



## The development of an open web based resource for answering clinical questions: Catering to geographically dispersed learners, teachers and clinicians

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Some of the problems facing medical students, teachers and medical practitioners today are increasing medical knowledge and publications, rising patient expectations, information management and patients' internet access. Key skills such as efficient identification and appraisal of quality evidence are essential for medical practitioners. In an academic environment where clinical teachers and students are geographically dispersed in regional and urban centres it is a challenge to provide resources to teaching staff to support a consistent approach to teaching evidence based practice. Here we describe the development of an open web based resource to assist staff to progressively develop medical students' key skills in answering clinical questions.

Keywords: evidence based medicine, evidence based practice, answering clinical questions, learning objects

## **Introduction**

The ability to access, interpret and apply relevant information from medical literature to patients is essential for medical practitioners. These skills should be taught in all medical curricula and are equal in importance to content knowledge (Whitcomb, 2005). Glasziou Burls and Gilbert (2008) go further by saying "the necessary skills must be taught and assessed with the same rigour as the physical examination". The integration of individual clinical expertise and the use of the current best evidence in making decisions about the care of individual patients is known as evidence based medicine (EBM) (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). It is a fundamental skill that health practitioners must learn to succeed in today's world, where the generation of new, clinically relevant knowledge outstrips individual capacity to assimilate the literature, and where patients have access to internet information. Graduate level students should understand the principles of EBM, and have sufficient practice in using the process to become efficient and competent when applying EBM in the

context of patient care. Traditionally at the University of Western Australia EBM has been taught sporadically in the curriculum using didactic lectures. A review of EBM teaching within the Faculty of Medicine, Dentistry and Health Sciences (2007) revealed a lack of consistency of terminology and approach to teaching EBM throughout the six year undergraduate medical course. There were also few opportunities in the clinical years (4-6) for students to apply EBM concepts in the context of real patient clinical problems (Nowak et al., 2010). EBM teaching varies in complexity according to the level of the students, for example what is expected of a first year student is very different from what is expected from a sixth year student. A survey of 4<sup>th</sup> year medical students (2008) showed that almost half of the students were using Google as their primary source to find evidence. At the same time there were increasing numbers of students to teach but decreasing numbers of clinicians available to teach EBM. Additionally, clinical staff and undergraduate medical students are geographically dispersed throughout Western Australia. The EBM Working Party recommended improving the consistency and approach to EBM teaching throughout the curriculum through the development of a central web based resource to cater for all levels of the undergraduate medical course.

## **The project**

A team, composed of disciplinary experts (EBM medical practitioner, librarians, elearning staff and instructional designer) were assembled to design and develop the central resource. The project team was guided by constructivist learning theory which sees learning as an active process where students construct meaning and make sense of things for themselves, rather than just memorizing facts (Jonassen & Reeves, 1996; Lebow, 1993), and therefore wished to create multiple pathways through the resource, rather than dictating a particular sequence or starting point. The team also realised that the resource would be relevant to, and could be used by disciplines of dentistry, podiatric medicine, nursing and physiotherapy in the Faculty. The focus was changed to evidence based practice rather than evidence based medicine and was retitled to 'Answering clinical questions'.

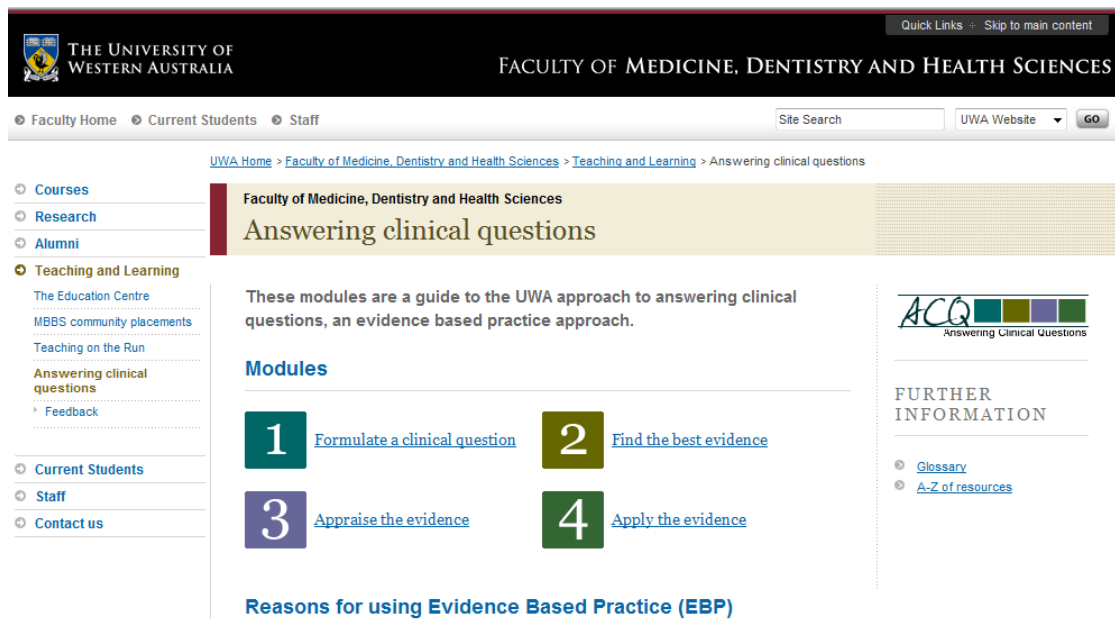
The project aimed to produce four learning objects that could be used separately or sequentially by educators and students. Educators would be free to build learning activities and assessments around the objects and students would be free to explore the objects as they chose. Another aim of the project was for the resource to be used widely both at UWA and internationally.

Although the University provides a central learning management system, currently, WebCT by Blackboard™ for web based learning; content in the system is password protected and cannot be easily shared between units without creating multiple copies of the content. This system was not deemed to be a suitable place for the resource, as it would limit access.

Given that the resource was also being developed for clinical staff and students from various health related disciplines (Medicine, Dentistry, Podiatric Medicine, Nursing and Physiotherapy) who were geographically dispersed it was felt that an open web based resource would provide better access and would engage a wider community of learners leading to greater contribution to the discipline resources.

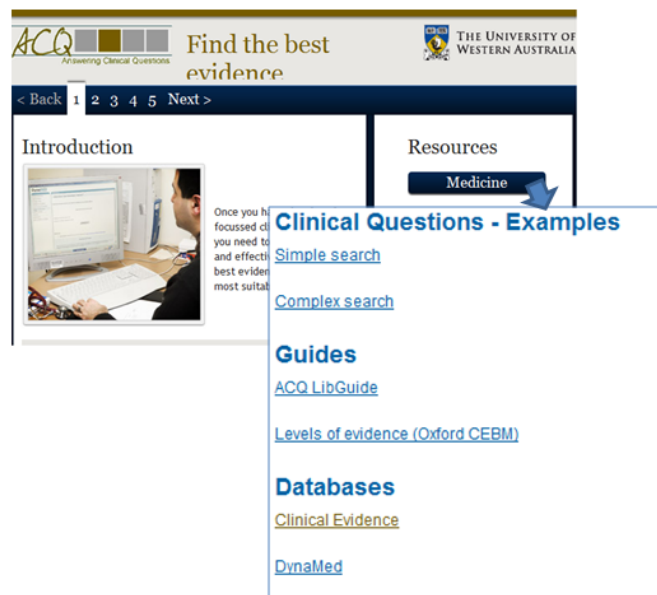
## **The modules**

Four modules (Formulate a clinical question, Find the best evidence, Appraise the evidence and Apply the evidence) were developed as illustrated in Figure 1 and were stored in the University's learning object repository. The learning object repository allows a single version of the objects to be maintained as well as allowing linking to the objects from any web site. To provide access to the objects a web site was created on the Faculty of Medicine, Dentistry and Health Sciences web under the Teaching and Learning area. The site contains the learning objects, and is supported by a range of resources including a glossary of terms and an A-Z of resources.



**Figure 1: Answering clinical questions website**

Each module contains discipline based resources that can be used to scaffold students' learning (e.g. clinical examples, guides, and worksheets) which have been created by both staff in the disciplines and/or by staff from the medical/dental library. Figure 2 shows the first page of module 2 Find the best evidence and an excerpt of the medicine resources from this module (clinical questions, e.g. simple search, complex search, guides and databases).



**Figure 2: Module 2 Find the best evidence and an excerpt showing some of the medical resources**

## Challenges

Some of the challenges faced in implementing the resource were engaging staff and students, and development of discipline based resources. The team met with staff from Medicine, Dentistry, Podiatric Medicine, Nursing and Physiotherapy to promote the web site and to discuss resource development. Also throughout the undergraduate medical course, unit coordinators referred to the

resource in their guidebooks. The ACQ website was promoted as a resource for effective completion of evidence based practice assessments in order to encouraging student uptake. Faculty librarians also introduced the resource through presentations to each year group in the undergraduate medical, dental and podiatric courses.

### Use of the resource

The uptake has been promising with four out of the five disciplines currently developing their own resources. Site analytics through Google Analytics show over 1,185 unique visits to the site (Figure 3). Peaks 1, 2 and 3 relate to the days when library staff introduced the site to student groups in the Faculty. Site analysis through Google Analytics shows the main users of the site are from Western Australia (Perth, Geraldton and Kalgoorlie), however, there are also accesses from other parts of Australia (Brisbane, Sydney, Geelong, Adelaide, Goulburn, and Craigieburn) and New Zealand (Wellington) as well as some from overseas (Frankfurt am Main, Nairobi, Petaling Jaya, and Slagelse). Over half the accesses are return visitors mainly from Australia and New Zealand (see Figure 4).

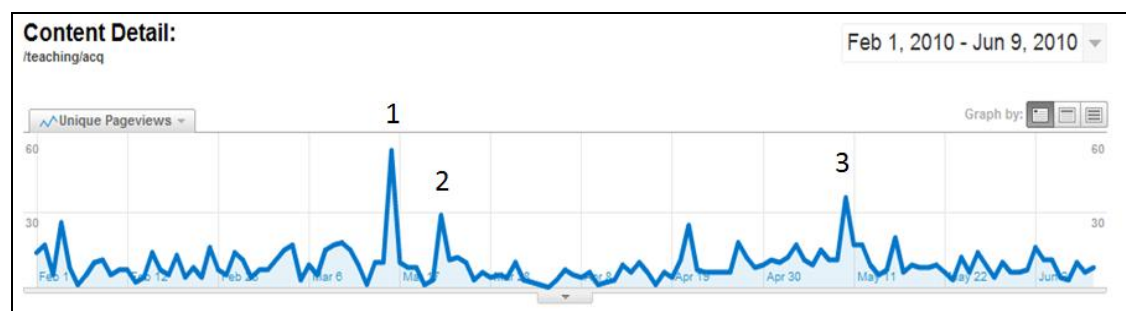


Figure 3: The number of page views since the site became available

Pageviews		Unique Pageviews		Avg. Time on Page	
<b>851</b>		<b>805</b>		<b>00:02:06</b>	
% of Site Total: 0.01%		% of Site Total: 0.01%		Site Avg: 00:01:48 (17.50%)	

Visitor Type	City	Pageview	Individual Visitor Type performance: Pageview
1. Returning Visitor	Perth	694	81.55%
2. Returning Visitor	Wellington	46	5.41%
3. Returning Visitor	Geraldton	27	3.17%
4. Returning Visitor	Kalgoorlie	18	2.12%
5. Returning Visitor	Sydney	18	2.12%
6. Returning Visitor	Frankfurt am Main	18	2.12%
7. Returning Visitor	Craigieburn	9	1.06%
8. Returning Visitor	Geelong	9	1.06%
9. Returning Visitor	Brisbane	9	1.06%

Figure 4: Return visitors

### Ongoing evaluation

Ongoing evaluation includes a longitudinal survey of medical students using a validated questionnaire to determine their attitudes, knowledge and use of EBM. The questionnaire has been administered annually since 2008 to medical students, either online, or as a paper questionnaire to years 4 and 6 and also includes year 5 in 2010. Data collection will continue until 2012. Additional evaluation includes, document analysis looking for increased use of EBM terminology throughout the undergraduate medical curriculum, student focus groups, staff interviews and web site analytics.

## Conclusions

In conclusion, the importance of progressively teaching medical students how to answer clinical questions was previously established. Development of the open web based resource 'Answering Clinical Questions' web site, including learning objects and resources, was outlined along with preliminary usage information. Just how successful the resource will be in encouraging staff to take a consistent approach to teaching evidence based practice skills to students in order for them to efficiently, confidently and competently answer clinical questions remains to be seen. Future evaluation incorporates evaluation of students' attitudes, knowledge and use of evidence based practice as well as staff and students' evaluations of the open web resource.

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**Diana Jonas-Dwyer** is an academic in the Education Centre at the Faculty of Medicine, Dentistry and Health Sciences at the University of Western Australia. She is passionate about educational technology being used in pedagogically appropriate ways to encourage student learning.

**Anna Nowak** is an academic Medical Oncologist who developed an interest in Evidence Based Practice (EBP) during a postdoctoral fellowship at the University of Sydney NHMRC Clinical trials centre. She is passionate about getting students and junior doctors to value and use EBP through integrating EBP teaching and learning into all levels of the curriculum.

**Belinda Shilkin** is a Librarian at the University of Western Australia (UWA) Library, and has worked closely with the Faculty of Medicine, Dentistry, and Health Sciences. She is dedicated to developing and promoting best practice information literacy at UWA.

**Fiona Leece** is the Project Officer in elearning for the Education Centre at the Faculty of Medicine, Dentistry and Health Sciences, UWA. Her interests include educational design and development and the use of emergent technologies within the medical curriculum.

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