

The Internet School of Medicine: Use of Electronic Resources by Medical Trainees and the Reliability of those Resources

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BACKGROUND: Electronic sources of medical information are plentiful, and numerous studies have demonstrated the use of the Internet by patients and the variable reliability of these sources. Studies have investigated neither the use of web-based resources by residents, nor the reliability of the information available on these websites.

METHODS: A web-based survey was distributed to surgical residents in Michigan and third- and fourth-year medical students at an American allopathic and osteopathic medical school and a Caribbean allopathic school regarding their preferred sources of medical information in various situations. A set of 254 queries simulating those faced by medical trainees on rounds, on a written examination, or during patient care was developed. The top 5 electronic resources cited by the trainees were evaluated for their ability to answer these questions accurately, using standard textbooks as the point of reference.

RESULTS: The respondents reported a wide variety of overall preferred resources. Most of the 73 responding medical trainees favored textbooks or board review books for prolonged studying, but electronic resources are frequently used for quick studying, clinical decision-making questions, and medication queries.

The most commonly used electronic resources were UpToDate, Google, Medscape, Wikipedia, and Epocrates. UpToDate and Epocrates had the highest percentage of correct answers (47%) and Wikipedia had the lowest (26%). Epocrates also had the highest percentage of wrong answers (30%), whereas Google had the lowest percentage (18%). All resources had a significant number of questions that they were unable to answer.

DISCUSSION: Though hardcopy books have not been completely replaced by electronic resources, more than half of medical students and nearly half of residents prefer web-based sources of information. For quick questions and studying, both groups prefer Internet sources. However, the most commonly used electronic resources fail to answer

clinical queries more than half of the time and have an alarmingly high rate of inaccurate information. (*J Surg* 72:316-320. © 2014 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: medical education, residency, electronic resources, Internet

COMPETENCIES: Medical Knowledge, Practice-Based Learning and Improvement, Systems-Based Practice

INTRODUCTION

Patients are known to perform their own Internet research about medical and surgical conditions.¹⁻⁵ Information used by patients includes both written and video sources. The Internet is often the first source of information about medical conditions, rather than physicians.⁵ Previous studies have exposed problems with both accuracy and readability of the information available, but there have also been data reported that affirm the reliability of information available.^{1,4}

Modern medical education increasingly uses Internet resources, including online lectures and online textbooks, among other electronic resources. Smartphone use by medical students during their clinic rotations is nearly ubiquitous, and a recent survey of medical students from a single institution suggested that students prefer web-based resources over standard textbooks.^{6,7} The use of Internet resources by residents has not been determined, and the accuracy of electronic resources used preferentially by medical and surgical trainees has not been studied.

The aims of this study were to identify the preferred information resources for medical students and residents, determine the factors affecting their preferences, and evaluate the accuracy of the information available online to medical trainees.

METHODS

A 12-item questionnaire was distributed to surgery residents in southeastern Michigan and third- and fourth-year

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medical students from an American allopathic and osteopathic medical school and a Caribbean allopathic medical school. The survey was web-based, and responses were solicited via an e-mail invitation. Medical trainees were questioned regarding their demographics, their preferred sources of medical information, their confidence in these resources, and the most important features of resources.

The top 5 electronic resources cited by the trainees were then assessed for accuracy. To best simulate the scenario of medical training, a list of 254 questions was generated, which might be asked of a student or resident on rounds, appear on a written exam, or be applicable to patient care. Questions were generated across specialties, including primary care, psychiatry, and surgery. Included within each specialty were questions on diagnostic examinations, epidemiology, medications, indications for procedures, and miscellaneous topics. Answers for these questions were obtained from standard reference textbooks.⁸⁻¹⁰

The top 5 electronic resources were then searched to find the answers for each question. The answers within the electronic resources were compared with the standard textbook answers for accuracy. For a search engine, a logical search term was used for each question, and the top 3 links that did not overlap with one of the other electronic resources were used to represent accuracy.

Each of the 254 queries directly pertained to medicine, surgery, or psychiatry. The accuracy of each resource within each specialty was examined.

RESULTS

In total, 73 medical trainees responded to the survey. Of them, 39 responders were medical students in their third and fourth years, and 34 responders were residents, ranging from post-graduate years 1 through 5. Most respondents (40%) were planning careers in general surgery, followed by internal medicine (21%), family medicine (12%), and

Medical trainees' confidence in preferred resources

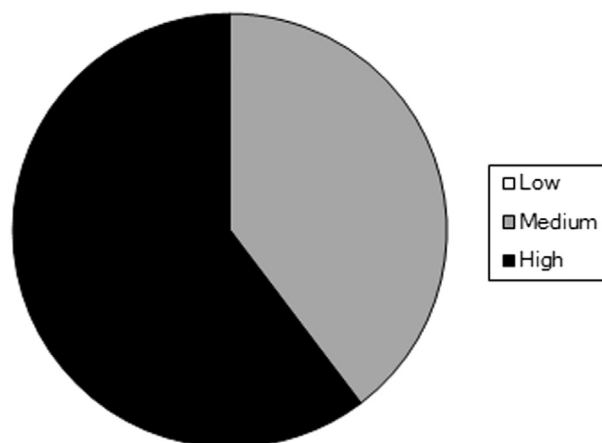


FIGURE 1. Medical trainees' confidence in their preferred resources.

various other specialties. Male to female ratio was 2.1:1. Most respondents (89%) were between 25 and 34 years of age, and 10% were between 18 and 24 years of age.

The overall preferred resource was highly varied (Table 1). More than half of respondents preferred purely electronic resources (58%), whereas 33% opted for textbooks or board review books. Online textbooks accounted for another 13%. When only considering responses of residents, 55% preferred either textbooks or online textbooks.

For dedicated study time, the division was more heavily in favor of hardcopy printed material, with 81% preferring textbooks or board review books, and another 11% preferring online textbooks. A variety of resources online were cited as the preferred source of information for brief study sessions.

UpToDate was most heavily favored for clinical decision making; and smartphone applications, most commonly Epocrates, were the preferred resource for medical information.

TABLE 1. Medical Trainees Preferred Resource

	Overall	For Dedicated Study Time	For Quick Studying	For Day-To-Day Patient-Care Decisions	For Medication Information
Textbook	14 (19%)	30 (42%)	5 (7%)	4 (6%)	1 (2%)
Textbook online	10 (13%)	8 (11%)	9 (13%)	3 (4%)	1 (2%)
PubMed	3 (4%)	0 (0%)	3 (4%)	1 (1%)	0 (0%)
Google	12 (16%)	1 (1%)	22 (31%)	1 (1%)	4 (7%)
Wikipedia	5 (7%)	1 (1%)	14 (19%)	0 (0%)	2 (3%)
Medscape	3 (4%)	0 (0%)	14 (19%)	11 (15%)	10 (17%)
MD Consult	0 (0%)	1 (1%)	3 (4%)	4 (6%)	1 (2%)
STAT!Ref	2 (3%)	0 (0%)	3 (4%)	1 (1%)	0 (0%)
UpToDate	13 (18%)	2 (3%)	27 (38%)	44 (60%)	7 (12%)
Smartphone application	1 (1%)	1 (1%)	6 (8%)	4 (6%)	40 (68%)
Board-review book	10 (14%)	28 (39%)	6 (8%)	0 (0%)	1 (2%)
Other	1 (1%)	3 (4%)	2 (2%)	0 (0%)	9 (15%)

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