underpinnings to determine how this may provide guidelines for the clinical supervisors regarding a variety of desirable practices, such as supervising students and assessing their work as well as building a framework for CS. To a larger extent, we would recommend not only reviewing the DR and NM curricula but we also propose the analyses of all Health Science Center (HSC) curricula including different majors such as physical therapy, occupational therapy as well as other majors.[25–27] Doing so will strengthen the clinical fieldwork education learning experiences and likely improve future multidisciplinary collaborations of various healthcare disciplines. Future studies are suggested to conduct rigorous research to investigate the effectiveness of the co-curricular interprofessional education regarding its long-term benefits and values in the careers of health science students.[28]

Conclusion

In conclusion, the effectiveness of CS has been evaluated in third and fourth year students across the two divisions of Radiologic Sciences department at Kuwait University. The results showed a significantly higher total MCSS-26 score in the NM compared with the DR division with a higher score in the restorative domain. Considering the overall satisfaction rates with CS, students in DR and NM divisions (70%) reported being satisfied with the overall experience. This study provided a baseline analysis data regarding the CS of radiologic sciences students at Kuwait University. Limited studies are available that focuses on students' perceptions of clinical supervision, future mixed method studies are needed to have comprehensive data to evaluate the effectiveness of CS among RS students. Finally, changes to the health sciences curricula to support interprofessional education are suggested. This will further facilitate desired clinical fieldwork learning experiences and patients' outcomes.

Disclosure

The authors report no conflicts of interest in this work.

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