Development of a Web-Based Module for Teaching Evidence-Based Medicine Skills to Urology Residents-in-Training

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I. Education Grant Proposal

Project Title: Development of a Web-Based Module for Teaching Evidence-Based Medicine Skills to Urology Residents-in-Training
Project Date: 2007-2008 Academic Year
Principal Investigator: Philipp Dahm, M.D., M.H.Sc., Associate Professor of Urology
Amount Requested: $5500
Department: Urology
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Abstract

The teaching of evidence-based medicine (EBM) skills has become an integral component of medical student education at most medical schools but is given much less attention in graduate medical education, particularly in the surgical sub-specialties such as urology. To date, no formal curriculum or any other dedicated resources exist for teaching urology residents the principles of EBM. However, such resources are essential to all urology residency programs that wish to adequately address the Accreditation Council for Graduate Medical Education (ACGME) core competency of practice based learning and improvement, which is closely aligned with the principles of EBM. In this application, we propose to develop a pilot module to teach urology residents core content that relates to therapy and allows these learners to apply this knowledge in an interactive, web-based format. The results of this study will provide preliminary data to inform a larger subsequent study aimed at investigating the effectiveness of this type of educational intervention and allow us to apply for external grant funding.

Does this proposal utilize human subjects for other than the following purposes?

The activity consists of improving the curriculum of the course in which the participants are enrolled, serves as didactic device involving only individuals enrolled in the class, or provides training in the conduct of such professional activities as interview procedures.

Yes □
No   X

In submitting this proposal and signing below, the principle investigator and the sponsoring department agree to carry out the activities described in this proposal within the time specified. The applicants assure that the allocated funds will be spent in the manner prescribed.

Principle Investigator’s Signature: ___________________________ Date: __________

Department Chair Signature: _______________________________ Date: __________
II. Budget

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III. Budget Justification

A. Personnel Salaries:

Philipp Dahm, M.D., M.H.Sc. The Principal Investigator has requested no salary for his effort. He will oversee the development of the module and the implementation of the pilot-test.

C. Consultation Services:

To Be Determined, Website Consultation. Up to $3150 will go to consultation fees associated with the development and design of the website and modules.

D. Equipment:

A website domain must be purchased for this project; includes costs associated with domain registration and purchase as well as monthly maintenance costs from domain provider.

G. Other:

Residents that participate in this voluntary study will receive a $60 gift certificate as compensation for completing the module and both pre- and post-learning assessments.
IV. Specific Aims

The underlying hypothesis of this proposal is that an interactive, web-based module represents an effective, well received and timely format for the educational content of an EBM curriculum for urology residents. Based on this hypothesis, we have defined the following specific aims:

1) To develop a web-based module that uses urology-specific examples to teach the principles of EBM and allows learners to apply this knowledge in an interactive format.

2) To pilot-test the acceptance and effectiveness of this type of educational intervention in a small sample of urology residents using a pre- and post-test format of knowledge assessment.

V. Background and Significance

Introduction

Teaching EBM has become an integral component of medical school curricula; however it receives far less attention in subsequent residency training, particularly in the surgical specialties such as urology. To date, there is no formal curriculum of EBM core content that urology residents should acquire during their residency training, nor are there dedicated urology-specific resources to facilitate such learning. However, with the mandatory implementation of a competency-based curriculum, it will become imperative for residency programs to cover EBM related core content to meet the ACGME requirements for Practice Based Learning and Improvement. The learning objectives of this core competency are defined as follows: 1) locate, appraise, and assimilate evidence from scientific studies related to their patients’ health problems, 2) apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness, 3) use information technology to manage information, access on medical information and support their own education. These goals mirror the guiding principles of EBM and its underlying commitment to continued, lifelong learning.

The Need for EBM Training in Urology

A recent study by our group explored the attitudes and opinions toward EBM, familiarity and use of EBM resources and self-assessed understanding of related terminology of urologists.¹ This cross-sectional, web-based survey of members of the American Urological Association (AUA) documented that most urologists believe that practicing EBM improves patient care and that all urologists should be familiar with critical appraisal skills. This study further suggested that urologists’ self-assessed understanding of EBM terminology and the reported use of resources such as the Cochrane Library may be sub-optimal. However, the validity of our study findings appeared questionable in light of a low response rate of only 9%.

In 2006, we therefore conducted a second, similar EBM survey of AUA members using a mixed methodology of mailed questionnaires and the internet. This survey achieved a much higher response rate of 44%, yet confirmed many of the findings made in the earlier survey. Figure 1 summarizes the survey responses as to the level of agreement to statements made about EBM on a scale of 0 (strongly disagree) to 10 (strongly agree). In brief, urologists expressed strong support for the importance of EBM, while at the same time questioning the degree of its
current implementation in the community. There was strong agreement with the statement that all urologists should be familiar with critical appraisal skills.

**Figure 1.** Attitudes toward importance and current role of EBM in urology. Survey participants were asked to indicate their agreement with statements about EBM on a scale form 0 (strongly disagree) to 10 (strongly agree). The results are reported as box-plots with representation of median, IQR and 95% confidence intervals.

In the same survey, we queried survey participants’ self-assessed understanding of common terms such as “number needed-to-treat”, “publication bias” and “levels of evidence” that relate to important EBM concepts. Figure 2 provides a graphic representation of the percentage of respondents that stated that they understood these terms and could explain them to others (dark bars) or understood these terms but could not explain them to others (light bars). These findings suggest that many core concepts are not well understood by urologists and efforts to promote EBM training are indicated. Finally, when asked about whether they thought that a dedicated, web-based EBM training program, the survey participants indicated strong support (median score: 8, IQR 6-9).

**Figure 2.** Level of self-assessed understanding of common EBM terms. The dark bars represent the percentage of respondents who indicate that they understood and could explain these terms to others; the light bars represent the percentage of respondents who indicated that they understand but could not explain these terms to others.
EBM Training in Urology Graduate Medical Education

In early 2007, we conducted a survey of urology residency program directors to explore their opinions about the role of EBM training for urology residents and obtain information about ongoing efforts. We surveyed all ACGME-accredited urology programs in the United States (n=117) using a single-page, self-designed survey instrument. One-hundred and eight programs responded for a response rate of 92.3%. Program directors overwhelmingly confirmed the importance of EBM training to urology residents: Approximately 90% agreed or strongly agreed with the statement that EBM training is valuable to urology residents, and 84% agreed or strongly agreed that formal EBM training should be part of all urology residency programs. Twenty-two percent of program directors indicated that they did not direct any particular educational efforts towards EBM teaching, and half reported that they did not use any specific resources to teach EBM. When asked what would make it easier for them to teach urology residents EBM, the most commonly reported items were: Urology-specific educational materials (33.3%), a formal curriculum (24.4%), and faculty development (16.3%).

In summary, survey data of practicing urologists and residency program directors support the basic premises of this proposal that there is a need for dedicated, educational resources to teach urology residents the fundamental principles of EBM. This data further suggests that an online format would be well received by both urologists and urology residency programs seeking to address the core competency of practice based learning and improvement. Literature from outside the specialty of urology further supports that an interactive, online format is effective in teaching EBM content.2

Significance

The outlined proposal represents an innovative and timely approach to the teaching of EBM to urology residents. The principal investigator has an established track in medical education and a documented research interest in clinical research methodology and EBM. Specifically, he serves as a small group leader of the University of Florida EBM course for medical students, directs a monthly EBM session for urology residents and has for three consecutive years directed a postgraduate course on EBM at the annual national meeting of the AUA. This year, he has been a faculty member of the Duke EBM Workshop (Teaching and Leading EBM; http://www.mclibrary.duke.edu/training/courses/ebmworkshop/) and will serve as tutor-trainee at the McMaster EBM Workshop (http://clarity.mcmaster.ca/date_loc.php). He is also enrolled in the University of Florida Master Educator Program (Cohort 4) for which the outlined project will serve as the educational project.

It is expected that the outlined application will result in presentations and/or publications at both urological and educational meetings. The experience gained from this study will directly benefit current and future urology residents at the University of Florida. Although, this application is focused on EBM training for urology residents, its finding will be readily applicable to other areas of graduate and postgraduate education, in particular to other surgical sub-specialties. It will be able to build on the considerable expertise and effort that has been dedicated to EBM training at this institution.3 Finally, this project is well aligned with the COMEC proposal that is being submitted by Cynthia Wilson Garvan and Hubert H. Fernandez that is aimed at promoting statistical literacy among neurosurgery residents. Although no formal collaboration is planned in this proposal, we see considerable potential for future multidisciplinary projects that will result in competitive grant applications.
VI. Experimental Design and Methods

Curricular Content

Based on the published literature and our own teaching experience we have identified a number of core curricular items that relate to therapy.\textsuperscript{4,5} These include the following topics:

- Randomization
- Stratification
- Allocation Concealment
- Blinding (masking)
- Co-interventions
- Contamination
- Relative Risk
- Relative Risk Reduction or Relative Benefit Increase
- Absolute Risk Reduction or Absolute Benefit Increase
- Number Needed to Treat (NNT)
- Confidence Intervals
- Intention to treat Analysis
- Survival curves

Aim #1: To develop a web-based module that uses urology-specific examples to teach the principles of EBM and allows learners to apply this knowledge in an interactive format.

In the initial phase of this application we will develop a web-based module that will introduce these core content items to the learner using examples taken from the practice of urology and the published literature. The program will be self-paced and include opportunities for knowledge application and learner self-assessment. At the end of the module, the acquired knowledge will be formally evaluated. The evaluation tool to be used will be based on a previously described test of EBM competency for surgeons. Once completed, interested urology residents at UF will be asked to pilot test the module and offer feedback for its improvement.

Aim #2: To pilot-test the acceptance and effectiveness of this type of educational intervention in a small sample of urology residents using a pre- and post-test format of knowledge assessment.

In the subsequent phase of this proposal we will test the acceptance of this pilot module in a small group (n=35) of urology residents across the country. We will generate a detailed study protocol which will be submitted to the IRB for approval. In brief, participants will be selected at random from urology residents that are currently in training (approximately 1000 at any given time) in accredited urology residency programs in the United States using the AUA membership directory. In order to enroll study subjects with a basic understanding of urology, eligibility will be limited to PGY-3 through PGY-6 residents. Prospective participants will receive an invitation email from the principal investigator outlining the purpose of the study and requesting participation. Individuals with incorrect contact information, that fail to respond or decline participation will be replaced. An incentive inform of a $60 gift certificate for a yet to be specified vendor (such as Barnes and Nobles) will be offered to those participants that complete the study in its entirety.
Study subjects that are interested in taking part in this study will be asked to indicate their agreement in a return e-mail. These participants will be provided with an individual, secure login that will provide them with access to the web-based module. Prior to completing the actual module which is expected to take about 90 minutes to complete, study subjects will be asked to provide demographic (i.e. age, PGY-level) and other background information (size of program, prior EBM training) to inform the analysis.

**Evaluation of educational value**

At the beginning of the module, study participants will be asked to complete a formal evaluation of their pre-training knowledge. Since no validated evaluation instrument for this particular assessment is available and it appears beyond the scope of this project to develop and validate such an instrument, we will adapt an existing instrument to meet our requirements. These instruments include the Berlin questionnaire, the Fresno test, the McMaster instrument of EBM competence for surgeons and an assessment tool developed by MacRae et al. Approximately two weeks after the completion of the EBM module, participants EBM knowledge will be reevaluated using a similar instrument.

**Analysis and Statistical considerations**

We will use descriptive statistics to analyze and report the baseline characteristics of the survey participants. The answer to items of the multiple choice evaluation before and after the planned educational intervention will be recorded as “yes” or “no” and coded as values of 1 and 0 respectively. The percentage of correct answers will be reported as percent correct using the mean and standard deviation versus median and interquartile range as appropriate.

Sample size considerations for this pilot study are based on findings from our recent survey of AUA members which included the competence instrument developed by Poolman et al. In this survey, respondents achieved an average score of 65% with a standard deviation of 17%. Using a paired-t-test, an alpha of 0.05, a beta of 0.10 and defining a 10% increase as clinically meaningful, we estimate that we will need 31 subjects to demonstrate a difference of that magnitude.
VII. References


