Acquisition of Evidence-Based Surgery Skills in Plastic Surgery Residency Training

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INTRODUCTION: The teaching and learning of critical appraisal skills and evidence-based practices by surgical residents has been identified as an unmet need in many surgical training programs.

METHODS: Monthly journal clubs over a calendar year were the setting for a critical appraisal curriculum. Preassigned homework assignments and carefully selected articles with specific methodologies were posted electronically and formed the course material. Pretests and posttests on medical statistics and methodology were administered. Presurveys and postsurveys on attitudes toward evidence-based surgery (EBS) were administered.

RESULTS: Precourse surveys revealed a lack of confidence in residents' knowledge of epidemiology and biostatistics, with an increase in confidence postcourse (2.6 vs 2.9; $p = 0.4$). Precourse and postcourse, there was strong support for more critical appraisal training in residency (5.1 vs. 4.8; $p = 0.1$) and an agreement that understanding evidence-based practices is important for the clinical practice (4.6 vs. 4.6; $p = 0.4$) as well as the research endeavors of a plastic surgeon (5.4 vs. 5.5; $p = 0.8$).

Pretest scores, when compared with PGY level, showed an increase in knowledge with increasing PGY level ($p = 0.6$). Average pretest scores were 6.5 of a total of 15 points, or 43%. Posttest scores were improved, at 7.8 of 15, or 52% ($p = 0.6$). Sixty-four percent of learners felt that journal club was a good venue for teaching critical appraisal skills precurriculum. Fifty percent of learners were still of that impression at course completion ($p = 0.3$). The modest improvement in test scores indicates an impact on critical appraisal skills, but reliance on journal clubs to teach these skills is insufficient.

CONCLUSIONS: Through monthly journal clubs and self-directed assignments, critical appraisal skills were improved across PGY levels in an academic surgical training program; however, other settings and methods of teaching are required to augment a curriculum in evidence-based surgery. (J Surg 68: 167-171. © 2011 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: evidence-based medicine, critical appraisal, plastic surgery, Journal Club

COMPETENCIES: Patient Care, Medical Knowledge, Practice Based Learning and Improvement

INTRODUCTION

Evidence-based surgery (EBS) involves integrating clinical expertise and the best available clinical evidence from systematic research to make sound, informed surgical decisions.[1] The "Office of Evidence-Based Surgery," established within the American College of Surgeons, perceives that "most surgical specialists base their practice on uncontrolled case series and uncontested expert opinion."[2]

To alter this behavior, ideally students would be introduced to evidence-based practices in medical school.[3] Unfortunately, even when exposed to critical appraisal principles, many medical school graduates feel that their clinical practice is not based on the best available evidence.[4]

Thus, often it falls on the shoulders of the academic surgeon to train residents in EBS. This is challenging as few surgeons themselves are trained in EBS. From a systematic review of the effectiveness of critical appraisal skills training for clinicians, Taylor et al.[5] concluded that there is a paucity of educators within the field of evidence-based health.

A second challenge is to find the right venue for instruction of these skills. Surgical residents are clinically busy, and academic teaching time is squeezed by a continuously increasing volume of knowledge coupled with a mandated decrease in work hours. Yet, critical appraisal cannot just be absorbed—these skills need to be taught explicitly and then reinforced during the care of specific patients. The weekly formal lecture series is one venue to integrate acquisition of these skills; however, dry lectures may not produce lasting retention. Self-directed learning alone may not be realistic for the busy surgical resident. "One-off" half-day clinical courses in critical appraisal

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have not been particularly effective.[6] Integrating EBS into journal clubs is an acceptable way to begin to integrate formal teaching of critical appraisal skills into residency training.[7]

As a first step to tackling this deficiency in our program, we elected to introduce formal teaching into the University of Western Ontario Plastic Surgery Residency Training Program via a combination of journal club sessions and self-directed learning assignments. Our hypothesis was that "doing" EBS in an integrated fashion would allow it to be done efficiently and would facilitate its routine use in daily practice.

METHODS

A formal program for teaching EBS was run over one academic year. Materials were provided to the learners on a password-protected website, including links to the "Users Guides to the Surgical Literature" series from the Canadian Journal of Surgery.[8-17] Three homework assignments were posted, with topics covering randomized controlled trials (RCTs), meta-analyses, and diagnostic tests. Carefully selected journal articles with methodologies matching the homework assignments were delivered electronically.

Formal teaching was incorporated into monthly, 3-hour evening journal clubs. At the first journal club, residents were asked to list any courses they had taken in epidemiology and biostatistics. A short questionnaire sampling attitudes toward EBS was administered. A 6-point Likert scale was used, with responses ranging from "strongly disagree" to "strongly agree." Domains sampled included the student confidence in their EBS skills, the need for better teaching of EBS in residency, the usefulness of EBS skills in clinical and academic surgery, and the preferred forum for acquiring these skills. Finally, residents completed a pretest covering basic topics in EBS. The test was proctored to promote independent test taking among the residents. No time limit was set on this examination.

At alternating journal clubs, a theme for the journal club (ie, RCTs) was selected, and a carefully selected journal article illustrative of that topic was assigned. In addition, a corresponding homework assignment on that topic was completed by each resident and brought to the journal club. The learners were encouraged to access multiple resources for this assignment, including textbooks, Internet resources, and the applicable user's guide. An in-depth discussion on the methodology of the article was undertaken, and the homework assignment was reviewed. Additional articles were also reviewed as per the consultant hosting the journal club that evening.

At the final journal club in the year-long program, a posttest, identical to the pretest, was administered. Likewise, an identical survey on attitudes toward EBS was given. Each pretest and posttest was then anonymized for features, including name (which was optional), PGY level, and whether the test was the pretest or posttest. Examinations were then graded using a standardized answer key by a single surgeon (C.T.).

Precourse and postcourse attitudes and pretest and posttest scores were compared with paired t-tests. Linear regression was used to assess PGY level and test score results. A p-value of less than 0.05 was considered significant. Analyses were completed using InStat 3, version 3.0 b (In-STAT Inc, Scottsdale, Arizona) for Macintosh.

RESULTS

Ten plastic surgery residents in the University of Western Ontario plastic surgery training program participated. There were two each of PGY 1, 2, and 3 residents, three PGY 4 residents, and one PGY 5 resident. Six had had prior undergraduate or medical school courses in epidemiology or biostatistics. Four participants had had none.

Eight journal club sessions were held over a single academic calendar year. Of the 10 residents, on average 8 were present at each session. No resident consistently missed the sessions. Two were invariably away either on vacation or were busy on call. On average, 4 consultant surgeons attended each session.

Although no time limit was set for the examination, all learners had completed both the survey on attitudes and the test by 20 minutes. Of the 10 residents, 7 had complete results, including a pretest and posttest. Two had a pretest only, and 1 had a posttest only.

Regarding precourse perceptions, most participants lacked confidence in their knowledge of epidemiology and biostatistics, scoring 2.6 on a 6-point Likert scale with "poor" confidence a 1 and "high" confidence a 6. After the course, there was a nonsignificant increase in confidence (2.6 vs 2.9; $p = 0.4$).

Precourse, there was strong agreement that there should be more critical appraisal training in residency, scoring 5.1 on a 6-point scale of agreement. After the course, there was a similar sentiment (5.1 vs 4.8; $p = 0.1$).

Precourse and postcourse, there was strong endorsement that understanding critical appraisal is important for the clinical practice of a plastic surgeon (4.6 vs. 4.6; $p = 0.4$) and for a plastic surgeon scientist (5.4 vs. 5.5; $p = 0.8$).

Pretest scores, when regressed on PGY level, showed no association ($p = 0.6$) in knowledge with increasing PGY level. This would indicate that these skills are not being learned informally within the existing training program curriculum.

Average pretest scores were 6.5 of a total of 15 points, or 43%. Posttest scores were improved at 7.8 of 15, or 52%; however, this difference did not reach statistical significance ($p = 0.6$). This might represent beta error, in that there may be an insufficient number of subjects to reject the null hypothesis of no difference in scores.

Qualitative impressions from informal feedback from the year-long course included a widespread appreciation of the effort that went into the program. There was moderate resentment for the time required to complete the self-directed assignments. Although initially 64% of students felt that journal club was a good venue for teaching critical appraisal skills, 50% were still of that impression upon completion of the curriculum ($p = 0.3$).