

Instituting an Undergraduate Core Clerkship in Radiology: Initial Experiences in Pakistan

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Abstract

Utilization of radiology as an educational resource carries great potential. Accreditation bodies, physicians and medical students deem it important for a well rounded medical curriculum. Unfortunately this resource is yet to be developed and implemented to an optimal extent. We share the experiences from the first radiology core clerkship in Pakistan at the undergraduate level. An overview of clerkship objectives and structure is followed by discussion on lessons learnt during the initial three years of institution. Development of assessable objectives, integration of radiology with other specialties, and supervised andragogical learning tailored for undergraduate students are emphasized.

Introduction

A clinician encounters disease not in a cadaver but in a living human. The 'Eye of Medicine' can provide a succinct and true-to-life view of the normal as well as the disease processes in the human body. This capacity, combined with a minimally invasive approach, makes radiology an exceptional resource for the training of future physicians.^{1,2} The Liaison Committee on Medical Education has also appreciated this potential in its accreditation standards stating that, "Educational opportunities must be available in diagnostic imaging and clinical pathology."³ Undergraduate training in radiology has also been opined imperative, by both non-radiologist physicians and medical students, for a well rounded medical

education.^{4,5} Focused training in radiology is also deemed essential for optimal identification of life threatening abnormalities on radiographs.⁶

Keeping these facts in view, it is disconcerting that radiology contributes only five percent to the teaching of anatomy,⁷ only a third of US medical schools have instituted a core clerkship in radiology,⁸ and academic endeavors fail to appear among the productivity indicators of academic radiology departments.⁹ It is obvious that the potential of radiology as a learning resource for medical students is yet to be realized fully. We present the experiences from the first undergraduate radiology core clerkship instituted in Pakistan. These may contribute towards optimal evolution of this promising learning resource.

Clerkship Objectives and Structure

At our institution, a five-year, integrated, problem-based undergraduate curriculum is followed with a progressive transition of emphasis from basic to clinical sciences. A two-week core clerkship in radiology for third year medical students was instituted in the year 2005. The clerkship was designed for a nifty integration in the spiral curriculum with considerations for the needs of the patients, local community and the students. It aims at familiarization with various imaging modalities, appreciation of normal anatomy, presentations of common diseases, and development of differential diagnoses. By the end of the clerkship, the future physicians are expected to be able to recommend judicious, cost effective imaging modalities to

	Day1	Day2	Day3	Day4	Day5	Day6	Day7	Day8	Day9	Day10
0800 hrs	Orientation class	Daily Case Discussion								
0900 hrs		Daily Film Reporting Round General Radiology, US, CT, Podiatric Radiology (2 days each) MRI and Fluoroscopy (1 day each)								
1000 hrs										
1100 hrs										
1200 hrs										
1300 hrs	Lunch Break									
1400 hrs	PSIL case1	Tutorial	Tutorial	PSIL case1	PSIL case2	Tutorial	Tutorial	PSIL case 2	Self study	Viva Voce
1500 hrs										
1600 hrs										
Daily Case Study										Feedback
CT = Computerized Tomography; MRI = Magnetic Resonance Imaging; PSIL = Problem Solving Integrated Learning; US = Ultrasonography										

Figure 1: Clerkship Structure (Schematic).

their patients, keeping in mind their indications / contraindications, radiation hazards and diagnostic utility for answering specific clinical questions.

The schematic structure of the clerkship is given in Figure 1. Batches of four to five students rotate for a period of ten days. During the orientation session, the principles of imaging, facts about radiologic contrast media and essentials of radiation protection are introduced. The students participate daily in the reporting rounds of various modalities. Other pedagogical learning activities include four interactive tutorials, and twice-daily post-graduate academic sessions. Keeping in view the focus of PBL curriculum on andragogical learning, two Problem Solving Integrated Learning (PSIL) case discussions are conducted and a task-oriented approach is followed. In case of completion of clinical work before the designated time the students are encouraged to study according to their individual learning styles. Reference textbooks, CDs and an endogenously developed database of teaching files are placed at their discretion for this endeavor.

The students receive evaluation after each learning session in three areas viz. punctuality, knowledge/skill and participation. The End-of-Rotation evaluation comprises a film-based viva voce examination. Both evaluations are recorded on a single card thus providing a serial observation of the students' performance. (Figure 2) The students provide both verbal and anonymous written feedback at the end of the clerkship. This continuous assessment of educational strategies facilitates their evolution.

Discussion

In light of three most influential theories of learning; the behaviourist, cognitivist, and constructivist theory,¹⁰ we will present the experiences during the clerkship followed by the lessons learnt from them.

The area of improvement most persistently identified by the students, particularly upon encountering

Name	Clerkship period							Registration //												
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10										
Morning Case Discussion																				
Faculty signature																				
Afternoon Case Study																				
Faculty signature																				
Radiology Section	Gen. Rad.	Gen. Rad.	Peds. Rad.	Peds. Rad.	US	US	CT	CT	MRI	Flouro										
Punctuality																				
Knowledge																				
Participation																				
Faculty Signature																				
PSIL case1	Punctuality:		Knowledge:		Participation:		Faculty signature:													
PSIL case 2	Punctuality:		Knowledge:		Participation:		Faculty signature:													
Grading: E = excellent, G = good, A = adequate, I = inadequate																				
End of Clerkship Viva voce Result																				
Overall Grade Of Clerkship:																				
Feedback by Clerkship Coordinator:																				

CT = Computerized Tomography; Flouro = Fluoroscopy; Gen. Rad. = General Radiology; MRI = Magnetic Resonance Imaging; Peds. Rad. = Pediatric Radiology; US = Ultrasonography

Figure 2: Evaluation card (schematic).

cross-sectional imaging, is exposure to radiologic anatomy during the basic science courses. Usually the gap is too large to be overcome by the radiology faculty. An integration of radiology into anatomy courses may not only fill such gaps but may also equip the future physicians with an improved ability to appreciate the normal and abnormal during their clinical practice.^{1,7} In institutions where such an integration cannot be achieved, the radiology clerkship should be built up from the teachings in radiological anatomy.

Throughout the rotation, students value the faculty who help them to conceptualize. Previously, a preference

for interactive teaching has been reported among students in radiology.¹¹ Nonetheless, in our experience, students deem adequate comprehension of the subject prime over any particular learning style. A detailed discussion on the learning strategies follows.

The orientation class is one of the most demanding parts of the rotation. The students opine that grasping some of the very complicated concepts of a new specialty in the very first hours is too arduous. They also consider this session less important than other learning activities as the topics covered are neither reiterated nor assessed. Our experience suggests that spreading these concepts evenly along the clerkship is important for optimal learning. It also underlines the linkage of learning and assessment.¹²

During the reporting rounds, it is ensured that the student-to-faculty ratio does not exceed two. Assemblies of more than four students around a view-box, often observed during medicine and surgery rounds, have been reported to hamper adequate view.¹³ Maintaining a small student-to-faculty ratio enables dedicated teaching and is highly appreciated by the students.

Despite a one-to-one interaction with the faculty during teaching rounds, a dearth of adequate time required to acquaint the novice learner to cross-sectional imaging has been experienced. Such issues have been attributed to frequent interruptions by technical staff and consulting physicians.¹⁴ Allocation of dedicated time for the teaching rounds may aid in overcoming this problem. Substitution of passive learning¹⁴ with the active involvement of the students in clinical problem solving could also be of value; being particularly pertinent to integrated curricula.

The team work which is an integral part of medicine or surgery rotations is not substantial in radiology. We have observed communication gaps between residents and students leading to the wastage of a potential learning resource for both parties. Fostering better communication may not only enhance the residents' motivation to study but will also allow quality learning for students in a more comfortable environment.^{15,16}

Participation, rather attendance, in the post-graduate academic sessions is not considered productive by the students. Collins et al. suggested that the same resources may be used for both residents and students on the basis of an equivalent increase from the baseline knowledge.¹⁷ However, Afaq and McCall's observation,¹⁸ that the material covered at departmental conferences is often overly advanced for novice learners, is more pertinent to our situation. Although instructions tailored to the students' level of knowledge are highly desirable,¹ involvement of students in such sessions may maximize their exposure of

the specialty in the face of limited time and human resources.

The PSIL approach ensures a commendable integration of imaging findings with the clinical scenario in a system based manner; but the concepts strictly relevant to radiology like radiation protection and principles of imaging are often overlooked.¹⁹ Striking the balance may become difficult owing to limitations of time. Our students opine PSIL to be an excellent opportunity for self-motivated explorations; but they have also indicated a greater probability of losing focus on the core concepts. PSIL holds many promises but it also demands a lot of effort on part of both the faculty and the students.

The provision of endogenously developed database of teaching files is considered constructive as it aids in understanding of local disease patterns. At the time of inception, there were some reservations regarding adequate utilization of time dedicated for self-study since our pre-medical education is entirely pedagogical. Our experience suggests that such an approach can be highly effective provided adequate direction and learning resources are available.

Our experience reiterates the observation that learning for assessment overrides learning per se.¹² The students feel compelled to diagnose which ever case they come across and tend to overlook objectives that are not assessed. The duress of achieving satisfactory evaluation surpasses the priority of learning objectives. Mullins et al. have also noted a similar discordance of learning priorities between faculty and students.²⁰ This underlines the merit of harmony between clerkship objectives and evaluation for optimal learning.

Conclusion

It is overwhelming to see the students appreciate structure and function of a living human on radiological imaging. Every time a students exclaims, "if only I had seen this image while I was studying anatomy", our belief in the potential of radiology is fortified. Effectively designed, tailored instructions in radiology have the potential to buttress medical education from the foundation to the very pinnacle.

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