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Providing premedical students with quality clinical and research experience:

The University of Wisconsin Tobacco Science Scholars Program

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Abstract

Undergraduate premedical students face a prodigious decision as they work to determine whether to pursue a profession in medicine. Experience in clinical medicine and research is essential to inform students what it might be like to be a physician. Undergraduates, however, face a number of obstacles to obtaining the kind of quality clinical and research experience needed to best inform them on this decision. Growing regulations designed to protect patient confidentiality, though undeniably important, pose a barrier to students seeking patient contact. Traditional passive physician shadowing often does not provide ample opportunities for one-on-one patient interaction or problem solving. Finally, research opportunities available to students typically are not associated with clinical work and therefore do not provide an experiential model of how empirical evidence informs medical practice. This report provides a description of the University of Wisconsin Tobacco Science Scholars Program, a pilot program designed to grapple with some of these barriers. The program provides supervision for students so that they might fulfill institutional requirements required for patient contact, provides an active model of clinical patient interaction and problem solving, and provides access to research that is integrated into the student's clinical experience so the student might better understand the nature of research-based evidence in medicine. Program details and limitations are discussed.

Keywords

Premed students; clinical experience; research experience; tobacco

Introduction

The education of physicians has been the subject of debate for over a century (Flexner, 1910), and as Jeffery Gross notes, “begins long before the first day in medical school” (Gross et al., 2008). While considerable attention has been provided to designing quality premedical academic curricula (Cooke et al.; 2006; Finnerty et al., 2010; Institute of Medicine, 2001; Larson et al., 2004; Sales and Schlaff, 2010; Shusterman, 2010), comparatively less attention has been given to determining how premedical students are to

obtain clinical and research experience (Gross et al., 2008). Medicine is a clinical profession, but undergraduates often must decide whether or not they wish to apply to medical school with limited clinical experience (Gerbens et al., 1998; Holmboe, 2004). Furthermore, the rigorous competition to achieve acceptance to medical school results in what has been called the “pre-med syndrome,” a focus on science courses and grades to the exclusion of non-science courses and clinical experience (Young, 1986). This narrow premedical focus has resulted in first year medical students who are unprepared for the experience of human suffering found in a hospital, and unfamiliar with the relationship between patient and healer (Engel, 2005). For those who do obtain quality clinical experiences, it is often these experiences that provide contextual meaning and motivation to better grapple with their heavy course loads (Alexander et al, 1992; Dornan, 2005; Moffat et al., 2004). Premedical students today face several obstacles to gaining quality clinical and research experience. **1)** Premedical students today are faced with growing restrictions to patient access in clinical settings due to expanding implementation of hospital and clinic regulations necessary protect patient confidentiality (Kitsis, 2011). **2)** Students continue to gain clinical experience primarily through *passive* physician shadowing (Chuck, 1996; O’Connell and Gupta, 2006), while evidence now supports the benefits of more *active* forms of patient interaction (Gerbens et al. 1998; Willenbring et al., 2008), **3)** Premedical students are required or encouraged to obtain research experience prior to applying to medical school, but most research opportunities available are not integrated with clinical practice and as such do not provide a model for understanding how evidence informs clinical practice (Chuck, 1996).

Patient privacy

In the last ten years there has been a substantial evolution in our understanding of patient confidentiality resulting in a greater number of institutions adopting confidentiality policies. Principles of patient confidentiality have been codified in the Health and Insurance Portability and Accountability Act (HIPAA) (U.S. Congress, 1996), which protects all “identifiable health information” ...on “physical or mental condition” ... from the “patient’s past, present or future”. The passing of national legislation and local guidelines on patient confidentiality is of undisputed importance in the evolution of medical practice, however, these regulations have also created limitations to pre-medical students hoping to acquire clinical experience. Most undergraduates obtain premedical experience through “shadowing” (Alexander et al., 1992; Kitsis, 2011; Willenbring et al., 2008) with the student-physician introduction facilitated through a student’s family member, friend, or acquaintance. Unfortunately these informal relationships do not typically provide guidance often required to overcome institutional confidentiality regulations (O’Connell and Gupta, 2006). Recognizing the growing barriers to patient contact, (Kitsis, 2011), many universities are now creating shadowing programs for pre-medical students that provide institutional support for obtaining HIPAA certification and gaining compliance with local institutional regulations. When available, these programs are highly prized and utilized by premedical students (Alexander et al., 1992; Wagner and Stewart, 2001).

Active vs. passive clinical experience

Shadowing is a venerable tradition in which a student follows a physician through patient rounds and observes patient interactions (Alexander et al., 1992). Although shadowing experiences vary widely, the role of the shadowing student is typically passive and observational and not designed to provide one-on-one patient interaction or engage the student in problem solving (Chuck, 1996). Today there are a small but growing number of institutions that have recognized the limitations of passive clinical experience and are providing more active clinical programs for premedical students (Alexander et al., 1992; Chuck, 1996; Lovecchio and Dundes, 2002). Programs that emphasize active clinical learning for undergraduates include the Patient Perspectives Program (Charlotte NC), the Minneapolis Heart Institute Foundation Summer Research Internship Program (Minneapolis MN), the Stewart F. Alexander Premedical Program (Westwood, NJ), the Dartmouth Health Experience Learning Program (Hanover, NH), and the St. Jude's Pediatric Oncology Education Program (Memphis, TN), and have shown that active learning experience greatly enhances student decision making when considering a medical career and provides deeper sense of purpose and motivation with regard to other coursework (Alexander et al., 1992; Almy et al., 1983; Gronemeyer, 2005; Wagner and Stewart, 2001; Willenbring et al., 2008).

Research

Today, essentially all medical schools require or recommend that their applicants have research experience (American Association of Medical Colleges, 2013). Understanding the nature of medical knowledge requires experience with scientific methodology, not only through reading textbooks, but through participation in research itself (Stoeckle et al., 1993). Research is an important aspect of premedical education because it is a foundation of evidence-based medicine (EBM) (Bauer and Bennett, 2003; Lopatto, 2004). EBM is a philosophy of practice wherein health care practitioners, whenever possible, attempt to provide therapies based on empirical results instead of tradition or opinion (Sackett et al., 1996). Today, EBM has wide support among medical providers and for many is considered a requisite foundation for optimal medical care (Carey, 2006; Fichman et al., 2011). In 2008, the Institute of Medicine recommended that all undergraduates interested in clinical health professions take courses that teach the principles of EBM (Riegelman and Garr, 2008). For the student to gain a hands-on understanding of how research informs medical practice, the particular research experience should have some relevance to clinical practice. An ideal way to facilitate this would be involve the student in clinical research that can be directly applied to the patients he or she encounters in clinical rounds. If a program integrates research and clinical experience in this way, a student can participate in the development of therapy and then observe the clinical utilization of this therapy, thereby gaining an experiential understanding of evidence-based practice.

TSS Program Description

The University of Wisconsin School of Medicine and Public Health, Center for Tobacco Research and Intervention (UW-CTRI) is in its second year piloting the UW-Tobacco Science Scholars Program (TSS). TSS is a one-semester program, run by volunteer faculty,

and provides supervision so that students may complete required HIPAA and local institutional certifications, provides an active-model clinical rotation and a fully integrated research experience. The TSS Program is offered as a one-credit course with evaluations of student performance and an opportunity for a physician recommendation to medical schools.

TSS introductory training

An important aspect of the TSS program is referred to as “introductory training” wherein students are supervised in a step-by-step process to satisfy requirements for patient contact and research involvement outlined by HIPAA, the University of Wisconsin Institutional Review Board and a local community hospital (Table 1). During introductory training, staff provides necessary forms, websites and introductions to various personnel involved in completion of the process. Without supervision, completion of these multiple steps could be confusing and prohibitive to most undergraduates. An additional component of introductory training is instruction on unique TSS guidelines for interactions with patients and medical staff. These guidelines provide instructions on appropriate hospital dress-code, restrictions on physical contact with patients, appropriate and inappropriate patient questions, discussion on how to end a patient interaction, and guidelines for interactions with physicians and staff during rounds. These guidelines are more detailed and comprehensive on issues of patient interaction than those provided by local hospital or HIPAA. Once introductory training is complete, students have not only satisfied required institutional regulations for patient contact and research participation, but have gained a more nuanced understanding of clinical etiquette than would otherwise be available.

Clinical Experience

The TSS clinical experience involves rounding with a physician during a clinical rotation at a local community hospital. Rounds last 3 hours every 2 weeks throughout the semester and typically involve three to four patient encounters. The physician first selects a patient with reasonable disposition and ability to communicate and then explains to the patient that he or she is rounding with a student who is in a premedical clinical program. The physician first asks the patient if he or she is willing to allow the student to stay and talk, and emphasizes that talking to the student is voluntary. If the patient agrees to speak to the student, then the student goes into the patient’s room and asks open-ended questions such as “tell me about yourself” or “why did you come to the hospital?” The patient then provides a history of variable depth and the student takes notes. After the student has seen each patient, he or she provides a brief verbal history to the physician. After three or four patient encounters, the physician sends the student to the library to look up pathophysiology and treatment on one of the patient diagnoses. Preference is given to investigating patients with smoking addiction and smoking related illness. The student then writes out a rudimentary patient history with discussion of relevant pathophysiology and treatment. At the end of rounds, the history and discussion is provided as a five-minute presentation to the attending physician. In this way, the student engages in patient interaction as well as problem solving, activities that he/she might engage in routinely as a practicing physician. One advantage to this system is that the supervising physician is less burdened with a TSS student than a shadowing student because the TSS student spends a portion of time talking to patients independently and studying the

patient's problem in the library. Several physicians have volunteered to participate in the TSS program and have provided positive feedback on students in areas of clinical etiquette and clinical presentation.

Research Experience

The TSS research experience is conducted at the UW Center for Tobacco Research and Intervention, and as such, is clinical and related to smoking cessation. For students, this provides a unique opportunity to gain an understanding of smoking cessation research and at the same time see patients in the hospital with smoking addiction and smoking related illness. The research experience is one semester and requires the student to read the study protocol and later conduct a one-hour review of the protocol with the principal investigator. The student is then provided with a limited dataset (for example, data on a single self-report questionnaire) and provided with instructional materials on how to conduct simple data analysis to find means, standard deviations, t-tests and ANOVA and asked to conduct a simple analysis. After analyses are complete, the student meets with one of the UW-CTRI doctoral-level research faculty who spends an hour advising them on how to improve on their analysis. Five members of the research faculty at UW-CTRI have volunteered to help guide TSS students in analyzing and understanding data.

Presentation

At the end of the semester, students are required to provide a PowerPoint presentation to staff at UW-CTRI containing two components. The first component is a clinical presentation with a patient history, diagnosis, relevant pathophysiology and treatment plan; the second component is a presentation of descriptive and comparative analysis on study data from smoking related research. The two parts of the presentation are typically related through a theme. For example, the clinical component might provide a description of a smoker with anxiety and the research component might provide description of data from an anxiety scale taken in smokers who are trying to quit. The presentation concludes with time allotted for UW-CTRI clinical and research faculty to discuss findings with the student. This presentation provides the student with an experience of formal clinical and research presentations common in clinical medicine and medical research and provides an example of how evidence from research informs clinical practice in medicine.

Program Response

The TSS program is available to undergraduates with Junior or Senior status, strong academic standing and an interest in becoming a physician. As a volunteer program, TSS was initially piloted with only one available position, although three positions are currently available and larger numbers expected in the future. When the TSS program was first offered, 49 applicants applied, in semester two 71 applied representing a significant portion of the qualifying UW pre-medical class. UW Madison provides numerous opportunities for students to volunteer in local hospitals and obtain shadowing experience. Based on a brief survey, roughly half of our interviewees had already shadowed, while the other half had encountered institutional barriers to shadowing. Those who had not shadowed applied to the program primarily to gain clinical experience. Those who had already shadowed mostly

applied to gain a more engaged clinical experience. A small number stated that they applied to the program because they sought an integrated research experience. On an exit survey, students completing TSS reported that the program helped them understand better what it meant to be a physician and helped them gain clarity about their decision to apply to medical school. Another common response was that the experience made them excited to go to medical school and motivated them to do well in their course work.

Conclusion

The undergraduate who is considering the medical profession faces a decision of considerable magnitude. Medical school is expensive and requires substantial sacrifice of time and freedom. Presently, shadowing is the primary method through which students gain clinical experience necessary to approach this decision. There are, however, an increasing number of barriers to gaining shadowing experience and shadowing is typically passive in nature. Today, educators are beginning to implement programs that provide support for overcoming barriers to clinical involvement and provide active clinical experience to undergraduates. Another issue for students is that their research experience is often unrelated to clinical practice. As EBM becomes the standard of care in medical practice, it is becoming more important for students to engage in research. An ideal situation is one in which the student participates in research and clinical practice on the same diagnostic area. In this situation, the student is able to arrive at an experience-based understanding of how research informs clinical practice. The University of Wisconsin Tobacco Science Scholars Program is one of a number of programs that are attempting to meet these goals. TSS is in its infancy, but applications to the program have been impressive and feedback among completers has been very positive. It is hoped that description of this program might provide a few ideas to educators on how to solve particular problems in premedical education.

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Table 1

TSS Program Introductory Training

1.	Proof of immunizations to Rubella, Hepatitis B, Rubeola, Mumps, Varicella, and TB test
2.	Permission from the UW School of Medicine and Public Health to enroll in the course
3.	Letter from undergraduate advisor stating that student is enrolled and in good standing
4.	Letter from TSS Program to the local hospital indicating the activities of the student
5.	Letter from the supervising physician stating they accept the student into the clinical program
6.	Waiver of Liability and Pledge of Confidentiality to local hospital.
7.	HIPAA certification through the Institutional Review Board
8.	Human Subjects Research Training Certification through the Institutional Review Board
9.	Institutional Review Board approval of student as key personnel on the research project
10.	Training in TSS program guidelines for clinical patient interaction.