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Librarian Participation in Meta-Analysis Projects

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Meta-analysis is an epidemiological and statistical tool used to combine the results of independent studies and synthesize their conclusions for the purpose of evaluating therapeutic effectiveness, determining procedural efficacy, or providing a basis for development of treatment protocols. Meta-analysis also may be described as "studying the studies." The process, however defined, requires access to a large quantity of medical literature and presents new opportunities for medical librarians to use their data gathering skills.

At Dartmouth Hitchcock Medical Center, a librarian assists with the identification, location, and review of literature in support of meta-analysis projects done by the Technology Assessment Program. Comprehensive literature searches are performed and references with abstracts, indexing terms, and other elements of the unit record are downloaded, converted, and presented as records in a database program. References are then analyzed, decisions are made about their relevance, and article copies are acquired for further analysis.

INTRODUCTION

Meta-analysis is a statistical tool used to analyze the results of multiple independent studies. It synthesizes the various conclusions for the purpose of evaluating therapeutic effectiveness, determining procedural efficacy, or providing a basis for development of treatment protocols. Meta-analysis also may be described as "studying the studies." The process, however defined, requires access to a large quantity of medical literature and use of literature analysis skills by researchers. Involvement in meta-analysis projects provides new opportunities for medical librarians to use and refine their data gathering and organizing skills. This paper describes how librarians can become research partners in these endeavors, participating in substantial ways.

META-ANALYSIS

Meta-analysis is controversial and its methods are evolving. Detractors point out that such projects

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sometimes may compare apples and oranges, or that the process attempts to reduce a rich literature to a single number [1], or that publication bias or the statisticians' prejudices may confound results [2]. Even so, meta-analysis is an important technique for mining the available literature. For example, Joseph Lau and others demonstrated that meta-analytical techniques could have shown twenty years ago that streptokinase can save the lives of patients with acute myocardial infarction [3]. Instead, several very large and expensive trials, involving tens of thousands of patients, were carried out. This approach meant that thousands of subjects were relegated to control groups and were given placebos instead of streptokinase.

Lau also makes a case for performing cumulative meta-analyses on topics of importance. This method would require an updated meta-analysis every time a new trial appears. Cumulative meta-analysis is more feasible than it sounds, provided that the library already has established literature-evaluation procedures and services. Schell and Rathe [4] outlined the history of meta-analysis in medicine and the basic steps of the meta-analytical process, including the librarian's role. This paper continues that discussion

Figure 1
Example of a meta-analysis template used in a project on benign prostatic hypertrophy

and describes how librarians in one institution provide specialized support for meta-analysis research.

BACKGROUND

The Center for the Evaluative Clinical Sciences (CECS) of Dartmouth Medical School engages in outcomes research and technology assessment. The research team in a meta-analysis project typically includes individuals with a range of specialized expertise. Among these are the team leader, one or more statisticians and subject specialists, and grant source people. The head of the Technology Assessment Program (TAP), a unit of CECS, recognized that his meta-analysis team would need regular services from a medical librarian, and he built such provisions into grant applications. He understood that medical librarians have the expertise to provide assistance with several aspects of meta-analysis.

Among the services TAP requires that the librarian can provide are selection of bibliographic databases and vendors, planning and testing of search strategies, and use of Medical Subject Heading (MeSH) tools and other controlled vocabularies. Other such services include use of alternate strategies for finding references, initiation of focused discussions with subject experts, checking of search results against known relevant papers, and provision of regular updates. Finally, librarians had been experimenting with capturing references electronically, post-processing of references, and designing computer interfaces to accomplish filtering of references—all of which are services of particular interest to meta-analysis researchers. The TAP and Dartmouth's Biomedical Libraries entered into an agreement whereby 25% of a biomedical reference librarian's time is dedicated to the

provision of expert bibliographic support for meta-analysis projects.

THE PROCESS

The typical meta-analysis project proceeds through a common series of stages. The initial phase is definition of the topic, followed closely by the setting of parameters and determination of scope. The next stage is data gathering, which frequently includes the construction of a comprehensive bibliography. Each reference is considered and a determination is made whether the full article will be needed for further analysis. If the full text of an article is required, then a document delivery process is initiated, either to acquire a copy from the local library or to request a copy through interlibrary loan. Once the article is acquired, it is shared with members of the research team, who determine whether the results of the study will be included in the meta-analytical process.

Reference librarians frequently are called upon to provide search results to busy clinicians. In doing so, the librarian constructs a search that restricts bibliographic retrieval to a manageable number of references on a narrowly defined topic, because the requester usually does not want to be presented with a great quantity of references. For meta-analysis projects, librarians have to change gears altogether. Unlike the library's usual customers, the members of a meta-analysis team are quite willing to read thousands of article titles with abstracts and MeSH terms. Indeed, the usual goal of meta-analysis is to identify and evaluate as many studies as possible.

EVALUATION OF REFERENCES

Biomedical reference librarians at Dartmonth have extensive experience downloading MEDLINE references for use with Pro-Cite and EndNote. So, when a librarian joined the meta-analysis team, it was natural to consider whether one of these bibliographic database programs could be used to support the evaluation of references. After much experimentation, FileMaker-Pro was selected. One of FileMaker's strengths is that it gives the database designer easy and unconstrained creative control over data elements, labels, buttons, check-boxes, macros, and fonts. The appearance and behavior of all these elements can be configured to suit various projects, including those involving bibliographic information.

Figure 1 shows one such template used in a project on benign prostatic hypertrophy. The database facilitates the process of evaluating each reference, one at a time. Not all MEDLINE fields are shown in Figure 1. Team members want to be blinded to author names and affiliations. The check-boxes near the bottom of

the screen are the "exclusion codes" for this particular project. Each reference is read, and if there is a reason to exclude the study from the meta-analysis process, then the appropriate check-box is selected, and the reader moves to the next record. If there is no reason to exclude an article based on review of title, abstract, and MeSH terms, then the "To Obtain" button is selected. All references marked "To Obtain" are acquired.

The benefits of this approach are many:

- It is not necessary to print thousands of references.
- The method is easy to use and support.
- The approach facilitates the recording of exclusion codes.
- The method simplifies and consolidates work effort.
- A single copy of the file can be networked.
- Articles not relevant are eliminated based on downloaded data instead of a hard copy, saving lots of trees and fees.

When the evaluation process is completed, the database contains many references marked "To Obtain." A computer procedure has been developed so that these references can be analyzed to determine local availability. For the "To Obtains" that are on campus, a list, sorted alphabetically by journal title, is printed and forwarded to the library's photocopy center. "To Obtains" requiring an interlibrary loan transaction are printed in a list that highlights Unique Identifier (UI) numbers. This approach facilitates careful monitoring of document delivery. In addition, update searches can be incorporated easily into the project database. An experiment is underway to test submission of DOCLINE requests directly from this database.

KNOWLEDGE AND SKILLS

Throughout the analytical process, the medical librarian's knowledge of the literature of medicine comes into play. Also important is the librarian's experience and expertise with online databases, indexing practices, medical terminology, thesauri, the scientific research process, copyright law, and database management. The skills brought to bear are expert computer use, including the ability to construct local networked databases; expert searching skills; and document-delivery management skills.

The knowledge and skills are applied in several nontraditional ways, thereby changing how the medical librarian provides support to research projects. The librarian now plays a significantly enhanced role as a selector and filterer of bibliographic information and as a designer of project databases. The librarian also assumes an expanded role within the library itself, taking responsibility for coordinating large document delivery efforts.

Thus, participation in meta-analysis projects allows librarians to enhance and refine the literature analysis process supporting scientific research. There is a fundamental change in the role of the librarian and in perceptions of it. The value of the librarian to the research enterprise is recognized, and the librarian is seen as a partner in the research process rather than just a passive provider of information.

CONCLUSION

Active participation in meta-analysis projects and other research efforts expands options for librarians and other information professionals at a volatile time for the profession. Librarians in the health sciences are redefining their roles—in the delivery of health care and in society itself. A recent publication of the Medical Library Association and the Association of Academic Health Science Library Directors [5] articulates the roles, knowledge, and skills that health sciences librarians can bring to the table in health care reform efforts. The same document provides valuable guidance to health sciences librarians as they undertake new tasks in information management and as they articulate the value of information in the range of health care processes. Active participation in meta-analysis projects is one example of a new role that health sciences librarians can assume in a changing environment.

These concepts are reminiscent of Swanson's 1990 paper entitled "Medical Literature as a Potential Source of New Knowledge," in which he said, "More than a half-billion online entries are available now and provide opportunity for exploration, synthesis, and discovery far beyond what has yet been put to use" [6]. He suggested that literature should be viewed as a vast mosaic of undiscovered connections, a potential source of countless recombinant ideas, a world with its own "endless frontier." Swanson was not discussing meta-analysis; he was experimenting with citation analysis and interesting manipulations involving subheadings. But clearly his ideas apply to librarian involvement in meta-analysis, which allows the application of knowledge and skills in nontraditional ways and assures the librarian a role as a significant player in that endless frontier.

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