THE IMPACT OF ELECTRONIC MEDICAL RECORD TRANSITION ON THE EDUCATIONAL EXPERIENCES OF MEDICAL STUDENTS

Daniel L. Roberts, MD
Mayo Clinic, Phoenix, AZ

Kenneth J. Mishark, MD
Mayo Clinic, Phoenix, AZ

Silvana T. D Alessandro, MD
Mayo Clinic, Phoenix, AZ

Lois Krahn, MD
Mayo Clinic, Phoenix, AZ

THE IMPACT OF ELECTRONIC MEDICAL RECORD TRANSITION ON THE EDUCATIONAL EXPERIENCES OF MEDICAL STUDENTS

Abstract

Little is known about the impact of major technological transitions (such as the adoption of a new electronic medical record) on the educational experiences of medical students supervised by residents. All visiting students whose rotation at Mayo Clinic in Arizona occurred during an EMR transition in September, 2010, were surveyed. Eight of twelve students (75%) agreed to participate. Although all students reviewed clinical notes and clinical data, only one (12.5%) used the new system to enter orders. Students reported an adverse effect on learning climate and time for resident- and faculty-directed teaching. Six of eight students (75%) felt that, despite the adverse consequences they noted, it was important to continue to offer clerkships during future transitions. These findings suggest that offering special computer training to students and adjusting the schedules of supervising faculty can only go so far in allaying the adverse effects of a major technological transition. The experiences of students at academic institutions facing similar technological transitions in the future can be improved if the educational leadership plans resident schedules during the transition with the impact of student teaching in mind and actively ensures students are entering orders on the day of go-live.

Introduction

Inadequate time available for teaching is a frequent concern expressed by both medical student clerks[1] and the educators that train them.[2] This challenge has the potential to become more acute during a major healthcare technological implementation such as the advent of a new electronic medical record (EMR), but the actual impact of technological implementations on clerkship experiences is unclear. Students bring many valuable characteristics that can be useful during a technological transition and may indeed find it valuable to function in this role while acquiring clinical experience.[3] Medical student feedback on the advantages and flaws of the new system is also essential, as students often face a unique set of challenges and constraints that cannot be overlooked without downstream consequences.

Previous studies have cataloged the preferences of students regarding EMRs,[4] the importance of maintaining their ability to enter orders in the electronic environment[5] and the impact of the presence or absence of computerized provider order entry on their clerkship experience.[6] We are aware of no studies that specifically address the experiences of students rotating during a technological implementation. Knight, et al, included a cohort of students who rotated at a hospital before an implementation and another who rotated after, but made it clear that the actual "go live" occurred between rotations.

In September, 2010, Mayo Clinic in Arizona changed from one EMR to another. The change impacted all aspects of inpatient and outpatient care, including order entry, clinical data review and documentation. The educational leadership briefly considered a moratorium on medical student clerkships during implementation, but decided such a moratorium was inconsistent with institutional goals and values. We surveyed students who rotated at our institution during the EMR change about the impact on their educational experience.

Methods

All students who rotated at Mayo Clinic in Arizona on the day of go-live for the new EMR were required to attend a two-hour computer training session. The authors attended and introduced the goals of the survey at that session. A survey was sent to each student electronically at the end of his or her rotation. Students were informed (both at the session and in the text of the survey) that their responses would be anonymous, would not have any impact on the grading of their rotations and would be reviewed only after being composited. The Institutional Review Board deemed the study exempt.

The survey consisted of 5 demographic questions (age, year of training, rotation, prior use of any EMR and prior use of the specific EMR being implemented), 3 questions assessing the extent of the student's use of the EMR and 5 questions assessing the impact of the EMR transition on the student's educational experience. The questions assessing educational experience used a five-point Likert scale with the exception of the final question ("During future technological transitions, do you think Mayo Clinic in Arizona should continue to offer medical student rotations or put them on hiatus?"), which offered three choices ("Continue to offer rotations during the transition," "Put rotations on hiatus during the transition" and "Unsure"). Electronic reminders were sent to maximize participation.

Results

Of the twelve medical students rotating at our institution on the day of go-live, eight (75%) agreed to participate in the survey. Three (37.5%) were in their third year of training and the remainder were in their fourth year. Their average age at the beginning of their rotation was 27.8 (range 24-37). Six students (75%) had used an EMR "a lot" in their prior training, one (12.5%) had used one "a little" and one had not used one at all. Two (25%) students had some prior experience with the specific EMR being implemented at our institution.

All students used the new EMR in the inpatient setting and four of them additionally used it for outpatient care. All students used it to read clinical notes and to review clinical data (vital signs, laboratory results, etc.), but only one (12.5%) used it to enter orders.

All students indicated that they were fully aware of the EMR conversion. Their impressions of its impact on their rotations are summarized in Figure 1. Five students (62.5%) felt it had a neutral impact on their rotation, while two (25%) felt it affected it somewhat negatively and one (12.5%) felt it affected it very negatively. No student indicated any overall positive impact.

Four students (50%) reported that the EMR transition affected the time their residents had to teach somewhat negatively. One (12.5%) felt the impact was very negative, and three (37.5%) felt it was neutral. With regard to faculty time for teaching, more students felt the impact was neutral (five students, 62.5%), but one student (12.5%) again reported a very negative impact. No students reported an increase in time available for teaching as a result of the EMR conversion.

With regard to learning environment, five students (62.5%) reported a neutral impact from the EMR conversion. Two students (25%) reported that their learning environment was affected somewhat negatively, none reported a very negative impact and one student (12.5%) reported a somewhat positive impact.

When asked about offering medical student rotations during future major technological transitions at our institution, six students (75%) favored continuing to offer them and two (25%) favored putting them on hiatus until after implementation.
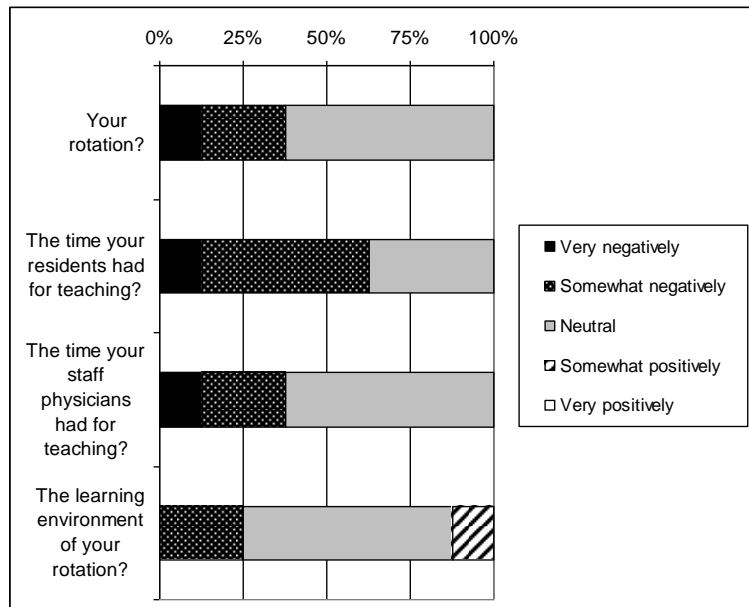

Figure 1: Proportion of student answers to questions beginning, "How did the EMR conversion affect…?"

Conclusions

The process of switching from one EMR to another is different in several important ways from transitioning from a paper system to an EMR, and the impact of this setting on medical student experiences has not been studied previously. First, unless students begin their rotation on the day of go-live, they are required to master two computer systems during a relatively brief rotation. Second, there may be a tendency to view a change in EMRs as more trivial or cosmetic than fundamental, with a subsequent decrease in the time and resources committed to helping students and faculty adjust to the change.

Students' perceptions of the impact of rotating during a major technological transition ranged from neutral to strongly negative with very little indication of any positive impact on learning environment or time for teaching. The fact that students reported a decreased amount of time available for teaching suggests that the impact of student teaching was not adequately accounted for when schedules were adjusted.

The most surprising finding from our study is that only one student reported using the new EMR for order entry, despite the availability of medical student order entry (with resident or faculty cosignature) having been a central tenet of design and implementation. The ability to enter orders has been shown to affect students' perceptions of rotations.[5] Since the expectation that students enter orders was expressed clearly at training sessions for medical students, residents and faculty, we must speculate that students were discouraged from entering orders until their supervising residents and faculty felt more comfortable with the new system themselves. This demonstrates the extent to which the "hidden curriculum" can affect the experiences of students with information technology in wholly unexpected ways.

We are also surprised that there was very little positive reflection about the experience of rotating during the technology transition from this group of young, computer-savvy students. We had hypothesized that the new system might level the playing field somewhat and allow the students to serve as a resource for their older supervisors. Perhaps the brevity of the rotation, the intensity of the EMR transition experience or the fact that the students appear to have been discouraged from entering orders prevented this from happening.

Our study has several limitations that should be taken into account. Despite our efforts to secure the participation of all students, only 75% consented to participate, a rate higher than prior, similar studies[7] but below our goal. We limited our focus to the students themselves and did not attempt to survey residents or faculty.

Our experience with medical education during the transition from one EMR to another suggests several lessons that may prove helpful to other academic institutions facing a similar transition:

- Since order entry is an essential component of interacting with a new EMR, efforts to include medical students in this process need to go beyond simply teaching the technique to students and the residents and faculty that supervise them. In retrospect, real-time communication with students about their order entry experiences could have led to interventions to counteract the "hidden curriculum" solution that appears to have prevented students from taking part.

- The relative youth and computer savvy of medical students will not protect them from the negative EMR-related experiences of their older, less technologically-experienced supervising physicians; any practice change that limits faculty time will limit teaching time.

- Despite the negative consequences, students generally perceive value in continuing to offer visiting student clerkships during the EMR transition. The energy we put into deciding whether or not to continue teaching students during implementation could have been better spent deciding how to meet the unique challenges of students during the process.

References

[1] Pettitt BJ. Medical student concerns and fears before their third-year surgical clerkship. *Am J Surg*. 2005:189:492-6.

[2] Jablonover RS, et al. Evaluation of a national curriculum reform effort for the medicine core clerkship. *J Gen Intern Med*. 2000;15:484-91.

[3] Whitley S. Medical students and the information generation. *AZ Medicine*. 2010:21:29.

[4] Keenan CR, Nguyen HH, Srinivasan M. Electronic medical records and their impact on resident and medical student education. *Acad Psychiatry*. 2006:30:522-7.

[5] Knight AM, et al. Medical student attitudes toward placing orders for hospitalized patients during training in the dawn of Computerized Provider Order Entry. *MEDINFO*. 2004:1685.

[6] Knight AM, et al. The effect of computerized provider order entry on medical student clerkship experiences. *J Am Med Inform Assoc*. 2005:12:554-60.

[7] Rouf E, Chumley HS, Dobbie AE. Electronic health records in outpatient clinics: perspectives of third year medical students. *BMC Medical Educ*