

Improving reference service using Evidence Based Medicine resources and methods

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Abstract

Background: EBM provides accurate methods to identify, summarize and analyze information. In parallel, new roles are integrating medical librarians and information specialists into the research and decision-making workflow in health institutions.

Objective: To highlight the need to implement a protocol to systematize general literature searches based on methodologies and quality assessment mechanisms developed by the EBM.

Methods: We analyzed the main proposals for selecting information resources and their adequacy for medical libraries, focusing on the COSI protocol.

Discussion: COSI helps locate information systematically and select pertinent sources based on CORE, Standard and Ideal searches, fitting searches to target information and available time and resources.

Conclusions: The use of EBM methods and resources will maximize the quality of their work for their users. In particular the COSI protocol is a valuable tool for assuring exhaustiveness in systematic information retrieval. Librarians should be involved from the start in formulating research questions (PICO) adapting searches to the study and resources available.

Key words: Evidence-Based Medicine; Evidence-Based Practice; Information Storage and Retrieval; Library Services; Research Design.

Background

Evidence Based Medicine, Health Technology Assessment and librarian services

Evidence based medicine (EBM) is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients and has philosophical origins in Paris back to mid-19th century, even earlier (1). Gradually EBM grew up and extended over the world. Publications began to report about it, new journals about this topic appeared (ACP Journal Club, Evidence Based Medicine...) and even some workgroups started to collaborate in this matter in order to continue developing these manners to practicing and teaching medicine (2). EBM utilises and incorporates methods and tools whose main goals are to make health professionals' work easier, while simultaneously helping them make daily decisions and save time.

Evidence-Based Practice (EBP) is defined by the Medical Subject Headings (MeSH) as a way to providing health care guided by a thoughtful integration of the best available scientific knowledge with clinical expertise. This approach allows the practitioner to critically assess research data, clinical guidelines, and other information resources in order to correctly identify the clinical problem, apply the most high-quality intervention, and re-evaluate the outcome for future improvement.

Related to the EBP, we found Health Technology Assessment (HTA), which is the synthesis of many pieces of information from numerous different sources. The purpose of an HTA is to provide health care decision-makers with the evidence they need to make informed decisions concerning the introduction, allocation, and cost-effective use of medical technologies (3). Within the context of literature searching for HTA, a protocol is a process for tackling the task of gathering information. It outlines, in a detailed and transparent way, a logical set of steps to work through in the course of the search, so that, it should be possible for another researcher to duplicate the search strategy and retrieve comparable results.

EBM and HTA provide librarians and information specialists with methods and resources to easier develop our daily tasks. Given this context, it seems appropriate to adopt these methods to medical libraries and in a specific way, to their reference services.

Information science and its current services to specific users

Librarianship and Information Science is an evolving discipline which is continuously and rapidly developing. It profits features from other sciences, adapting and integrating into itself in order to develop and update(4).

In this way, information services are being evaluated and improved; one of the most important is the reference service. This service can be offered in many ways and in the previous years lots of software tools have been developed to make easier this service. Understanding reference service as a point of meeting between librarians and health professionals, reference librarians must merge their skills with EBM methods and tools to locate the best answer for each query, following each one in an individual research. In order to point out the difference between a more traditional and a more advanced reference service, we take a classification from a systematic review signed by Brettle *et al.* (5) where models of clinical librarian services are identified. In this study two main ways to carry out a reference service are identified, and following we summarize a comparative table marking and highlighting the added value:

Information at the point of need	Information at the point of need PLUS CRITICAL APPRAISAL AND SYNTHESIS
Question and answer service: A static service is provided where users submit their requests via phone, electronically or in person, a literature search is conducted and reply provided to user (usually search results).	Question and answer service PLUS CRITICAL APPRAISAL: A static service is provided where users submit their requests via phone, email or in person, a literature search is conducted and reply WHICH CONTAINS A CRITICALLY APPRAISED SUMMARY OF RESULTS IS provided to user.
Outreach: Librarian uses a range of means and methods to provide information to users. This can include literature searches, training, attendance at journal clubs or ward rounds. Involves a pro-active approach to engage the users, perhaps as part of the team. Results of queries often provided in the form of literature search.	Outreach PLUS CRITICAL APPRAISAL AND SYNTHESIS = INFORMATIONIST Librarian uses a range of means and methods to provide information to users. This can include literature searches, training, attendance at journal clubs or ward rounds. Involves a pro-active approach to engage the users, perhaps as part of the team. Results of queries often provided in the form of literature search BUT INCLUDE A SYNTHESIZED CRITICAL APPRAISAL

Table 1: models of clinical librarian by Brettle *et.al* (2)

The enormous amount of information on the web and the superficial simplicity to recover it from the web makes essential the prioritization and screening of information and it's a great opportunity for us, health librarians, to show our abilities and knowledge in order to give an accurate answer and respond to the user's needs. In this context, information specialists need to implement a protocol to systematize general literature searches, that could be based on methodologies and quality assessment mechanisms developed by the EBM, adapting it to their user's needs, so that systematic searches of acquire an added value in making for users and health decisions. (6)

Objectives

This communication aims to identify and highlight protocols and methodological proposals used by the scientific community in EBM, mainly based on the COSI protocol, applicable to different types of task, and to propose how these can be integrated into the work of clinical librarians. Although clinical librarians need not to be specialists in EBM, use of these models will maximize the quality of their work for their users.

Methods

EBM includes methodologies and mechanisms for assessing the quality of studies accepted and endorsed by the scientific community. These resources are not always known to the clinical librarians who carry out literature searches and answer queries that arise in a reference service.

Before starting to evaluate the pros and cons of EBM practices, we should explain some issues:

First, we consider EBM not only for Medicine as subject; the practicing of these methods and tools are widely extended to related fields, so we can listen or read about Evidence Based Nurse, Evidence Based Physiotherapy, Evidence Based Psychology, etc. This methodological loan can be adapted also by librarianship, as well as by other life sciences.

Second, within the scope of the EBM, we found several methodological handbooks and guidelines about the wide variety of tools available for this discipline.

Several tools that have been surrounded EBM and HTA to help clinicians in making decisions, as for example the GRADE software or the one provided by

Cochrane for quantitative analysis of the evidence; the PRISMA Declaration and the AMSTAR scales and checklists for the assessment of methodological quality of systematic reviews, Ottawa, Strobe or CASP (Critical Appraisal Skills Programme).

Also institutions have developed work documents as for instance the "Cochrane Handbook for Systematic Reviews of Interventions" or "A guideline developer's handbook" by the Scottish Intercollegiate Guidelines Network (SIGN), the "Communication and Dissemination Strategies to Facilitate the Use of Health Related Evidence" by the Agency for Healthcare Research and Quality (AHRQ), or the "Press: Peer Review of Electronic Search Strategies" published by the Canadian Agency for Drugs and Technologies in Health (CADTH).

The main institutions in the MBE field (Cochrane, Campbell, SIGN, NICE, etc.) include resources and information about methodological aspects in their websites that can lead and help both researchers and librarians with locating the accurate information. Other related examples are the Centre for Reviews and Dissemination (CRD) or the UK InterTASC Information Specialists' Sub-Group (ISSG) (7).

All these examples have on one side diverse and heterogeneous formats, but on the other hand they also have search strategies referring to "Cochrane Handbook for Systematic Reviews of Interventions" regarding the source selection process, the search the establishment of methodological filters and the strategies filtering.

Shown that major institutions engaged in research associated to EBM and HTA, essay to establish criteria for the searching and selection of information sources, it seems obvious to adopt any of these proposals within libraries reference services in order to establish protocols and systematize this process. The specific challenge obtaining relevant information and reducing the uncertainty; the explosion of information difficult exhaustiveness and accuracy of information and this sometimes becomes incompatible with the expectations of the ones who needs the information for decision-making. Although there is no single definitive formula, the answer is in any case bound to the searches systematization (8).

Third, we are obliged to explain the main features that any protocol for search strategy should meet in this medical research context.

A literature search protocol is a structured, defined and clear search process made up by different sources of information; it must contain the identification of databases and resources to be consulted, how they are organized, the timing, implementation and at least, should provide mechanisms for evaluating the efficiency of this protocol.

A common protocol is high recommendable in order to systematize and maximize time and resources. At the same time, this protocol should be flexible in order to be able to adapt to any kind of individual case and specific search. The use of protocols is always recommendable because makes teamwork easy, enables systematic tracking of information, help to prioritize databases, set time limits if cut points settings are needed and reflects the amount of information handled. The search protocol used in all kind of studies like these should be logical, reproducible and objective, and must allow the possibility of comparing different strategies.

Searches are considered reproducible if the not only details of the combinations of search term used, but also Booleans operators, filters, etc. are provided (9). These aspects are essential when a systematic search has to be pointed out in case of difficult search strategies with few results (that shows that the research has been exhaustive), or when the search is performed by many people collaborating (8). In short, this is about a strategy's strategy and it must be agreed at the beginning of the research process by all team members.

Following the EBM guidelines the search questions should be define after the PICO format, PICO stands for Population, Intervention, Comparison and Outcomes and implies a search strategy that allows an evidence based approach, defining also criteria for inclusion and exclusion of potentially relevant documents. The correct

definition of research question in this format allows the librarian or information specialist to translate it into the accurate search strategy. Due to this, the librarian or information specialist must be part of the research team and be present all over the process from the approach to the relevant question.

The time available is another key aspect to decide the elements as well as the human and technical resources available that should be used (10).

Regarding the different types of databases for the searches, we need to consider the subject specificity, the type of study to carry out (systematic review, economic evaluation, meta-analysis, ...) and also the types of design including in the search (controlled or randomized clinical trials, cohort studies, case reports, ...). In addition, other issues should be born in mind, such as the availability of generic databases including all these types of documents, the possibility to link to full texts, the option of using controlled vocabulary thesauri, the simplicity and options exporting register results, the level of user-friendly interface or even the multilinguality (8) The choice of bibliographic databases is crucial and is decisive for the search results. It should be given preference to queries made in the different databases depending on the capacity of each of them to provide relevant and quality information. Commonly, bibliographic databases cover a limited discipline or topic, or contain only a type of resources; due to this it may be necessary to search on many of them, in order to assure the range of results that may respond to the research questions (11).

Besides searches in bibliographic databases, more general searches of the internet should not be dismissed. Some search engines, such as Google Scholar –restricted to academic work–, could miss the large number of research papers that are not formally published (as for instance ‘grey literature’). We can also include other relevant materials searching on websites from specific research centers, institutions or associations.

As the following figure shows, a search strategy may also involve a manual search for journals, books or other references, mainly for specific-related journals not indexed in the main bibliographic databases and for research topics where results are commonly published in book format. Finally, observing the bibliographic references of the checked of relevant studies can also lead reviewers to other relevant studies; furthermore citation indexes such as Google Scholar, Web of Science or Scopus as well as social platforms as Research Gate, can help reviewers to find papers that have cited documents or selected them as relevant, and this may even lead them to further studies.

This ‘snowballing’ technique can be highly productive in order to avoid inefficient search processes. The more thorough the search, the greater the proportion of relevant studies that are likely to be identified (increasing the ‘sensitivity’ of the search); however, the number of non –relevant studies is also likely to increase (lowering the ‘specificity’ of the search) (11). Searches should seek high sensitivity, which may result in relatively low precision (12).

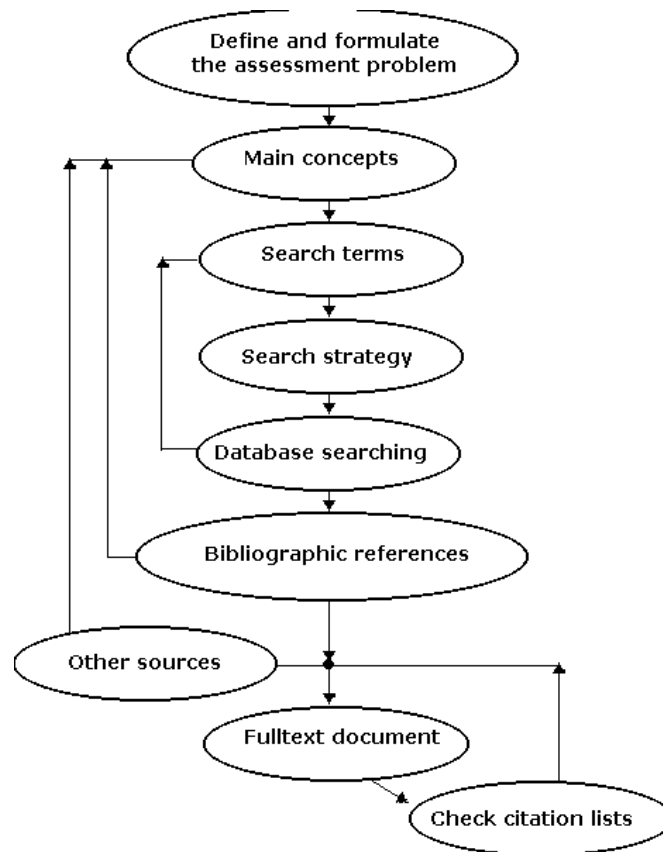


Figure 1: main steps in a search protocol (13).

After revising the relevant literature and recommendations about this matter, we would like to focus on the COSI Protocol, that because of its characteristics is the most easy to adopt and adapt to reference service's needs, within the context of EBP.

Discussion

Models for a methodological selecting of information: The COSI protocol

New Zealand Health Technology Assessment (NZHTA) and Danish Centre for Evaluation and Health Technology Assessment (DACEHTA) established a protocol named COSI as an approach to selecting sources of information (8).

The sources to be searched are ranked in order of expected yield (in terms of return for time spent). The individual sources used and their ranking will differ between topics and geographical regions. The COSI protocol fulfils the premises that grant it to be the one taken into consideration for almost any institution; each institution can adapt its use according to their needs and for this reason has been selected as probably the most appropriate model to establish the work in any referral service.

The COSI protocol is subdivided into three parts: The Core, the Standard and the Ideal searches.

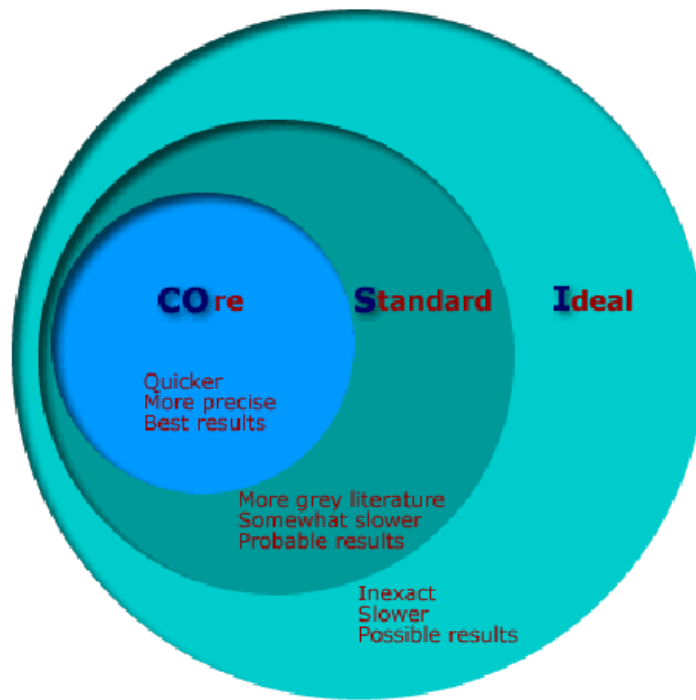


Figure 2: the COSI model (14)

CORE search:

Should comprehend databases and publications where there is expected to find the most important and relevant information. In Europe there seems to be a consensus in consider the following Medline, Embase, Cochrane, CRD and Science Citation Index as the core databases, together with other subject specialized databases (for example PsycInfo, CINAHL, Cancerlit, ...) as well as metasearchers as Tripdatabase or SUMSearch.

STANDARD search:

It consists on the core search and extends it to other areas of interest either by completeness or by relatively low recovery in core data bases. This additional group of sources provides useful information but is more dispersed or poorly indexed and therefore makes it more difficult to be found. A search with limited time frame should not consider going over to this second step. The sources include bibliographic citations, highly specialized databases, library catalogs, web pages from scientific institutions or associations, clinical practice guidelines (provided it that this is not the main source of the study being carried out), gray literature, and according to each study, databases international organizations (WHO, Eurostat, OECD).

IDEAL search:

This search seeks perfection and the objective is to retrieve any possible relevant document, although it's quite difficult to determine which databases or information resources will lead us to the recovery of all these relevant documents. Concerning searches for new and emerging technologies, it is possible that specific databases or resources are just located in the core search block.

If in the foregoing searches we already pointed out that certain resources were common but that depending on the subject studied these could vary; in this setting it is impossible to determine in a general way the sources that should be considered as relevant, because each item or research question will determine the specific

resources to be checked. Only guidelines and recommendations can be given in order to recover the most relevant documents. This group also contains social networks and all kind of 2.0 resources, wikis, mailing lists, manually searching in non-indexed journals, etc.

Pyramid of evidence resources

Within this background, in order to provide adequate solutions to the expressed needs and to provide the appropriate information for each particular user, the pyramid of evidence must be known; as Nancy Adams says, "how research studies gain more internal and external validity as one moves up the pyramid" (15).

Faced with a clinical question, in a situation in which we have enough time available, the best option should be *primary studies*, obtaining records from for instance PubMed, Clinical Queries, EMBASE, CINAHL, PsycINFO (16).

When the time available for clinical questions is reduced, there is the possibility to look up after resources summarizing single studies, this means, we can make use of *synopses* of studies, for example at sources as ACPJournalWise, Evidence-Based Medicine or Journal Watch. When the research question has to be answered in a short period of time but the amount of information is huge, *syntheses* could provide a quick answer. When talking about syntheses we refer to systematic reviews or meta-analysis in Pubmed, the Cochrane Library, CRD, AHRQ, etc.

If we have a lot of literature but we don't even have enough time to read systematic reviews, *synopses of syntheses* could be chosen using resources from ACP JournalWise, Evidence-Based Medicine, CRD, Journal Watch, AHRQ, Bandolier, or others.

Summaries give the answer when the information needed is a couple of sentences with the best evidence available in order to take a quick decision. Some resources that offer good results are UptoDate, National Guidelines Clearinghouse, Clinical Evidence or AHRQ.

Finally, *systems* will help to clinicians for each individual patient putting in contact electronic health records with up to date evidence, nevertheless this systems are not still now enough spread out.

European network for Health Technology Assessment (EUnetHTA) 's Role

HTA started in Europe in the 1970s and grew throughout the 1980s when the Health Services Research Committee of the European Commission contributed to its develop with contracts on economics appraisal or variations in use of particular technologies and mechanisms for regulating health technologies in different countries.

In 2002 the Commission and the Health Council (Health Ministers from EU Member States) started a political process on cross-border health care where HTA could support policy makers in making decisions concerning healthcare policy and practice based on evidence (medical, social, economic, and ethical issues) (17). In 2004 the Commission and the Health Council identified as a political priority the need to establish a suitable and effective network for HTA: EUnetHTA (18)(19).

"The consequent activities of the European network for Health Technology Assessment EUnetHTA were organized through establishment of the EUnetHTA Collaboration 2009, the EUnetHTA Joint Action 2010-2012 and the EUnetHTA Joint Action 2 2012-2015"; "EUnetHTA mission is to support the collaboration between European HTA organizations that brings added value to healthcare

systems at the European, national and regional level”, who work together in order to develop reliable, timely, transparent and transferable information (20).

The Directive 2011/24/EU on the application of patients’ rights in cross-border healthcare adopted in 2011 established that the Union should support and help the cooperation between the responsables for health technology assessment designated by the Member States. According to this, the HTA Network has to be supported by a scientific and technical cooperation to meet the objectives of the European cooperation on HTA.

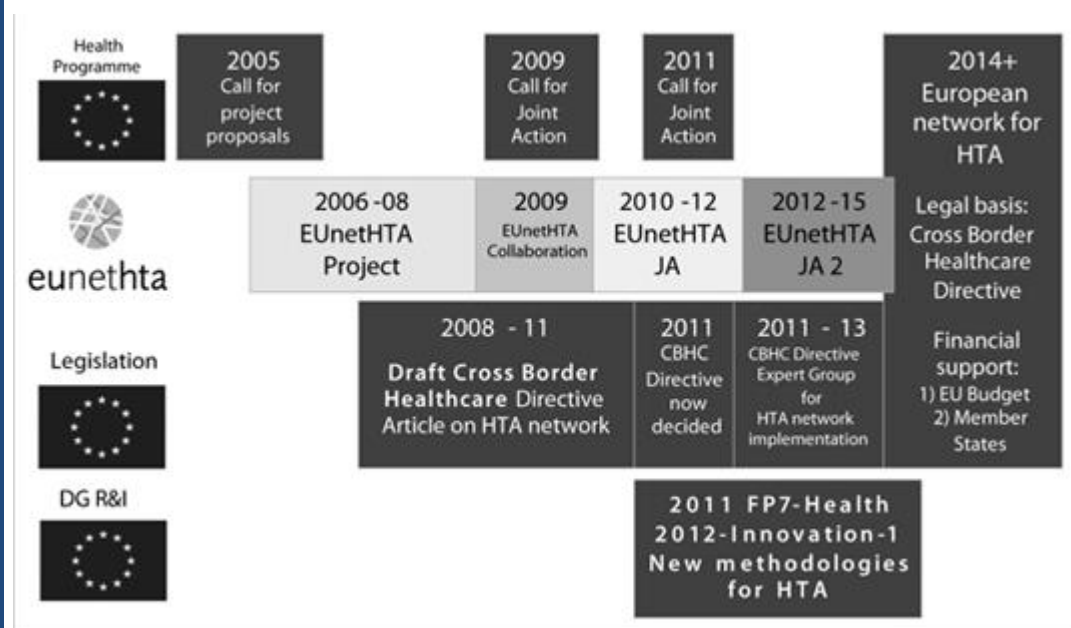


Figure 3: The time-line of reaching a sustainable and permanent HTA-network in Europe (18)

Among other results, EUnetHTA identified several patron groups as potentially sharing an interest in EUnetHTA: Policy makers (at national and regional levels as well as at institutional level), patient organisations, health care professionals and industry (18). This classification would match with the types of users from reference services of specialized libraries.

The most important product resulting of the EUnetHTA Joint Actions, related to our study, is the development and maintenance of the Core HTA model. This model includes tools that should allow the European HTA Agencies to share and develop information and knowledge through the achievement of an agreed model.

Some of the results of the EUnetHTA Joint Action 1 were to develop a multidisciplinary common core of HTA evidence, building a model applicable in two states: assessment of medical and surgical interventions and assessment of diagnostic technologies(18). During the development of the Joint Action 2 is scheduled to filling in new models for pharmacological and non-pharmacological interventions.

The researchers converted relevant issues into actual research questions, and the Core HTA model helps researchers in selecting the information sources required. This model is supported by element cards providing guidance on how to answer the actual research questions. Particularly, the *information sources* field in the cards may contain useful suggestions, recommended research methodologies, or even common research standards if desired. (19)

Content of field “Information sources”	Nature of recommendation
Database X can be used	Suggestion
Use of Database X is recommended	Recommendation
Database X shall be used to check Y	Standard
A systematic literature review may be useful	Suggestion
A systematic literature review is recommended	Recommendation
A systematic literature review shall be conducted	Standard
A systematic literature review shall be conducted using the methodology described in the Cochrane Handbook for Systematic Reviews of Interventions	Standard with detailed requirements regarding methodology

Table 2: Examples of Suggestions, recommendations, and standards in EUnetHTA

Conclusions

New roles are being integrated by medical librarians into the research and decision-making workflow in the institutions; in this way, the reference service of a medical library has to stay ahead of the needs of clinicians and managers in order to assist them in their questions and decision making.

The use of EBM resources can be of great help, providing researchers, clinicians and health managers with filtered, quality and accurate information. Although clinical librarians need not to be specialists in EBM, the use of these models will maximize the quality of their work for their users, adding value to literature searches and to the answers of queries that arise in a reference service.

The literature search is a continued activity during all the research process, particularly in the carrying out of systematics reviews or meta-analysis. Librarians or information specialists executing or collaborating within these searches should be active members of the team and be involved from the start in any stage of process, formulating research questions (PICO) and adapting searches to the study and to the available resources.

The COSI protocol helps locating information systematically and select pertinent sources based on CORE, Standard and Ideal searches, fitting searches to target information and available time and resources.

COSI is a valuable tool for assuring exhaustiveness in systematic information retrieval because it allows us to organize and increase the accuracy when performing literature searches, and besides it facilitates collaborative working environments. In addition is completely flexible and adapts to any kind of research questions and queries. Due to all these reasons in our opinion the application of COSI methods in the libraries reference services would improve the quality and the effectiveness of the service.

Finally, the COSI protocol is perfectly pertinent and applicable to the model developed by EUnetHTA, which emphasises its interest and convenience to be use in medical and clinical libraries' environments.

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