

TITLE: Putting Wikipedia to the Test: A Case Study

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ABSTRACT:

BACKGROUND: As guiding students' use of clinical information resources is an important role of the medical program, we wondered how well *Wikipedia*, given its popularity with students, compared with long-standing resources.

METHODS: Blinded to the information resources, medical academics compared conjunctivitis, multiple sclerosis and otitis media entries from *Wikipedia* against those from *AccessMedicine*, *eMedicine* and *UpToDate*, using a scale developed to rank their accuracy, coverage, concision, currency and suitability for medical students. Medical librarians assessed their accessibility and usability.

RESULTS: The entries in *Wikipedia*, in comparison with the other resources, were easy to access, navigate and well presented. Although reasonably concise and current, they failed to cover key aspects of two of the topics, and contained some factual errors. *Wikipedia* was thus judged unsuitable for medical students. *AccessMedicine* entries were judged the most suitable resources for medical students by two of the reviewers; the third was critical of the lack of emphasis on empirical data.

CONCLUSIONS: *Wikipedia* was found currently unsuitable for medical students in isolation from other medical information resources. Traditional information resources would be improved by having in-text referencing to strengthen the link to evidence. Perhaps experts should contribute more to *Wikipedia* to ensure it provides best information.

INTRODUCTION

A *wiki* is a technique for collaborative development of documents on the web (Altman 2005). Volunteers located throughout the world write the *Wikipedia* collaboratively. It was established in 2001 and has grown rapidly into the largest reference Website, attracting at least 684 million visitors yearly by 2008. In December 2008, *Wikipedia* had more than 75,000 active contributors working on more than 10,000,000 articles in more than 250 languages (About Wikipedia 2008). Increasingly, medical students use the free online encyclopaedia *Wikipedia* for an overview of medical topics. They Google for information and are led to *Wikipedia* articles that are frequently high on the results list. There is even a *Facebook* group called “*Wikipedia* is helping me get through med school”, with thousands of members worldwide reflecting its growing popularity (Hingston 2007).

A comparison in 2005 of *Wikipedia* and the online *Encyclopaedia Britannica* science entries found similar accuracy (Giles 2005). The appropriateness of *Wikipedia* as a source of medical information is controversial because anyone can contribute and edit (Keim 2007). Encouraging more experts to write articles, introducing stable versions of entries once they reach a certain standard and adding citations to journal

articles have all been suggested as ways to improve their quality (Giles 2005; Keim 2007). There are measures to limit malicious editing (Wikipedia: Vandalism 2007) and further enhancements have been proposed (Giles 2007). Yet the weakness of *Wikipedia* in allowing anyone to edit is also its strength – there are over two million articles in English alone and they can be updated instantly. In contrast, resources written by experts and peer reviewed take longer to produce and update, and are costly. Furthermore, students can be deterred by the more complex scientific language of these resources. We wondered how well Wikipedia compared with other, long-standing electronic resources in terms of quality and suitability for medical students in an era when instilling an evidence-based approach is a priority for medical schools.

METHODS

Selection of resources

For this case study, we compared the entries on conjunctivitis, multiple sclerosis and otitis media in *Wikipedia* with other resources used by medical students: the free version of *eMedicine* (<http://www.emedicine.com/>) and two subscription-based resources, namely *AccessMedicine* (<http://www.accessmedicine.com/home.aspx>) and *UpToDate* (<http://www.uptodate.com/home/index.html>). *eMedicine* and *UpToDate* are collections of overviews of medical topics whereas *AccessMedicine* provides access to core clinical textbooks.

We set out to use an entry from *Harrison's Principles of Internal Medicine* on each

topic but found the conjunctivitis and otitis media articles lacked sufficient detail to enable a comparison. As *Harrison's* was available online as part of *AccessMedicine* we altered our study design to select other entries from that resource. The topics were chosen based on the availability of subject experts.

Materials and procedures

All four entries for each topic were downloaded on the same day: conjunctivitis on 27 January 2008, multiple sclerosis on 17 October 2007 and otitis media on 5 February 2008. Searches were undertaken of each resource on each of the terms 'conjunctivitis', 'multiple sclerosis' and 'otitis media'.

Wikipedia had one article on each topic and the searcher was taken directly to the article. The searches of *AccessMedicine*, *eMedicine* and *UpToDate* produced multiple results. For *AccessMedicine* and *eMedicine*, we chose articles that were high in the list, had a relevant title and appeared comprehensive when scanned (Table 1). *UpToDate* had separate articles for key areas such as diagnosis and treatment; these were merged or hyperlinked for the study. *Wikipedia's* non-scientific references (describing, for example, movie characters with multiple sclerosis) and history sections were omitted because this clearly differentiated it from other resources. All figures, images and references were included. Copies of the entries were de-identified by removing all resource titles so the evaluation by the subject expert was blinded.

Participants

We included three medical academics who were subject experts for the clinical information entries evaluated: an ophthalmologist/epidemiologist for conjunctivitis; a research-active neurologist for multiple sclerosis; and an academic general practitioner and Coordinating Editor of a relevant Cochrane group for otitis media. Two medical librarians led the team, and prepared the blinding for the entries for evaluation.

Data analysis

A scale was developed to rank the content of the resources (Table 2). Medical librarians assessed the accessibility and usability of the resources by examining: cost and login requirements; ease of finding and navigating the information; and the quality of presentation.

RESULTS

The *Wikipedia* entries were judged relatively concise and current, but failed to cover key aspects of two topics and contained some factual errors. Each reviewer deemed it unsuitable as a learning resource for medical students (Table 3). *Wikipedia* was judged unsuitable because of factual errors, inadequate coverage of important areas, poor emphasis on empirical data, and the avoidance of technical language which health professionals have to master.

The medical librarians found *Wikipedia* the most accessible and easiest to use (free and requiring no log-in), and the easiest resource in which to find information (the relevant topics were retrieved immediately upon searching). In practice, students may Google a topic and select the *Wikipedia* entry from the list, where it is often high-ranking. The other resources required the searcher to select from lists of entries but, thereafter, navigating around the information was simpler in *UpToDate* and *eMedicine* than in *Wikipedia*, which in turn was simpler than in the *AccessMedicine* entries, which were structured like traditional textbooks. *Wikipedia's* presentation quality was comparable with the other resources. *AccessMedicine* was rated the most suitable resource for medical students in terms of content by two of the experts; the third (who reviewed the otitis media entry) was critical of the inadequate emphasis on empirical data (Table 3). Against the criteria it was judged as the best of the four electronic resources evaluated for medical students.

DISCUSSION

We found that although *Wikipedia* was easier to use than the other three electronic resources, several shortcomings rendered it unsuitable for medical students.

This study has a number of limitations. Only three of us sampled three topics and four clinical information resources. We evaluated the resources using our own scale developed in-house, rather than using a formal external critically appraised instrument.

Nevertheless we are aware of few studies undertaking this comparison. One study

compared Wikipedia with Medscape Drug Reference on 8 categories of drug information and found it to have a more narrow scope, be less complete and had more errors of omission than the comparator, a traditionally edited online database (Clauson et al. 2008). Another reviewed 35 *Wikipedia* entries for inpatient procedures in isolation, finding them reasonably accurate but with significant omissions (Devgan et al. 2007). Medical students have a growing preference for electronic resources for reading, particularly for *UpToDate* (DeZee 2005; Leff 2006; Peterson et al. 2004) perhaps the consequence of insufficient referencing of primary research in most print textbooks, as declared by their medical teachers (King et al. 2006). Insufficient referencing adds to the other barriers to obtaining the information needed for evidence-based medical practice, namely: lack of time; difficulty accessing electronic information resources; lack of awareness of appropriate resources; and inadequate searching skills (Ely et al. 2002; Green 2005; Peterson et al. 2004). *Wikipedia* has the potential to overcome many of these barriers. Students are likely to demonstrate that “convenience trumps quality every time” (Tenopir 2005), using Google as a pathway to *Wikipedia*.

Table 1 Content selected from each resource

Condition	AccessMedicine	eMedicine	UpToDate	Wikipedia
Conjunctivitis	Conjunctivitis of Chapter 5 'Conjunctiva' from Vaughan & Asbury's General Ophthalmology 17 th edition (alternate title Lange Ophthalmology)	Conjunctivitis of the Emergency Medicine category	Conjunctivitis and Evaluation of the red eye	Conjunctivitis
Multiple Sclerosis	Multiple Sclerosis section of Chapter 375 'Multiple Sclerosis and Other Demyelinating Diseases' from Harrison's Principles of Internal Medicine 16 th edition	Multiple Sclerosis of the Neurology category	Epidemiology, risk factors, and clinical features of multiple sclerosis in adults; Diagnosis of multiple sclerosis in adults; Treatment of relapsing-remitting multiple sclerosis in adults; Treatment of progressive multiple sclerosis in adults; Comorbid problems associated with multiple sclerosis in adults.	Multiple Sclerosis
Otitis Media	Chapter 49 'Otitis Media' from Current diagnosis and treatment in otolaryngology-Head and Neck Surgery 16 th edition (alternate title Current otolaryngology)	Otitis Media of the Emergency Medicine category	The diagnosis of acute otitis media; The epidemiology, pathogenesis, treatment, and prevention of AOM; Epidemiology, pathogenesis, clinical manifestations, and complications of acute otitis media; Treatment of acute otitis media; Prevention of recurrent acute otitis media	Otitis Media

Table 2 Scale for ranking content of resources

Score	1	2	3
Accuracy	Numerous important errors	Some minor factual errors	No factual errors
Coverage	Important areas not covered	Adequate coverage of all areas	Comprehensive coverage of all areas
Concision	Substantial repetition	Generally concise	Highly concise
Currency	Out of date in many areas	Generally up to date but not in all areas	Completely up to date
Overall suitability for medical students	Unsuitable	Generally suitable but with some limitations	Highly suitable

Table 3 Performance of the data resources

Data resources		Wikipedia	UpToDate	eMedicine	AccessMedicine
Conjunctivitis	Accuracy	3	2	3	3
	Coverage	1	1	2	3
	Concision	2	1	2	3
	Currency	2	2	3	2
	Suitability	1	2	2	3
Multiple Sclerosis	Accuracy	2	3	1	3
	Coverage	1	3	1	3
	Concision	3	1	2	3
	Currency	3	3	2	2
	Suitability	1	2	1	3
Otitis Media	Accuracy	2	3	2	3
	Coverage	3	3	2	3
	Concision	2	1	3	1
	Currency	3	3	2	3
	Suitability	1	2	1	1

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Practice Points

- Medical information resources are essential for medical education. Yet students enter medical programs literate in the use of *Wikipedia* through *Google*.
- *Wikipedia*, when tested for suitability for medical students by content experts, was inadequate as an isolated medical information resource compared to three industry standards.
- Traditional information resources might be improved by in-text referencing to link to evidence.
- The content of other medical wikis (perhaps those with expert authors, such as Dr Wiki ¹, Ganfyd ² and WiserWiki ³) need assessment. Perhaps experts should contribute more to *Wikipedia* to ensure it provides best information.

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