Impact of an Information Retrieval and Management Curriculum on Medical Student Citations

While the teaching of evidence-based medicine (EBM) has been increasingly integrated into medical training, most efforts have focused on skills such as the critical appraisal of the literature. There has been little focus on the basic skills of information retrieval and management (IRAM) which first year medical students often lack. In the 2006–2007 academic year, the University of California San Francisco (UCSF) School of Medicine implemented a new curriculum that teaches and promotes the development of students' IRAM skills within a problem-based learning (PBL) context. Students were taught IRAM skills, given individualized feedback by staff librarians, and encouraged to apply these skills by PBL instructors. We hypothesized that this skills-based curriculum would result in better student IRAM skills and habits.

To test our hypothesis, we assessed the outcome of student application of IRAM skills to PBL learning issues. Students participated in five PBL cases during their first year of medical school, generating six researched learning issues per student. We compared the citations of students from 2006–2007 (intervention group) to those of students from 2005–2006 (historical control). Preliminary data analyses revealed that the intervention group submitted fewer learning issues without citations (9.0% vs 14.5%), had a higher average number of citations per learning issue (3.10 vs 2.89), and had more citations with complete documentation (65.8% vs 29.4%). Their citations also showed a greater use of primary articles and textbooks, and of certain online tools. The curriculum was effective in improving student IRAM skills and habits and will be continued.

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Background

Over the past several years, the availability and volume of medical information has dramatically increased and continues to rise. There has also been a growing emphasis on the practice of medicine based on scientific evidence, and physicians need to effectively retrieve and manage this evidence in order to provide optimal patient care.[1] While the teaching of evidence-based medicine (EBM) has been increasingly integrated into medical training at all levels, most efforts have focused on skills such as the critical appraisal of the literature and do not necessarily provide skills for information retrieval and management (IRAM).[2] Subsequently, medical students often lack IRAM skills. For example, when researching learning topics, students at our institution tended to access a limited range of resources, relied on inappropriate sources of information, and cited their sources inadequately. To address this problem, UCSF introduced an IRAM curriculum to the first year medical students in 2006–2007 and integrated it with an existing problem-based learning (PBL) course. In the PBL course, students work in small groups on clinical cases, generate learning issues or topics from the case using self-directed learning, research their individual learning issues, and submit their research reports to the group.

The IRAM curriculum is led by UCSF staff librarians and focuses on the main competencies developed by the Association of American Medical Colleges (AAMC) through the Medical Student Objectives Project (MSOP): knowledge of available information resources and tools; the ability to retrieve, filter, evaluate, and reconcile information; and the development of good ''information habits'' such as the use of multiple information sources and citation of these sources.[3] Our curriculum intervention consisted of five parts: 1) student orientation to the library and available resources; 2) librarians training faculty to be PBL instructors ; 3) IRAM skills workshop for the students timed around a PBL case; 4) one librarian visit to each PBL small group to review submitted learning issues and provide feedback and guidance on information retrieval strategies, resources, and citation documentation; and 5) continued reinforcement of IRAM skills by the PBL instructors.

The purpose of our study was to evaluate the effectiveness of the new IRAM curriculum. We assessed the impact of the curriculum on student IRAM habits by measuring the outcome of student application of IRAM skills to PBL learning issues.

Methods

We conducted a prospective longitudinal study of a curricular intervention at the UCSF School of Medicine. Participants included first year medical students from the academic years of 2005–2006 and 2006–2007. Students from 2006–2007 who received the curriculum were the study subjects with students from 2005–2006 serving as historical controls. This study was approved by the UCSF Committee on Human Research.

Students participated in five PBL cases in their first year; four of the cases unfolded over two sessions and one over three sessions, resulting in six researched learning issues per student. We assessed

each learning issue using three measures: 1) the presence of citations; 2) the quality of citation documentation; and 3) number and type of resources cited. All the learning issues submitted from both classes were scored using an internally developed scoring rubric. The rubric was piloted and refined by the four study investigators, and scoring rules and reliability established prior to implementation. The same investigator scored each learning issue using the developed scoring rubric and rules.

For our initial data analysis, we calculated means and percentages within each group of students and compared the two groups using unpaired *t* test and two-tailed Fisher exact test. Additional analysis will be completed with repeated measures ANOVA using SPSS Version 14.0.

RESULTS

A total of 818 learning issues from 2006–2007 and 807 from 2005–2006 were available for scoring and all 1625 (100%) were scored. There were 2309 citations in the intervention group and 1991 in the control group. The intervention group submitted fewer learning issues without citations (9.0% vs 14.5%, $P<.001$), had a higher average number of citations per learning issue (3.10 vs 2.89, $P<.05$), and had more citations with complete documentation (65.8% vs 29.4%, $P<.001$).

In our analysis of resources used (*P* values pending final analysis), we found the following preliminary results. The intervention group, compared to the control group, cited primary articles (25.0% vs 19.3%) and textbooks (34.8% vs 26.4%) more often as resources. The intervention group also used library-vetted specific online tools (eg, STAT!Ref, MD Consult, and AccessMedicine) more often (29.7% vs 13.2%).

CONCLUSION

We found that the IRAM curriculum appeared to be effective in improving the IRAM skills and habits of students. The class that received the curriculum had fewer learning issues without citations, more citations per learning issue, and more citations with complete documentation. They also used better sources and, when searching online, more often used tools that had been vetted by the school. We will continue to analyze the data for trends over time to determine patterns of improvement or attrition. Additional next steps include analysis of available satisfaction data from PBL instructors and intervention students and evaluation of the quality of the written learning issues including presence of verbal synthesis and application to the PBL case. In the meantime, UCSF will continue the current IRAM curriculum for future first year medical students.

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