Reviving the corporate medical library: using technology to become a cost center

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INTRODUCTION

As Americans adjust to the global economy, corporate librarians are beginning to face the service challenges that these changes bring to their own institutions. Not only are they serving staff working in various geographic locations and time zones, corporate librarians are finding that they must do so with fewer staff and smaller budgets [1]. If corporate librarians are unable to meet these new challenges, they might find management questioning the value of their services and the need for the organization to support a library or information center.

The literature reports cost-effective evaluation of library services to assist librarians in proving their value to administration [2–4]. However, while this approach is a useful one, librarians may want to begin exploring ways, not just to prove that they are ''worth the money,'' but to prove that they can actually contribute to their institution's revenue base. Library staff at Qualidigm, a quality improvement organization (QIO), did just that and are becoming a self-sustaining department in their organization.

REACHING OUT TO OTHER COMPANIES

The Medical Library at Qualidigm supports the company's vision of ''better health through better health care information.'' Qualidigm is a nationally recognized, nonprofit QIO with more than two decades of experience in improving health care. Under the direction of the Centers for Medicare and Medicaid Services (CMS), the QIO program consists of a national network of fifty-three QIOs responsible for each US state, territory, and the District of Columbia. Medicare QIOs work with consumers, physicians, hospitals, and other caregivers to refine care delivery systems to make sure patients get the right care at the right time, particularly among underserved populations [5].

Several changes, primarily technological, to library services and workflow positioned the Qualidigm library to begin considering an expansion of services.

Figure 1
Survey questions

- Was there a library at the quality improvement organization (QIO)?
- If so, who managed it?
- How did staff obtain articles they were interested in?
- Contact information

Table 1
Quality improvement organization (QIO) A pilot statistics: as of January 9, 2004: averages of turnaround time and fill rate for document delivery requests during the three-month pilot

	Turnaround	Fill rate
Baseline (pre-pilot period)	2.35 days	98%
Qualidigm (during pilot)	1.76 days	98%
QIO A	2.1 days	90%

Using grant funds, the library implemented Ariel for document delivery operations [6], allowing staff to streamline ordering and delivery of DOCLINE requests. In addition, library staff created a library Website with links to PubMed, full-text journals, online request forms, and other pertinent resources. Lastly, the medical librarian created a database to track interlibrary loan (ILL) requests and statistics.

These infrastructure and workflow changes freed library staff time and allowed them to initiate new projects, including investigating offering contractual library services. To do so, library staff created an email survey to determine if other QIOs had librarians or library services. The survey was sent to the most appropriate staff member, typically a communications officer, of all fifty-three national QIOs. Thirty QIOs (representing 34 states) responded to the survey (63% response rate).

Although three QIOs indicated that they were considering developing a formal library, only two (7%) reported professional library services available to national QIO staff, and only three (10%) had a staff member responsible for the administration of an in-house library. Other QIOs contracted with outside organizations, primarily for access to articles (Figures 1 and 2). Document delivery services, at the very least, were obviously needed among many of the QIOs. With this in mind, Qualidigm library staff felt that they could offer needed and important resources to other QIOs.

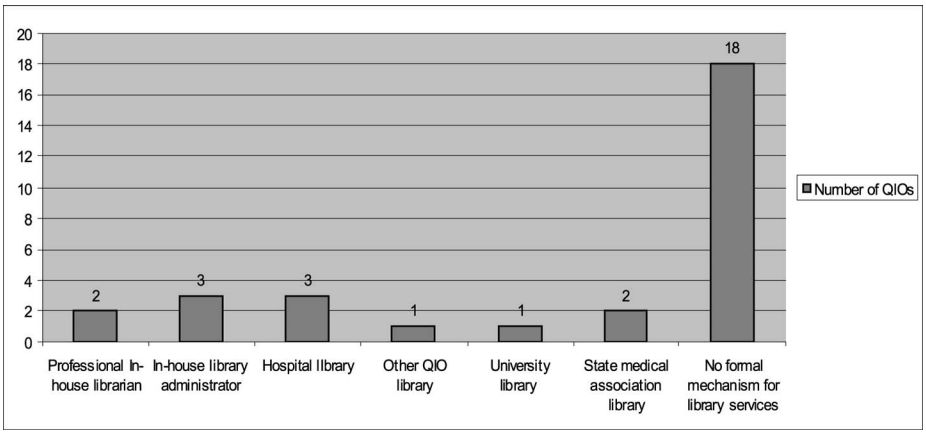
PILOT

To evaluate the library's readiness to assume a larger customer base and to determine appropriate service packages and pricing, staff initiated a three-month pilot of providing full library services (i.e., in-person or teleconference orientation, basic literature searches, reference queries, and ILL requests delivered electronically) to one carefully selected QIO (QIO A) at no cost to the QIO, other than providing timely feedback. The assessment of the pilot would include tracking use and cost (i.e., service costs had the QIO been paying a rea-

Table 2
QIO A pilot statistics: as of January 9, 2004: time spent during the three-month pilot

	Total	Average
Librarian	24 hours	2.4 hours/week
Library assistant	25 hours	2.5 hours/week

Figure 2
Survey results: type of library services QIOs use: 2002



sonable, customary, hourly fee). Based on the results of the pilot, library staff could determine whether the concept of offering services to other QIOs was viable. Before beginning the pilot, library staff calculated internal statistics to monitor customer service to internal users during the pilot phase. In addition, staff calculated the cost of time spent providing various services to develop profit figures for each of the pilot services based on the actual cost to Qualidigm.

PILOT RESULTS

Within the three months that Qualidigm offered the pilot, QIO A staff requested 12 literature searches and 199 documents. Staff calculated turnaround time and fill rate statistics for document delivery to both QIO A and Qualidigm personnel during the pilot and compared them to their original, pre-pilot statistics (Tables 1 and 2). Staff also tracked the time spent on each request to determine the average weekly time spent on QIO A requests and the cost to Qualidigm of offering services to another QIO. Turnaround time for both user categories decreased compared to pre-pilot statistics, and the cost for offering services (based on an hourly rate for each service with salary, indirect, fringe, and leave rates included) proved within a viable range for offering contractual services.

Based on this successful pilot, the librarian began assessing service packages to offer QIO A to continue library services, deciding that a subscription fee, with a built-in 20% profit fee, would allow for the greatest use of library services and the least administrative work for Qualidigm staff. The result was a proposal that consisted of a 6-month contract with a monthly payment for library services.

During this first pilot, the library also began a second pilot with another QIO (QIO B). Staff tracked the same statistics (Tables 3 and 4) and found that, once again, internal customer service did not suffer, even though they completed fourteen literature and reference queries for QIO B and seventy-six document delivery requests.

Ultimately, both QIO A and B have agreed to subscribe to Qualidigm library services. Qualidigm is using much of the revenue from these contracts to cover the company's overhead costs for the library. However, this revenue also allows library staff to offer new services to patrons, both internal and external, much of which staff can do using new technologies.

MOVING FORWARD

With the success of both pilots, library staff have begun investigating the best strategies to market their service to other QIOs. One of the librarian's immediate concerns was how to expand the library's infrastructure to accommodate more patrons. As a result, the library purchased Clio's basic ILL management system, which is now compatible with DOCLINE and affordable for small libraries. In addition, the library has subscribed to EBSCO'S Corporate Biomedical Reference Collection to provide the new patron base with electronic access to more materials.

Table 3
QIO B pilot statistics: as of March 5, 2004: averages of turnaround time and fill rate for document delivery requests during the three-month pilot

	Turn around	Fill rate
Baseline (pre-pilot period)	2.35 days	98%
Qualidigm (during pilot 2)	1.65 days	97%
QIO B	2.20 days	100%

Table 4
QIO B pilot statistics: as of March 5, 2004: time spent

	Total	Average
Librarian	19.5 hours	1.6 hours/week
Library assistant	8.0 hours	0.7 hours/week

To improve customer service, the library is also purchasing its own uniform resource locator (URL) for a new Qualidigm Medical Library Website, accessible to external customers through authentication. Qualidigm hopes that the purchase of additional technology will eliminate the need to increase staff time, which is ultimately more costly to the company than most of the electronic resources the library staff use. Lastly, the staff have created a pamphlet to market the new library services. This pamphlet is being mailed to all QIO chief executive officers along with a cover letter from the Qualidigm chief executive officer, extolling the worthiness of this endeavor.

CONCLUSION

Like most libraries, corporate libraries are currently faced with reductions in their budgets and staffs and increases in the number and cost of journals and amount of vendor-provided information. Maintaining or improving services despite such challenges is a constant concern. The Qualidigm experience shows that niche libraries can market their ability to find and deliver requested literature in a timely and efficient manner to other institutions and promote the value of information services to companies that may not traditionally understand the need for a library. Corporate or hospital libraries can also use extra revenue to provide services they might not otherwise have been able to offer, such as access to aggregated databases and full-text journals.

All libraries can benefit from collecting compelling return-on-investment data that can help secure their places in their institutions. By using their professional skills to their advantage, librarians can create a ''win-win'' situation for their own library and the organizations they serve.

REFERENCES

1. OUTSELL. The changing roles of content deployment functions: corporate information professionals. InfoAboutInfo, briefing 6, no.14. Burlingame, CA: 2003. Sponsored by the Federal Library and Information Center Committee.
2. DIPROSE K. Pricing the invaluable: putting a value on information in the corporate context. Australian Libr J 1997 Nov;46(4):386–93.
3. KHAN A. Performance management: helping to prove worth. Libr Information Update 2005 May;4(5):23–5.
4. EDGAR W. Corporate library impact, part I: a theoretical approach. The Library Quarterly [serial online]. 2004 Ap; 74(2):122–51. [cited 20 May 2004]. <http://www.journals.uchicago.edu/LQ/journal/contents/v74n2.html>.
5. AMERICAN HEALTH QUALITY ASSOCIATION. [Web document]. Washington, DC: American Health Quality Association, 2004. [rev. 7 Jul 2004; cited 7 Jul 2004]. <http://www.ahqa.org/pub/inside/158_670_2426.cfm>.
6. NATIONAL NETWORK OF LIBRARIES OF MEDICINE, NEW ENGLAND REGION. Electronic document delivery award, ($1,000), 2003.

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An assignment for building an awareness of the intersection of health literacy and cultural competence skills*

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What does it mean to be a health literate patient? What does it mean to be a culturally competent health care provider? How are these concepts related? All health care providers should ask themselves these important questions, not to arrive at an answer, but rather for the wisdom to be gained by trying. Students planning to enter any health or human services field need to be exposed to the vast array of practices and beliefs that inform health care decision making.

Health literacy is more than simply the ability to read; it is a tapestry of skills combining basic literacy, math skills, and a belief in the basic tenets of the treatment modality. To provide culturally competent patient care, health care providers must try to understand their patients' beliefs and assess their health literacy. This paper describes an assignment designed to expose undergraduate students to the health care barriers that people face when they lack the skills to be health literate.

Many definitions of health literacy exist. This paper and the described assignment use the National Library of Medicine's definition: ''The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions'' [1]. In an age of rapidly changing technology, increased access to diverse kinds of information, and a complex health care system, health literacy will present a challenge for everyone at some point in their lives. Not only will future health care providers be challenged to treat ethnically and linguistically diverse populations, but also people with varying degrees of literacy and myriad cultural and religious beliefs that influence their attitudes and behaviors toward the health care system.

The recent Institute of Medicine report, *Health Literacy: A Prescription to End Confusion,* outlines the basic skills that individuals need to participate in health care. Patients must be able to:

- promote and protect health and prevent disease
- understand, interpret, and analyze health information
- apply health information to a variety of life events and situations
- navigate the health care system
- actively participate in encounters with health care providers

* This paper is based on a poster titled, ''Health Literacy: Reaching Students through *Un*teaching,'' presented at MLA '05, the 105th Annual Meeting of the Medical Library Association; San Antonio, TX; May 2005.

- understand and give consent
- understand and advocate for rights [2]

These are complex, higher level literacy skills, many of which require mediation even for educated consumers. Additionally, clinicians must learn the ways in which compromised literacy manifests itself. To competently provide care to patients with varying degrees of health literacy, providers must master a related set of skills. In addition to clinical skills, health care providers must be able to assess a patient's literacy and cultural beliefs to provide meaningful information.

The following assignment has been designed for students enrolled in an undergraduate introductory health care informatics course. Because the best efforts to explain the experiences of vulnerable populations are often met with blank stares, the intention of this assignment is to evoke the unique combination of frustration and enlightenment that leads to understanding. The objective of the assignment is to enable students to experience compromised health literacy firsthand. Like a frightening diagnosis, compromised health literacy must be experienced to be understood. By removing a skill that most college students take for granted (reading), informatics students were plunged into a low-literacy world. They emerged frustrated and angry, but empathetic.

The ''Introduction to Health Care Informatics'' course is a one-credit elective course offered as an interdisciplinary undergraduate class. Typically, the class roster is composed of two-thirds nursing and pre-nursing students (i.e., students who hope to enter the competitive nursing program) and one-third health sciences, social work, and other students. The course description reads: ''This class is an introduction to the use of information technology in the delivery of health care services. Topics covered include basic databases, health literacy, current and future trends in information technology, and human computer interaction.'' The class periods in which health literacy is discussed fall under the stated goal of discussing human factors at play in the integration of technology into health care. Completion of the assignment described here is worth 15% of the grade.

The course begins with a discussion of databases in general terms, the information they contain, and the ways that information is entered and retrieved. Once students have an understanding of basic database architecture, various kinds of databases are examined, from patient record databases to bibliographic databases. The concept of controlled vocabulary is discussed, and examples, from International Classification of Disease (ICD-9) codes to subject headings, are used. To begin the discussion of health literacy, a class period is used to introduce the concept of an information prescription and the role information can play in changing behavior. Website evaluation is discussed, with emphasis placed on identifying the author or sponsor of a Website, as well as its authority and timeliness. Students compare the content of MedlinePlus with other sites aimed at health care consumers.

The next class period begins with an audio excerpt from *The Spirit Catches You and You Fall Down* [3], a book that eloquently chronicles a Hmong immigrant family's attempt to get health care for their epileptic daughter. Approaches to reaching both non-English speaking and low-literate patients are then discussed, along with strategies used by these groups to get information about their health. In light of the earlier discussion about information prescriptions, the class discusses the challenges of providing primary and supplementary information to patients with whom communication is compromised.

Each student is then given a three-by-five card with an ''information prescription'' (i.e., a brief description of treatment for a common ailment) on it and told to find additional information on their topic (Figure 1). Students are asked to imagine that this is information a clinician has given them regarding their diagnosis. The information on the cards is written in a variety of languages other than English—including Spanish, Hebrew, French, German, Arabic, Russian—and that language is disclosed. For comparison, a few students receive their prescription in English.

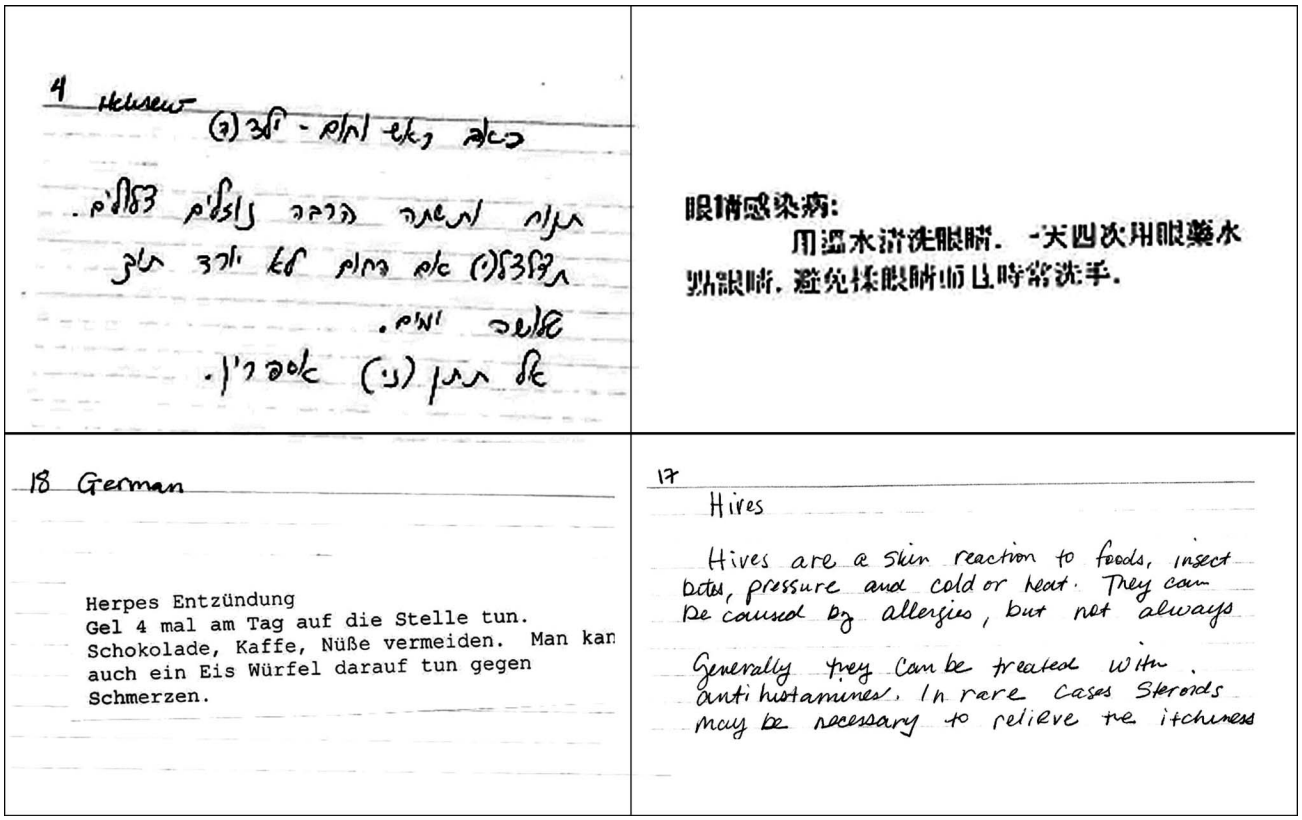
The following week students discuss how they completed the assignment. Discussion includes whom they consulted, what sources they used, how long it took, and whether they were able to locate a translation. Importantly, students are encouraged to discuss how they felt about the assignment. Results are recorded on the whiteboard in class (Table 1). After all students have the chance to share their strategies and feelings with the class, the approaches are evaluated. Building on the earlier discussion of evaluating Websites, it becomes clear that the information gathered from the listed informal sources does not meet most criteria for reliability. Students then understand how compromised literacy can lead to poor health decisions.

In discussing how they felt about the assignment, some students are hesitant to express anger, although the more time a student spends trying to locate a translation, the likelier they are to broach the subject of frustration. Experience teaching this elective class has shown that undergraduate students' participation varies significantly. Whether a student reports having made a creative attempt, like calling a synagogue or restaurant, seems to correlate to their approach to the class in general. Because this course is an elective, it is difficult to force students to care about one element if they are inclined not to.

Because students' attitudes regarding patients with compromised health literacy have not been pretested and the assignment has only been given to a total of approximately thirty-five students, the results of this assignment are anecdotal. However, students' comments reveal that they experience many of the same things that patients with compromised literacy feel, as well as increased empathy for them. Future research could involve the administration of a pretest and posttest to gather quantitative data measuring students' attitudes toward patients with compromised literacy.

Librarians involved in teaching new skills to their users often begin by attempting to understand the us-

Figure 1
Examples of information prescriptions distributed in class



ers themselves. By understanding students' (or library users') learning styles, librarians can develop novel ways of connecting them to the information and skills they need. In academia, the use of digital game-based learning to reach students has been discussed [4–6]. Games work as educational tools, proponents argue, because they force the players to remain on the cusp of their competence [7]. Fueled by rewards, players continue to progress through the game's levels while learning new skills. The pedagogy behind this is interpreted by Van Eck to be based on Jean Piaget's model of intellectual development, wherein students ride a cycle of accommodation and assimilation, always learning new information and changing behavior or belief to reflect it. What occurs when new information does not match already held information is described by Piaget as ''cognitive disequilibrium'' [8]. The approach in this assignment is an extreme example of induced cognitive disequilibrium, akin to pulling the rug out from underneath the students. It is effective in eliciting an emotional reaction when such a reaction might otherwise not occur.

Attempting to alienate or frustrate users is seldom an approach used intentionally by librarians or educators. However, when the goal is to help the student understand how emotions may contribute to a situation—in this case, how anger and frustration may interfere with a patient's health care—experiencing the emotion firsthand can be extremely effective. Without frustration, the full experience of compromised literacy is left to the students' imaginations.

Cultural competence and health literacy are two

Table 1
Students' responses to the assignment

Language	Approach	Time	Feelings
Spanish	Asked neighbor	1 hour	Frustrated
Croatian	Tried to translate it myself	90 minutes	Anxious, irritated
Hebrew	Called synagogue	30 minutes	Stupid, embarrassed
German	Did nothing	None	Angry
Spanish	Searched the Internet	45 minutes	Frustrated
English	Used encyclopedia	10 minutes	OK
Chinese	Called restaurant	20 minutes	Silly
Hebrew	Called family, friends, others	4 hours	Frustrated, challenged

closely related concepts. Cultural competence is the constant attempt to understand the values, beliefs, traditions, and customs of diverse groups. Culturally competent health care providers are able to appreciate the practices and health beliefs of their patients, without judgment, even when they contradict their own beliefs. Health literacy is the combination of skills that enables people to locate and evaluate health information to make health care decisions for themselves or their families. The practice that is common to both is belief. All individuals choose what information they will believe, and this choice is made within their own cultural milieus. For health care providers to demonstrate cultural competence, they must try to understand what their patients believe and where they get their information, two of the essential elements of health literacy.

Competence is always situational. A nurse who is competent at administering medication may be incompetent at communicating with patients who do not speak English. A brilliant physicist may be an incompetent cook. Communications scholar William Howell proposed five levels of competence in communication: unconscious incompetence, conscious incompetence, conscious competence, unconscious competence, and unconscious supercompetence [9]. Regarding cultural competence, most preclinical undergraduate students are at the lowest level, unconscious incompetence. The goal of this assignment is to guide them to the conscious incompetence level, thereby opening their minds to the concept that cultural competence is a skill that must be cultivated.

Health care providers in the United States today face an increasingly diverse population, as reflected not only in physical and ethnic characteristics, but also in abilities and willingness to participate in care, expectations of health care providers, and definitions of health. Moreover, the available universe of information, from which everyone draws to make decisions, is constantly growing and changing. Any capable health care provider must strive to be culturally competent and aware of health literacy issues to deliver effective health care.

REFERENCES

1. National Library of Medicine. Current bibliographies in medicine: health literacy. [Web document]. Bethesda, MD: The Library, 2000. [7 Mar 2002; cited 1 Jun 2006]. <http://www.nlm.nih.gov/pubs/cbm/hliteracy.html>.
2. Committee on Health Literacy, Board on Neuroscience and Behavioral Health, Institute of Medicine. Health literacy: a prescription to end confusion. Washington, DC: National Academies Press, 2004.
3. Fadiman A. The spirit catches you and you fall down: a Hmong child, her American doctors, and the collision of two cultures. 1st ed. New York, NY: Farrar, Straus, and Giroux, 1997.
4. Oblinger D. Boomers, gen-xers, millennials: understanding new students. EDUCAUSE Rev 2003 Jul–Aug:37–47.
5. Prensky M. Engage me or enrage me: what today's learners demand. EDUCAUSE Rev 2005 Sep–Oct:61–4.
6. Foreman J. Game-based learning: how to delight and instruct in the 21st century. EDUCAUSE Rev 2004 Sep–Oct:51–66.
7. Gee JP. Good video games and good learning. Phi Kappa Phi Forum 2005; 85(2):33–7.
8. Van Eck R. Digital game-based learning: it's not just the digital natives who are restless. EDUCAUSE Rev 2006 Mar–Apr:16–30.
9. Howell WS. The empathic communicator. Prospect Heights, IL: Waveland Press, 1986, c1982.

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Managing database overlap in systematic reviews using Batch Citation Matcher: case studies using Scopus*†

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INTRODUCTION

Systematic reviews use explicit methodology to review and synthesize research evidence in health care [1]. The objective of the method is to limit bias, therefore, a comprehensive literature search is required to identify as much of the relevant literature as possible [2]. The role of multiple database searching is twofold (Figure 1): (1) to broaden coverage to include additional sources (unique coverage) and (2) to take advantage of differences in indexing across databases to increase the chances of retrieving relevant items that

* The Wait Times study was funded by Canadian Institutes of Health Research. The PRESS project was funded by Canadian Coordinating Office for Health Technology Assessment.
† This topic was presented as a poster at the Fourth Canadian Cochrane Symposium; Montreal, QC, December 2005.

EC Supplemental electronic content is included with this paper on PubMed Central.

are in both databases (incremental retrieval). The marginal contribution of each additional source searched is the retrieval from the unique coverage plus the incremental retrieval from overlapping coverage. For example, if 55% of relevant studies are identified after searching database 1, and 95% are identified after searching database 1 and database 2, the marginal contribution of database 2 is 40%. In some systematic reviews, 20 or more databases with overlapping content may be searched [3–7]. Managing this overlap is a pressing issue for systematic reviewers.

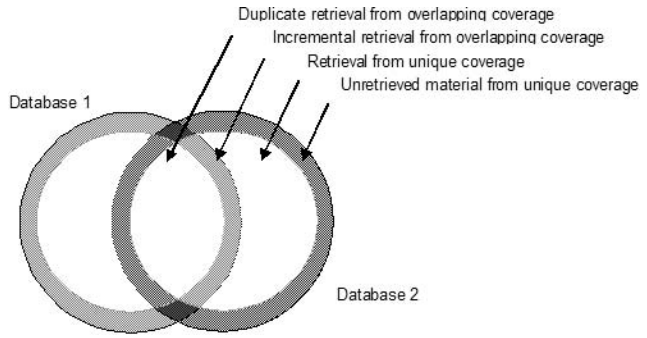
MEDLINE is almost universally used as a starting point in health-related systematic reviews. Numerous useful limits [8, 9] and methodological hedges are available [10]. MEDLINE indexing has greater discriminating power than the indexing of several other biomedical databases, including EMBASE [11]. Thus it yields a smaller retrieval set without sacrificing recall. Scopus is a new database produced by Elsevier Science. Its data sources include MEDLINE, EMBASE, open access sources, scientific Websites, and gray literature. Scopus lacks a thesaurus, and indexing is not standardized across the different sources that Scopus draws its content from [12].

Searching additional databases with overlapping coverage but fewer precision-enhancing features may reintroduce irrelevant material that has already been eliminated from the retrieval in the database with the fullest feature set. Relevant items may be missed in one database when assigned indexing terms different than those used by the searcher. The same record might be retrieved from another database because the indexing in that database matches the terms selected by the searcher [13]. Yet without its own indexing system, Scopus provides little chance for such incremental retrieval and the marginal yield of relevant records will be limited to its unique coverage [6]. This paper presents the development and testing of a technique to efficiently isolate records from unique sources.

METHODS

Scopus was added to the search plan for two systematic reviews when it became available through institutional subscriptions in early 2005. One of the reviews, Wait Times, addressed questions pertaining to wait times for sight restoration practices. The other systematic review, Peer Review of Electronic Search Strategies (PRESS), studied the impact of search errors on search results in health technology assessment searches and looked for scales or other tools to assess electronic search strategies. For each review, a complex search strategy was developed in MEDLINE by the review team's librarians and tailored to the other major databases. Simplified free-text searches were developed for searching databases with more limited search interfaces or without formal indexing. For the Wait Times systematic review, five databases were searched with complex search strategies and five (including Scopus) were searched with simplified strategies. For the PRESS systematic review, six databases were searched with complex strategies and three (including Scopus) were searched with simplified strategies. In both reviews, reviewers screened articles retrieved for relevance according to the protocol for that review. Full search methods will be published in the final reports of those reviews.

Figure 1
Potential contributions from searching an additional database



Scopus procedure

The Scopus records from sources not indexed in PubMed were isolated using the following procedure (Appendix; find online). Scopus records were brought into Reference Manager software (version 11). All material with a record type other than ''journal articles'' was assumed to be unique and was transferred to the final database. The remaining records, those with a record type ''journal articles,'' were output to a text file suitable for the PubMed Batch Citation Matcher (BCM) <http://www.ncbi.nlm.nih.gov/entrez/citmatch.cgi>. The text file was submitted to the BCM, and results were returned by email. Records returned with the phrase, ''NOT_FOUND;INVALID_JOURNAL,'' were deemed to be from unique coverage and were transferred to the final set. As a check, a batch duplicate search was run in Reference Manager to identify records missed by the BCM or retrieved from other databases already searched. Reviewers screened the material retained from Scopus for relevance and methodological rigor according to the protocol for that review.

RESULTS AND OBSERVATIONS

The search results are summarized online in Table 1. In both cases, Scopus yielded large retrievals. The results sets from Scopus were reduced considerably after material from journals recognized by the BCM was removed. Although the screening of retrieved articles identified some relevant material from Scopus for one review, the yield was low (Table 2; supplemental content online).

The overall accuracy of the procedure was excellent. The only duplicates missed were several records from journals with ''and'' in the title. In PubMed, ''and'' is spelled out, while, in Scopus, the symbol ''&'' is used.

The procedure presented in the appendix has been modified to address this difference.

DISCUSSION

The large initial yields from Scopus searches were impractical for inclusion in the screening set for these systematic reviews. Instead, the novel material that was isolated using the PubMed BCM resulted in a more manageable set than the initial yields.

These case studies used Scopus as the record source and Reference Manager to process the records into the format for the BCM. However, any bibliographic record that can be imported into a citation manager can be processed this way. Any citation manager capable of exporting records in a customizable format could be used to generate the input strings for the BCM.

These case studies identify many useful applications of the BCM. First, records can be identified from Scopus that are from sources not indexed in PubMed. A second approach is to remove only records matched exactly by the BCM. Overlap of journal coverage is extensive [5, 6], but, even when a journal is indexed in two databases, the number of records covered may vary [4, 14]. Thus, this second approach is more conservative as it may capture material from partially indexed journals, but it will increase the amount of material to be screened. A third approach is to use the BCM to identify records found in one database that also exist in PubMed. The PubMed unique identifier (PMID) returned by the BCM can serve as a search string to retrieve those records from PubMed, and precision-enhancing limits can then be applied. As an example, records of controlled clinical trials from The Cochrane Collaboration's CENTRAL registry could be extracted for limiting to the ''child'' age group in PubMed, a limit not available in CENTRAL. A fourth approach is to resolve duplicate records by submitting records from all sources to the BCM. Although duplicate records will result from searching multiple databases, they will resolve to one PMID, if that record is in PubMed. Many of the duplicate records can be removed from the result set by deleting all records that were matched by the BCM and then replacing them with a set obtained by searching PubMed for those PMIDs.

While Scopus contributed little unique material for the two systematic reviews studied here, the primary purpose of this study is not to assess its contribution to systematic reviews in health care. The contribution of the database may be different in a more typical systematic review of an intervention, and the citing and cited reference features of Scopus may be a useful adjunct to subject searching.

This technique can be used to isolate material from journals not indexed in PubMed. This allows systematic reviewers, or other researchers needing comprehensive searches, to tap into the material unique to additional sources while controlling the growth in the amount of material to be managed by the librarian and examined by the reviewers.

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REFERENCES

1. McGowan J, Sampson M. Systematic reviews need systematic searchers. J Med Libr Assoc 2005 Jan;93(1):74–80.
2. McAuley L, Pham B, Tugwell P, Moher D. Does the inclusion of grey literature influence estimates of intervention effectiveness reported in meta-analyses? Lancet 2000 Oct 7;356(9237):1228–31.
3. Royle P, Waugh N. Literature searching for clinical and cost-effectiveness studies used in health technology assessment reports carried out for the National Institute for Clinical Excellence appraisal system. Health Technol Assess 2003; 7(34):1–64.
4. McCain KW, White HD, Griffith BC. Comparing retrieval performance in online data bases. Inf Process Manag 1987; 23(6):539–53.
5. Biarez O, Sarrut B, Doreau CG, Etienne J. Comparison and evaluation of nine bibliographic databases concerning adverse drug reactions. DICP 1991 Oct;25(10):1062–5.
6. Sodha RJ, Amelsvoort TV. Multi-database searches in biomedicine: citation duplication and novelty assessment using carbamazepine as an example. J Inf Sci 1994; 20(2):139–41.
7. Taylor L, McDonald S, Adams C. Are you searching the right database? an example from mental health. 6th Annual Cochrane Colloquium, Baltimore, MD, 1998.
8. National Library of Medicine. PubMed help: limits: ages. [Web document]. Bethesda, MD: Information Systems Branch, Division of Research Grants, National Institutes of Health. [cited 7 Jul 2001]. <http://www.ncbi.nlm.nih.gov:80/entrez/query/static/help/pmhelp.html#Ages>.
9. National Library of Medicine. Publication types: genre terms 2002. [Web document]. Bethesda, MD: The Library. [cited 25 Oct 2004]. <http://www.nlm.nih.gov/mesh/pubtypesg2002.html>.
10. Jenkins M. Evaluation of methodological search filters—a review. Health Info Libr J 2004 Sep;21(3):148–63.
11. White HD, Griffith BC. Quality of indexing in online data bases. Inf Process Manag 1987; 23(3):211–25.
12. Hane PJ. Newsbreaks: Elsevier announces Scopus service. [Web document]. Inf Today 2004;(Mar 15). [rev. 15 Mar 2004; cited 28 Mar 2006]. <http://www.infotoday.com/newsbreaks/nb040315-1.shtml>.
13. Savoie I, Helmer D, Green CJ, Kazanjian A. Beyond Medline: reducing bias through extended systematic review search. Int J Technol Assess Health Care 2003 Winter;19(1): 168–78.
14. Odaka T, Nakayama A, Akazawa K, Sakamoto M, Kinukawa N, Kamakura T, Nishioka Y, Itasaka H, Watanabe Y, Nose Y. The effect of a multiple literature database search—a numerical evaluation in the domain of Japanese life science. J Med Syst 1992 Aug;16(4):177–81.

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