ORIGINAL ARTICLE

USING DOPS (DIRECTLY OBSERVED PROCEDURAL SKILLS) FOR PRE CALL ASSESSMENT OF ULTRASOUND PROFICIENCY OF FIRST YEAR RADIOLOGY RESIDENTS: DEVELOPMENT AND INITIAL ANALYSIS

Imaad ur Rehman, Rustam Alam Shah, Ahmed Kamal, Mobeen Ahmed

Department of Radiology, Shifa International Hospital, Islamabad, Pakistan.

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ABSTRACT

RATIONALE AND OBJECTIVES: DOPS (Directly Observed Procedural Skills) is a relatively new educational technique for assessment of practical skills assessment of radiology residents. We conducted 2 DOPS session over two years for ultrasound proficiency assessment of first year radiology residents. The purpose of this study was to assess feasibility and potential benefits of DOPS and to decide its future implementation in our department. **MATERIAL AND METHODS:** The study was conducted in department of Radiology, Shifa International Hospital, Islamabad, Pakistan between January 2012 to December 2013. Each first year junior radiology resident was rotated in the department of ultrasound at initiation of training for 2 months programmed ultrasound rotation. At the end of the rotation, a senior radiologist, with more than 4 years post fellowship experience in ultrasound, carried out DOPS assessment session of these residents. A single station was made with ultrasound performed on a mock patient (healthy volunteer). A DOPS Proforma was designed and assessment was marked in four areas (approach to patient, knobology of machine, theoretical knowledge and technique) and performance was graded according to a set scale. A post DOPS questionnaire was given to participating junior residents to give their opinion on this newer system. Another questionnaire was given to the senior residents to assess outcome of this exercise in terms of improvement in ultrasound skills of first year residents during call hours. **RESULTS:** Over two years, 7 of 8 first year residents (87%) passed the exam on first attempt. The one who failed was remediated after attending extra ultrasound sessions and passed the exam a week later. All were put on night call subsequently. A post implementation survey was conducted from all the junior (n=8) and senior (n=7) radiology residents with 100% response rate. Eighty percent (n=12) of the residents thought that this new tool was effective in improving their ultrasound proficiency and should be implemented in future. Hundred percent (n=15) thought it to be better than conventional end of rotation written feedback. Eighty five percent (n=6) of senior residents felt that there was improvement in junior resident ultrasound skills during call hours as compared to previous years. **CONCLUSIONS:** Compared to our conventional end of rotation written feedback, using DOPS for proficiency assessment of ultrasound of first year radiology residents has been judged to be a useful assessment tool prior to starting call.

Keywords: DOPS (Directly Observed Procedural Skills), ultrasound proficiency, radiology residents.

Introduction

Postgraduate medical education and training is a dynamic field undergoing major changes throughout the world and requires new educational techniques and assessment tools to cater for the ever changing

Correspondence : Dr. Imaad ur Rehman
Department of Radiology,
Shifa International Hospital,
Islamabad, Pakistan.
Email: imaadur@gmail.com

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demands. These techniques and tools must be tailor made for each post graduate specialty and sub specialty.

Radiology differs from other specialties in multiple ways. Trainees work in their early years in a close apprenticeship with their supervisors and are protected. Their knowledge and skills in the workplace, are being assessed but not in a standardized way, and are not formally documented. Diagnostic sonography is perhaps the most difficult subspeciality to prepare first-year radiology residents for overnight call, because they must master both the technical aspects of scanning and the interpretive skills of sonography.[1,2,3] Sonography represents a major proportion of studies requested by physicians both during day hours and on call, because of the availability and safety of the modality. Our ultrasound department is very busy, so rapid patient throughput is necessary. Having a novice resident scan a patient before the sonologist adds time to the examination, which stresses our schedule and is sometimes seen by the patient as an unnecessary inconvenience. We felt that clinical time pressures are negatively impacting upon the educational requirements of our residents.

To fulfill this void, we held a departmental meeting after reviewing literature and it was concluded that performance-based methods such as direct observation of procedural skills are ideal in the assessment of diagnostic sonographic procedures. Mock scenarios and patients can help in training and assessment of the core skills of diagnostic radiology and reduce the time required for achieving and maintaining competence. This technique has been applied to different specialties in postgraduate medical education and training and although it has been proposed that it can be applied effectively in radiology as well,[4] we found no published data where DOPS has been practically applied to assess diagnostic ultrasound skills in radiology residents. We decided to try applying "direct observation of procedural skills (DOPS) to assess and improve the ultrasound skills of our newly inducted first year radiology residents.

Direct observation of procedural skills (DOPS), initially developed by Royal College of Physicians in the United Kingdom, requires an assessor to directly observe a trainee undertaking a procedure and then grade the performance of specific predetermined components of the procedure.[5] In addition to the procedure itself, these skills also include communication and the informed consent process.

It has been proposed that DOPS can have a role in the formative assessment of radiology residents. It can be used to evaluate resident's performance, provide feedback, and identify areas for improving performance and filling in identified gaps.[4] This technique has the ability to assess the four levels of competence described by Miller's pyramid. The steps progress from "knows", which reflects applied knowledge, through "knows how", which requires more than knowledge alone, and "shows how", which requires an ability to show clinical competency, to "does" which is the actual requirement.

The purpose of this study is to analyze the impact of directly observed procedural skills (DOPS) for assessment of ultrasound proficiency of first year residents.

Material and Methods

Study setting: The study was conducted in department of Radiology, Shifa International Hospital, Islamabad, Pakistan between January 2012 to December 2013.

Ethical Approval: Ethical approval of the study was obtained from the Institutional Review Board.

Implementation of a new rotation schedule:

Over the past few years, radiology practice has evolved rapidly with added pressure on residency programs as well. Anecdotal experiences in the development of our radiology residency training program describe the rise and fall of different techniques of assessment of junior resident's proficiency across different imaging modalities for safe, competent and efficient practice of radiology. What seemed to be lacking was a standardized and objective approach that could be used as a yardstick to gauge individual abilities and to compare different resident batches. Although the need for a new tool was duly recognized by senior faculty and residents alike, the thought of implementing any new tool across all modalities seemed a formidable task. So, it was thought best to begin with a single imaging modality. As ultrasonography and radiography form the main bulk of on-call workload, it was decided to start with ultrasound.

A modified training program was designed by mutual agreement of senior faculty members and sonologists after taking approval from Institutional Review Board (IRB) and post graduate medical education committee (PGME) of our hospital. Under this training schedule, all the newly inducted first year radiology residents were placed in a a pre-designed rotation of two months in ultrasound department. During this period, each resident was rotated in ultrasound department and was taught to use different sonography machines. Hands-on teaching sessions were arranged about the basics of equipment, probe handling and Knobology, as well as the basics of gray scale and Doppler imaging techniques. Departmental ultrasound protocols were taught to residents during rotation. New residents were also instructed to observe sonologists during routine procedures. A list covering both most frequently seen and clinically important emergency and routine gray scale and Doppler procedures were given to the residents during orientation. (Appendix I)

List of don't miss emergencies given to resident

CHEST

Pleural effusion

GASTROINTESTINAL

Colelithiasis
Acute pancreatitis
Appendicitis
Free fluid / Trauma

GENITOURINARY

Renal or ureteric stone
Ectopic pregnancy
Routine obstretical
Testicular torsion
Abortion / Retined product of conceptions

MISCELLANEOUS

To look for collection after surgeries
Neonatal head scan

DOPPLER

Deep venous thrombosis

Appendix I:

Conducting DOPS evaluation:

DOPS evaluation session was conducted as a tool for assessing junior resident's proficiency in performing ultrasound at the end of two months focused ultrasound training. At the end of the rotation, a senior radiologist, with more than 4 years post fellowship experience in ultrasound, carried out DOPS assessment session for these residents. A single station was made with ultrasound performed on a mock patient (healthy volunteer).

A healthy volunteer was chosen and was instructed to role play as a mock patient. Each candidate was to interact with the patient and proceed with performing relevant sonological study while the examiner observed and marked the resident performance on a proforma. Fixed time was given to each candidate. Candidates were asked at the end of each procedure to perform any other limited part of an ultrasound exam that may not be directly related to the scenario at the time. After this technical aspect of exam, the examiner asked few questions from each candidate related to theory of basic normal and pathologic imaging findings as well as basic knobology of machine. Immediate feedback was given verbally to provide early reformative intervention and to identify potential weaknesses.

Outcome measurements:

Assessment of candidates:

On spot assessment of each candidate was made by the examiner on DOPS proforma. Each candidate was assessed in four areas: approach to patient, equipment operation, theoretical knowledge and technique; with special emphasis on technique and procedural skills.

The performance was graded according to a set scale of four grades (excellent, good, satisfactory and below average) with below average considered as requiring remedial work. Results were compiled and feedback was given to each candidate regarding any flaws in technique or approach.

Qualitative feedback by residents:

Two separate questionnaires were used to conduct a post-implementation survey among junior residents and senior residents. (Appendix II and III). The questionnaires were designed to comment on the performance of the junior residents during during call hours with specific reference to proficiency in ultrasound performance. Feedback was also obtained from senior and junior residents on this new DOPS evaluation system and comparison with conventional end of rotation written feed back system. Resident opinion was asked regarding implementation of DOPS in other areas of radiology or its modification.

QUESTIONNARE FOR SENIOR RESIDENTS:

Regarding recetly conducted dops session for assessment of ultrasound proficiency, kindly respond to the following questions by selecting one option:

	Strongly Agree	Agree	Do not know	Disagree	Strongly Disagree
1) Do you think the DOPS session is useful as an educational and professional assessment tool	☐	☐	☐	☐	☐
2) Do you think DOPS is a better tool to judge procedural skills in comparison to conventional end of rotation feedback	☐	☐	☐	☐	☐
3) Would you like DOPS to totally replace conventional feedback	☐	☐	☐	☐	☐
4) Do you wish for DOPS sessions to be continued in the future	☐	☐	☐	☐	☐
5) Do you think the DOPS session has resulted in improvement of procedural skill of junior residents during call hours	☐	☐	☐	☐	☐
6) Do you think you feel more confident with procedural skill and findings of junior residents after this session in comparison to batch of residents that had not undergone such training in previous years	☐	☐	☐	☐	☐
7) Do you think DOPS session should be carried out in a pre planned manner	☐	☐	☐	☐	☐
8) Do you think DOPS should be introduced for senior residents also	☐	☐	☐	☐	☐

Appendix II:

QUESTIONNARE FOR JUNIOR RESIDENTS:

Regarding recently conducted dops session for assessment of ultrasound proficiency, kindly respond to the following questions by selecting one option:

	Strongly Agree	Agree	Do not know	Disagree	Strongly Disagree
1) Do you think the DOPS session is useful as an assessment tool for your skills	☐	☐	☐	☐	☐
2) Do you think DOPS is a better tool to judge your skills in comparison to conventional end of rotation feedback	☐	☐	☐	☐	☐
3) Would you like DOPS to totally replace conventional feedback	☐	☐	☐	☐	☐
4) Do you personally agree with the results being an appropriate judgement of your skills	☐	☐	☐	☐	☐
5) Do you wish for DOPS sessions to be continued in the future	☐	☐	☐	☐	☐
6) Do you think the DOPS session has resulted in increased confidence level	☐	☐	☐	☐	☐
7) Do you think the results are discouraging resulting in a feeling of self doubt relating specifically to ultrasound performance	☐	☐	☐	☐	☐
8) Do you think DOPS session should be carried out in a pre planned manner Do you think this experience has helped you in identifying flaws in your technique	☐	☐	☐	☐	☐

Appendix III:

How do you think dops method of assessment can be helpful in your training?

In what other modalities / sections do you wish for similar dops assessment sessions?

Do you have any recommendations regarding any other form of assessment or imprevement in this technique?

Results

Junior resident performance in DOPS session:

Over two years, 7 of 8 first year residents (87%) passed the exam on first attempt. The one who failed was remediated after attending extra ultrasound sessions and passed the exam a week later. All were put on night call subsequently. (Fig. 1)

Figure 1: Graph showing the performance of junior residents in RAD-DOPS session

Resident feedback:

A post implementation survey was conducted from all the junior (n=8) and senior (n=7) radiology residents with 100% response rate.

Conventional assessment vs. RAD-DOPS: Which is better? Resident opinion:

Hundred percent (n=15) thought it to be better than conventional end of rotation written feedback. (Fig. 2)

Eighty percent (n=12) of the residents thought that this new tool was effective in improving their ultrasound proficiency and should be implemented in future. (Fig. 3 and 4)

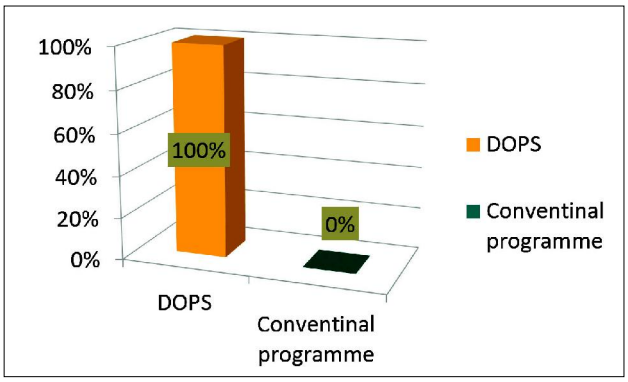

Figure 2: Graph depicting views of residents comparing both conventional and RAD-DOPS in terms of a better assessment method.

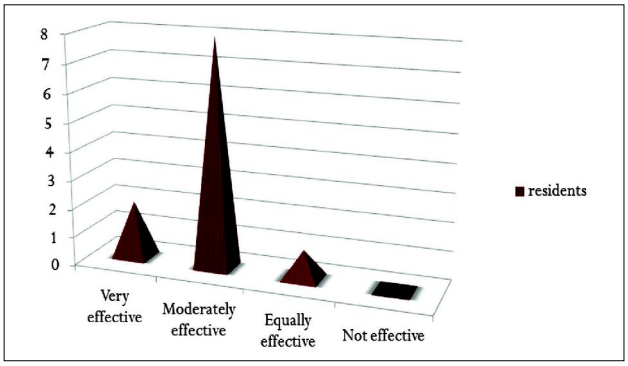

Figure 3: Graph depicting senior resident response on effectiveness of DOPS in improving on-call ultrasound proficiency of junior residents.

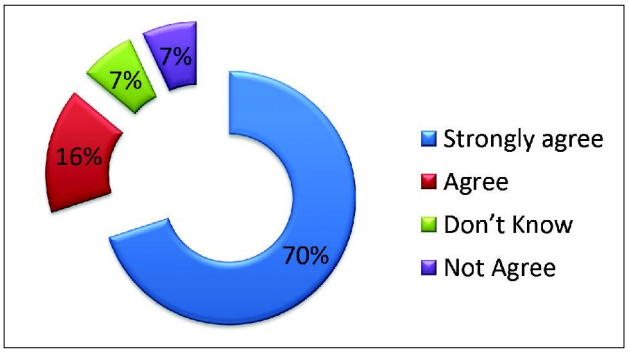

Figure 4: Graph depicting residents view on the their opinion regarding future implementation of DOPS.

Senior resident view regarding effect of RAD-DOPS on on-call junior resident performance: Eighty five percent (n=6) of senior residents felt that there was improvement in junior resident ultrasound skills during call hours as compared to previous years. (Fig. 5)

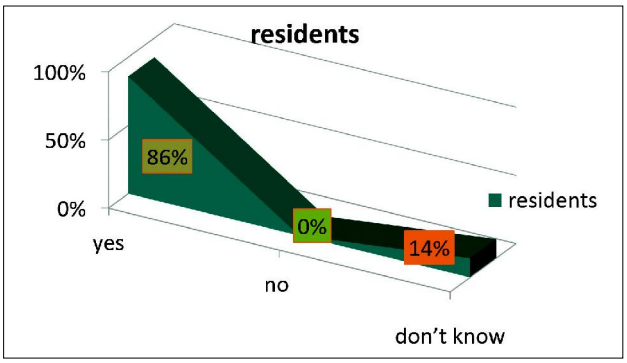

Figure 5: Senior resident view regarding effect of RAD-DOPS in improving on-call junior resident performance.

Resident opinion about utility of RAD-DOPS in other imaging modalities:
When asked to give open suggestions regarding use of utility in other imaging modalities, a significant portion of residents showed their enthusiasm in implementing RAD-DOPS in other areas of radiology as well, with majority preferring its implementation in fluoroscopy in the future. (Fig. 6)

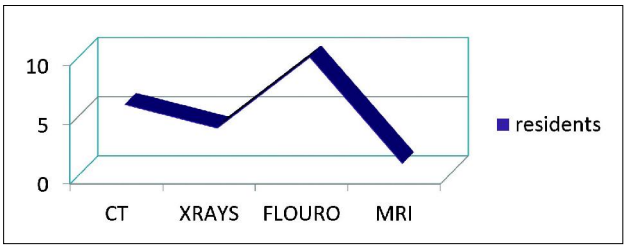

Figure 6: Resident opinion about use of RAD-DOPS in imaging modalities, other than ultrasound.

Discussion

There have been significant developments in the field of medical education over the past few decades with increased emphasis on reliable, valid and feasible resident assessment. Traditional methods of assessment have been critically examined and found inherently limited.[6] There has been a shift towards outcome-orientated education necessitating newer methods of assessment. On-call responsibility of residents is an important landmark in training and it is imperative that preparedness of resident to take on such responsibility be seriously and objectively assessed to alleviate any unnecessary anxiety felt by residents undergoing this transition and at the same time ensuring minimum competence to ensure

patient safety. Multiple new methods have been introduced over time of which direct observation of procedural skills (DOPS) is an important one. This method focuses on assessing what doctors do in everyday practice rather than written or practical simulations. Known collectively as "workplace-based assessment" tools, these have been embraced in North America, whereas they have been more cautiously adopted in the UK.[5,6,8,9,10] Few have been specifically developed for assessing radiologists (RAD-DOPS). Little has been done to critically scrutinize these methods except for few review articles.[7] However, they have been incorporated into radiology training in different parts of the World.

Sonography is a highly user-dependent modality requiring the resident to be competent in scanning and in interpretation before practicing independently. This fact is especially relevant in an on-call setting to avoid compromising patient care.

There is a general consensus in our department that resident training in sonography has benefited from this project. The curriculum has been standardized with equal duration rotations in ultrasound department at initiation of training with increased emphasis on cases residents are more likely to encounter in an on-call setting. This method can be used to supplement clinical teaching and to evaluate residents. We believe that in addition to individual resident improvement this method can ultimately allow us to raise the quality benchmark of our patient care and service by allowing us to identify weaknesses and inadequacies and modify training curriculum priorities accordingly.

The pre-call assessment that we implemented has been felt to be very helpful in that it established a measure to assess first-year resident's competence prior to starting on-call duties. Our residents are now going to be judged ready for call on the basis of their performance on the precall DOPS assessment in combination with their performance on regular rotations. Another important aspect of this assessment that is usually overlooked is the translated improvement of the on-call experience for the senior residents accompanying these on-call residents.

Another positive of this new curriculum is the feed back from the senior residents who supervise that new batches of first year residents who have undergone assessment with DOPS perform better in their ultrasound proficiency than the prior batches during their initial training phases in retrospect. This can also decrease the anxiety felt by more senior residents who otherwise feel unnecessarily burdened by inefficiency of junior residents during call hours.

Being a single centre study with relatively small number of participants is a limitation in our study. Subjective assessment by a single examiner created some degree of bias. We still feel it is a step forward towards our goal of providing safe care to our patients by residents on-call. Collaboration with other radiology training programs for possible expansion of similar programs and sharing the results may help clarify our combined path forward.

Conclusion

Compared to our conventional end of rotation written feedback, using DOPS for proficiency assessment of ultrasound of first year radiology residents has been judged to be a useful assessment tool prior to starting call.

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Conflict of Interest: None

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