



Original Article

The value of medical student radiology education: A comparison of 1-week, 2-week, electives, and compulsories

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Abstract

Background: Basic radiology interpretive skill is essential for all physicians. We developed a vertical type of radiology education, including basic radiology in the students' first clinical year and added the other 1-week or 2-week dedicated radiology rotation in the later clinical year. The objective of this study was to present a valuable radiology education to undergraduate medical students.

Methods: At academic year 2014–2015, there were three different groups of the clinical-year students took a radiology rotation. All students completed the pretest of 30-image quiz at the first day of the course and the posttest of the same quiz at the last day of the course. The mean scores and the mean score changes of pretest and posttest were compared. A grade point average was used to determine the students' background characteristics. The relationships between students' background characteristics and the mean score changes were calculated.

Results: There were three groups of students including; 11 sixth-year elective students, 19 fifth-year compulsory students and 39 sixth-year compulsory students. The mean posttest score of all students were statistically significant greater than the mean pretest score ($p < .001$). For the students' years, time space or interest level had no significant effects on the improved score.

Conclusion: Adding a 1-week dedicated radiology rotation to fifth- or sixth-year students after they finished the standard radiology course is beneficial to students. This type of vertical radiology curriculum is valuable and should be incorporated into formal medical school curricula. Copyright © 2017, the Chinese Medical Association. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: Medical students; Radiology; Undergraduate medical education

1. Introduction

There are various types of radiology curricula offered among medical schools.^{1–5} Most of the American medical schools have no required radiology clerkship.^{1,2} This little amount of radiology education has resulted in only modest percentages of the interns reported high confidence in the interpretation of plain chest and abdominal radiographs.³ A survey of medical students'

opinions demonstrated that most of them recognized the importance of radiology and 63%–77% of them planned to take a radiology rotation as an elective during their medical schools.^{2,6} Thus the need for medical imaging education is increasing. A survey by Straus et al.⁴ demonstrated that 63% of radiology department chairs required radiology as part of a formal medical school course and teaching by radiologists. In contrast, only one-third of radiology chairs' perceptions considered the importance of medical student teaching for department success to be critical.⁷ Most of deans and chairs' opinions reported a need for a standard imaging curriculum.⁸ Nowadays, there have been no written guidelines or consensus statement about how and when to teach radiology to medical students.

The purpose of our study was four fold: 1) to determine whether clinical-year students demonstrated statistically significant improvement of the test after having taken the

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dedicated radiology rotation; 2) to determine whether students in different clinical years (fifth and sixth) had statistically significant difference in score improvement of the test; 3) to determine whether different periods of time in education (1-week and 2-week) had statistically significant difference in score improvement of the test, and; 4) to determine whether elective or compulsory had statistically significant difference in score improvement of the test.

2. Methods

2.1. Study design

We retrospectively reviewed the pretest and posttest scores taken by fifth-year and sixth-year medical students who participated in a 1-week or 2-week radiology rotation. The ethic committee approval was received by the university review board, No 56/2560. Written consent was not obtained from participants because the test was in part of the course evaluation.

2.2. Setting

At our institution, radiology education is a standalone course for the fourth-year medical students in a space of two weeks. Didactic lectures of basic radiology knowledge are provided for 15 h, followed by interactive radiologic interpretation sessions for 25 h and the other 20 h in small group (eight students for each group) rotations. A small group session introduces students to routine works in the radiology department, at which students are asked to discuss the indication, contraindication and appropriate use of imaging. Following the radiology curriculum, students might have radiology exposure in informal training supervised by interns or ward staffs during their clinical rotations.

At the academic year 2014, dedicated two-week radiology elective was offered to sixth-year medical students. On the following year, a dedicated two-week radiology rotation was compulsorily added to sixth-year medical students and a 1-week radiology rotation was compulsorily added to fifth-year medical students. During radiology rotation, the students exposed to real-life radiology works, interpreted and discussed plain radiographs, and special studies such as mammography and computed tomography in person with radiology staffs in a reading session and performed US in US room. However, the number of cases was by chance according to routine studies in the department. No didactic lecture was delivered.

2.3. Testing

The student was instructed to identify and interpret a 30-image quiz within a 90-min time period to evaluate medical students' pre-radiology knowledge on day 1 of the course. A 30-image quiz was chosen by a senior author (L.S) with 24 years of experience. The case mix for the study consisted of 15 plain radiographs, nine spotted views of CT studies, five spotted views of US studies, and a mammography. The plain

radiographs consisted of a normal adult chest radiograph, four abnormal adult chest radiographs, two abnormal pediatric chest radiographs, two abnormal adult plain abdomen series, an abnormal pediatric abnormal plain abdominal radiograph, and four abnormal bone radiographs. The CT studies consisted of two abnormal CT brains, an abnormal CT chest, two abnormal CT abdomens, three abnormal CTAs, and an abnormal CT bone. The US studies consisted of a focal lesion in the liver, a dilated renal collecting system, a free intra-abdominal fluid, a thyroid cystic nodule, and a testicular torsion. No answer for each question was specifically discussed in between radiology rotation. The same test-set was delivered to the students on the last day of the course. The other author (K.S) examined and scored all the students' answer sheets, to limit inter-rater variability, blinded to students' identifications as well as the state of pre-test or post-test.

2.4. Statistical analysis

A paired t-test was used to compare the mean pre- and the post-test score of each group to determine whether the improvement was statistically significant. One-way analysis of variance (ANOVA) was used to compare the differences between pre- and post-test scores of three groups. An unpaired t-test was used to compare mean improvement score between two groups (between 1-week and 2-week course, between the fifth year and sixth-year students, and between elective and compulsory students). The relationship between students' background characteristics, in which measured in terms of GPA and the differences of scores was determined by Pearson's correlation. A p-value less than 0.05 were considered significant. The data were analyzed by SPSS version 17.

3. Results

A total of 76 students participated in this study. At the academic year 2014, there were 14 sixth-year medical students participated in 2-week radiology elective, divided into one to three students per rotation. The pre-test results or the post-test results were missed in three students. Thus eleven students have the completed pre-test and post-test results. Then 11 sixth-year medical students were enrolled. At the academic year 2015, there were the two groups of compulsory medical students. First, 20 fifth-year medical students participated in a 1-week radiology rotation but one of them had the incomplete pretest and posttest scores. Then 19 five-year medical students were enrolled. These students were divided into five students per rotation. Second, 42 sixth-year medical students participated in 2-week radiology rotation but three of them had incomplete pretest or posttest. Then 39 sixth-year medical students were enrolled. These students were divided into 2–3 students per rotation.

Demographic data of all groups showed no statistical difference. In all groups, students scored significantly higher on the post-tests. The pre-test group mean (standard deviation [SD]) was 111.6 (31.9) compared with the post-test group mean of 156.2 (35.4) ($p < .001$). The changes in score between

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