

Comparison of training interventions for PubMed search skills amongst 3rd and 4th year medical students

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Abstract

Objectives: To determine if the use of a MeSH (Medical Subject Headings) tutorial had a positive effect on online search skills in PubMed training programs for medical students.

Methods: Two cohort groups of medical students in their 3rd and 4th years of study were trained to search PubMed, and were subsequently examined by means of an OSCE (Objective Structured Clinical Examination). The first training intervention demonstrated the use of MeSH, but allowed discretion to decide if text word searching or the MeSH term was more appropriate. The second training intervention showed the use of the MeSH “Links” menu for searching within PubMed. **Results:** Both cohort groups showed a marked improvement in OSCE test scores after the second intervention. **Conclusions:** The use of the MeSH “Links” tutorial as a training intervention led to an increased OSCE score over the use of a MeSH demonstration with discretion to run a search with a MeSH term, or with free text word searching. Test scores may have been influenced by a facilitated clinical skills seminar, as opposed to self-study options. Test scores may also have been influenced by greater exposure to the OSCE format and to PubMed searching in the end-of-year examination.

Introduction

The University of the Witwatersrand Faculty of Health Sciences introduced a PBL (problem-based learning) medical curriculum in 2003, in line with reforms taking place in this area in most medical schools worldwide (Baum; Lloyd-Jones; Sefton). As with other medical libraries worldwide, the Witwatersrand Health Sciences Library (WHSL) played an increasing role in the new curriculum with regard to the acquisition of online search skills (Earl). Students initially received four contact hours of training in small group learning sessions. As student numbers are large (typically over 200 students in each year), this form of instruction necessitated two sessions per day, five times a week for four consecutive weeks, and placed a heavy burden on library resources. No further curriculum time for instruction by WHSL was afforded after these initial tutorials. In 2006, owing to teaching time constraints in the rest of the curriculum, this form of instruction changed to four contact hours of training in the form of lectures and demonstrations to the entire class. Although this format reduced resource constraints on the library considerably, it is not an optimal method of training for the acquisition of online search skills.

In conjunction with the new format for online search training, as the first group of students progressed to their clinical years of study, verbal reports were received that students remained unskilled in searching for evidence-related material. It was consequently decided that an assessment-driven learning approach would be adopted. A formative online examination was set for the first time at the end of the first teaching block, immediately after online training had taken place. Unfortunately the notorious lack of bandwidth in South Africa, together with a relatively poor supporting infrastructure with regard to information technology at the University, meant that large numbers of students were unable to log-on to PubMed simultaneously. It was thus decided that online search skills could most effectively be summatively assessed in the form of an OSCE (Objective Structured Clinical Examination). In conjunction with four contact teaching hours at the beginning of the 3rd year of study, online search skills now form part of the overall clinical skills program. The search skills OSCE is one station of the clinical skills OSCE for each term, which is conducted twice a year. This new means of assessment

afforded the opportunity to examine the outcomes of different PubMed training interventions.

Objectives

To determine if the use of a MeSH (Medical Subject Headings) “Links” tutorial had a positive effect on online search skills in PubMed training programs for medical students.

Literature Review

Systematic training, reinforcement and advancement of online search skills throughout the medical curriculum was recognized as a worthwhile objective by health sciences librarians as long ago as 1989 (Bradigan). Several studies document incorporation of online search skills into the medical curriculum (Paterson; Kaufman 1997; Brahmi; Kaufman 1999), particularly in regard to the teaching of evidence-based medicine (Brown; Burrows 2003; Rosenberg), but none document sustained success of outcomes of these teaching and training initiatives. It is noted however that a single brief training session can have a marked beneficial effect on the quality of short term searching performance outcomes (Gruppen 943). Attempts to increase searching by medical students, in spite of different interventions, have ranged from unsuccessful (Badgett), to a qualified success as judged by students’ self-reports (Ghali; Gjerde). However, it is noted that it may be appropriate to regard literature searching as a fundamental skill, such as history-taking and physical examination Ghali 21), and in consequence to examine it as such. In this regard, whilst there are numerous problems for libraries concerning the development, administration, cost and the grading of credit courses (Miller), the OSCE or PBE (Performance Based Examination) format lends itself to successful measurement of online search skills, much in the same way as other clinical skills are observed and measured (Brown 73; Davidson; Burrows 1999; Fliegel; Frohna).

There are numerous studies in the online search literature documenting the benefits of thesaurus term searching as opposed to text word searching. As far as MEDLINE is concerned, MeSH provided higher specificity but lower sensitivity than text word searching in a search to retrieve studies on sleep in healthy individuals, and it was

recommended that the two strategies should be used in conjunction with each other so as to yield maximal retrieval (Jenuwine). For end users or infrequent searchers however, the ability to combine MeSH with text word searching is difficult to grasp, and particularly so in the case of novice searchers. It was observed that within PubMed (the National Library of Medicine's online version), end user searching was more successful when MeSH alone was used (Chang). No documentation could be found with regard to the specific use of the NLM MeSH "Links" tutorial by end users. This tutorial demonstrates the use of MeSH, subsequently allowing a term to be selected and searched within PubMed by clicking on a hyperlinked "Links" menu. The searcher is then guided to a choice of optimal search options within PubMed, choosing for example to search PubMed with the selected MeSH term as a major topic, or as a clinical query. Both automated strategies yield very precise results. The MeSH term (not as a major topic) can also be selected to search PubMed automatically in those searches where more sensitivity is required.

Methods

As examination results would depend on the outcome of the interventions, it was deemed unethical to use a randomized control trial as the study design. In addition, as the initial method of training (four contact hours delivered either as small group training or as lectures and demonstrations) differed between the two groups, it was felt that either group could not effectively be used as a control. Consequently, the 3rd year (n=213) and 4th year (n=208) student populations were selected as cohorts. Approval for the study was obtained from the University's ethics committee for human subject studies.

The first intervention for both cohorts demonstrated the use of MeSH, but allowed the student to decide if the MeSH term or a free text word should be selected. The search strategy was relatively simple, and did not involve selection of more than one term. Students received a PowerPoint demonstration with downloaded screen shots in a voluntarily attended tutorial, and the PowerPoint program was loaded both onto the web-based student curriculum pages as well as onto computers in the library's walk-in facility for self-study. This program demonstrated the search process in its entirety, from the

selection of the appropriate term to the application of limits, and to the retrieval of a full text document from the library's collection by means of the PubMed LinkOut facility. A simple question based on the text was asked, so that it was necessary to download the document online in order to answer the question. The MeSH "Links" menu tutorial was not demonstrated. In consequence, students had to transfer the selected term (MeSH or text word) into the PubMed search bar. Both groups participated in an OSCE station that examined search skills in June/July 2006, and each station was observed by a professionally qualified librarian. Each OSCE search station lasted 5 minutes, and was part of the entire OSCE examination which also looked at certain clinical skills taught in that particular term.

The second intervention for both cohorts demonstrated the use of the MeSH "Links" menu tutorial in a facilitated skills session, and the PowerPoint demonstration used was also subsequently made available for self-study both on the web-based curriculum pages and in the library's walk-in computer facility. The Links menu in the MeSH database allows the MeSH term selected to be automatically searched in PubMed, as either a major topic or a clinical query. Only the major topic option was demonstrated. The same format for the OSCE was observed as in the initial intervention. The second OSCE for both groups was conducted in October/November 2006. Cohort numbers for the second intervention differed slightly as a result of student absences at the examination or withdrawal from study (3rd year n=210; 4th year n=206), but the difference in numbers were not statistically significant.

OSCE question papers were set by the library for each examination for both groups, and were tested by the Centre for Health Science Education (CHSE) to see if the searches were feasible within the allotted time period. Papers were also scrutinized by CHSE to see if the instructions were clear. Question papers were provided at each OSCE search skills station, and each examiner had a mark sheet for each student. Students are identified only by student number on their question papers. Answer sheets were tallied by the librarian examining at each search skills station, and marks were subsequently verified by CHSE. Each step in the search process was awarded one mark. Marks were

awarded according to CHSE standards, which allow for prompts, but then allocate a half-mark only for the prompted answer.

Results

OSCE results for the 3rd year cohort group are shown in Table 1. The first intervention was examined in July 2006. The second OSCE (November 2006) shows marks received after the second intervention.

	OSCE July 2006	OSCE November 2006
	3 rd year cohort (n=213)	3 rd year cohort (n=210)
Mean (out of 10)	5.8	9.0
Maximum (out of 10)	10.0	10.0
Minimum (out of 10)	0.0	1.4
Median	5.5	9.7
Standard Deviation	2.529	1.487

Table 1

Comparison of Scores after First and Second Training Interventions for 3rd Year Cohort

OSCE results for the 4th year cohort group are shown in Table 2. The first intervention was examined in June 2006. The second OSCE (October 2006) shows marks received after the second intervention.

	OSCE June 2006	OSCE October 2006
	4 th Year Cohort (n=208)	4 th Year Cohort (n=206)
Mean (out of 10)	7.1	8.5
Maximum (out of 10)	10.0	10.0
Minimum (out of 10)	1.7	0.4
Median	7.5	9.5
Standard Deviation	1.695	2.059

Table 2

Comparison of Scores after First and Second Training Interventions for 4th Year Cohort

Discussion

Both cohort scores show an improvement after the second intervention. The improvement in test scores is quite marked in the case of the 3rd year cohort. Both cohorts could have been influenced by increased exposure to assessment-driven literature searching. The marked improvement of scores for the 3rd year cohort between the July and the November OSCEs could have been due to the fact that students were unsure of the OSCE format in the July examination. The July OSCE was the first such examination to which this cohort was exposed.

The fourth year cohort still showed an improvement after the second intervention, although this was not as great as with the 3rd year cohort. Any differences that could be explained by students' unfamiliarity with the OSCE format would not apply, as this cohort had been exposed to this form of examination in their previous year of study. This may therefore account for the fact that improvement after the second intervention was not as high as that for the 3rd year cohort.

Improved scores could have been influenced by the fact that both cohorts had greater exposure to online searching at the time of the second OSCE.

The OSCE scores for both cohorts could also have been influenced by the type of training received in the first four weeks of year 3 of their studies (small group learning sessions for the 4th year cohort, and lectures and demonstrations for the 3rd year cohort). Not all students attended the "refresher" tutorials and seminars that were held before each OSCE, as attendance was not mandatory. Search skill performance could therefore also have been influenced by the training given before each intervention, although there is some limited evidence to show that self-study can be as effective as face-to-face instruction in a web-based environment (Needham).

A limitation to this and to other studies which examine training interventions for medical students' literature searching skills is that none of the studies attempt to examine sustained search skills over a longer period of time. However, as the CHSE has now

incorporated search skills training into the clinical skills curriculum, and into the twice-yearly OSCEs, this affords the opportunity for further studies on the long-term assessment of training interventions and outcomes.

Conclusion

Both cohort groups show an improvement in search skills after use of the MeSH “Links” menu tutorial. Use of this PubMed feature is thus recommended for the teaching of search skills to medical students. The assessment-driven learning approach to search skills taken by the CHSE, as part of the entire clinical skills program, no doubt also contributes in some measure to improved student performance, although this will need to be measured over the long term to assess sustained impact.

This study also demonstrates that use of the OSCE to measure search skill performance is extremely suitable, and a far more reliable instrument than student perceptions of self efficacy.

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