Essential Skills for Evidence-based Practice: Evidence Access Tools

Jeanne Grace

Abstract
In an efficient search for evidence to address clinical questions, clinicians consult trustworthy collections of critically evaluated evidence when those resources exist. The "5S" hierarchy organizes these resources in terms of their usability in clinical practice and suggests which sources to consult first. When relevant evidence cannot be found in one of the more developed resources, the clinician’s ability to conduct an effective and efficient search of the health care literature to locate evidence is a crucial skill for evidence-based practice. Two features of literature database search engines are particularly helpful: subject headings and clinical queries. Subject headings are specific terms assigned by an indexer to describe a topic or concept, in addition to whatever terms the author actually used. This allows the searcher to retrieve all the literature on that topic with a single search term. Clinical queries act as filters, retaining only evidence described as coming from the strongest designs to answer questions of a specific domain. These “expert searches” are available for therapy, diagnosis, prognosis and harm (etiology) question domains in several databases and may be offered at different rates of selectivity. The searcher who uses these features in evidence-rich databases is likely to be successful in locating relevant evidence when it exists.

Keywords: evidence-based practice, information services, computerized literature search.

As evidence-based health care practice has become more widespread, there has been a corresponding growth in the number and variety of information products intended to connect clinicians with the evidence we need. These products can be classified according to the extent evidence is assembled, critically appraised and made accessible to the intended users. Haynes suggests organizing this hierarchy of evidence in terms of "5S": five words beginning with the letter S arranged in the form of a pyramid.

"5S": The Hierarchy of Sources of Evidence
The most usable products (top of the pyramid) are expert systems. These are typically computer-based products that combine information about specific patients (often from electronic medical records) with evidence-based recommendations for the care of those patients in a single display. For example, the expert system may combine information from the patient’s lab results, health history (allergies and other health
problems) and current medication list with published evidence on antibiotic effectiveness to suggest the most effective way to treat that patient’s infection. An expert system connected to intensive care monitors may direct the clinician to take action when a pattern of patient status changes known to precede a life-threatening condition occurs, rather than sending an alarm only when the threat to life actually happens. Decision tools for heart failure management accept information about the patient’s risk factors and current status and then identify the most effective treatment under these circumstances. Clinicians who have access to these systems do not even need to know that relevant evidence exists in order to incorporate it into their practice.

Next most useful are summaries, which collect all the relevant evidence in one easy-to-access source. Summaries incorporate systematic reviews where available and make recommendations for care, but unlike systems they do not incorporate individual patient information into their recommendations. Summaries may be in the format of clinical practice guidelines focused on a specific health problem, or they may be broader collections of evidence, like UpToDate, published by Wolters-Kluwer, or Clinical Evidence, published by the British Medical Journal Group. Summaries are intended to make “best evidence” quickly available to the busy clinician and must be updated regularly to accomplish their purpose. Because of the effort needed to maintain summaries, the number of topics addressed in these collections of evidence is limited.

When summaries are not available or do not address the clinical problem of interest, the next most useful form of evidence for the busy clinician is a synopsis. Synopses are brief critical appraisals of either original research articles or systematic reviews that are intended to alert the reader to worthy evidence with clinical implications. These are typically published in journals like ACP Journal Club or Evidence-based Nursing, but they may also appear as regular features in a clinical practice journal. The Cochrane Library Database of Abstracts of Reviews of Effectiveness (DARE) is a collection of synopses of systematic reviews.

Systems, summaries and synopses all draw their evidence from the two least processed levels of the hierarchy, syntheses and studies. The most common form of synthesis is the systematic review, which selects and combines “best evidence” for a specific clinical question from the available individual studies. The results of these individual studies may be presented graphically as a forest plot. Syntheses are preferable to individual studies as evidence because they evaluate all three aspects of evidence strength: quantity, quality and consistency.

Finally, at the base of the hierarchy pyramid are individual studies. These are the foundation on which all the scholarly attempts to summarize and derive clinical applications must build.

At all levels of the “5S” hierarchy, evidence users are relying on the scholarship of others. We rely on the scholarship of researchers to design and conduct studies that provide accurate and meaningful findings, and we read the methods section of the study report to determine whether that scholarship is adequate. When the evidence involves synthesis as well as original findings, we rely on the scholarship of the authors to select and appraise the studies to be included in a thorough and objective fashion. We are reassured when the processes of selection and appraisal are explicitly described as part of the final product. Similarly, we rely on the authors of synopses, summaries and systems to select evidence that is current and relevant, to represent the findings accurately and to be clear about the process of selection, the source and quality of evidence and the values incorporated into their practice recommendations.

Although the most effective and efficient search for evidence starts at the top of the “5S” hierarchy, the availability of systems, summaries and even synopses that address nursing problems is much more limited than the availability of those products for our physician colleagues. Many nurses do not work in a setting where expert systems are available, and the content of evidence-based “textbooks” like Up To Date is currently focused heavily on disease management, not nursing care. Clinical practice guidelines, once created, may not be updated regularly as new
evidence appears. Therefore, nurses need to be able to locate and appraise systematic reviews and single studies. The ability to conduct an effective and efficient search in electronic databases for this evidence is an important clinical scholarship skill.

Subject Headings

There are many electronic collections in which evidence may be found, and the collections vary in availability, scope of content, cost, selectivity and ease of use. One important feature is whether the contents of the collection are reviewed and organized according to a pre-existing list of subjects (“subject headings”). In this process, called indexing, reviewers read every article that is to be added to the collection and assign all the subject headings from the collection’s pre-established list that describe what the article is about. For example, a systematic review of treatments for decubitus ulcers indexed in the Cumulated Index to Nursing and Allied Health Literature (CINAHL) database would be assigned the subject headings “pressure ulcer – therapy”, “wound care”, “clinical trials”, “systematic review” as well as subject headings for the specific treatments considered, such as: “hydrocolloid dressings”, “bandages and dressings”, “growth substances - therapeutic use” and “dietary supplements”.

Subject headings are important because they provide a single set of consistent terms to use in constructing electronic searches. Whether the authors of the original study referred to their topic as “pressure sores”, “decubitus ulcers”, or “bed sores”, the study will be retrieved when the subject heading “pressure ulcer” is entered in a CINAHL database search.

Electronic databases with subject heading indexes generally include a feature that suggests subject headings when a searcher enters an alternate term. When this feature is enabled, the first screen the searcher sees after entering a search term contains information about the subject headings that might be appropriate to use instead. Figure 1 illustrates the location and format of this feature in the current EBSCO search engine for CINAHL.

Figure 1. Subject headings in EBSCO CINAHL database

Caption Figure 1
Computer screen captures illustrating subject heading search in EBSCO Host interface for CINAHL. Interface © 2009 EBSCO Industries.
Unfortunately, the list of terms used as subject headings is not consistent across electronic databases. The Medline database and Cochrane Library use Medical Subject Headings (MeSH), while the CINAHL nursing and allied health database uses a separate set. When the “suggest headings” feature is enabled, entering the subject heading from one database into a database that does not use the same set of headings will usually provide you with the proper heading to use in the new database.

The availability of subject headings in an evidence database is particularly helpful to searchers with limited knowledge of the English language. Although the majority of international collections of health evidence are English-centric, the searcher does not need to know all possible English language terms that describe the problem. A single English language term will identify a subject heading that allows a comprehensive search.

Clinical Queries

The second database feature that enables effective and efficient searches for evidence is the availability of clinical queries. A clinical query is a search strategy built into the database search function that filters evidence according to the terms used to describe the study design. Different study designs provide the strongest evidence for different domains of clinical question\(^2\), so each clinical query is constructed with terms specific to the studies that best support the type of question being asked. For example, the PubMed clinical query for therapy evidence in the Medline database searches for studies described as “clinical trial” or “random allocation”, while the clinical query for prognosis evidence searches for studies described as “follow-up studies” or “cohort”\(^3\).

Clinical queries are not designed to identify systematic reviews, only single studies. According to the “5S” hierarchy, searchers should look for available systematic reviews before turning to clinical queries to look for single studies. Some databases have “reviews” as an additional category under their clinical query menu and some have a separate search menu or list “systematic review” as a publication type limit.

Clinical queries are like diagnostic tests, “diagnosing” whether or not an article is strong evidence to answer some kind of clinical question, based on the study description. Like any diagnostic test, the clinical query must be accurate about identifying strong evidence when it exists (“sensitivity”) and also accurate about identifying what is not strong evidence (“specificity”). The balance of sensitivity and specificity that evidence searchers desire depends on the amount of evidence available and the purpose of the evidence search. A scholar may wish to retrieve and personally examine any evidence that could possibly be relevant, even if that means examining a great many sources with study weak designs as well. A busy clinician may desire one or two sources for strong evidence and not be concerned that additional similar sources were filtered out along with the weaker sources. To meet these differing needs, clinical queries are constructed with a broad (highly sensitive) or narrow (highly specific) focus. The broad (sensitive) focus therapy clinical query in PubMed, for example, identifies all sources with either the words “clinical trial” or “random” in the title or abstract. The narrow focus therapy clinical query only identifies those sources that have both “clinical trial” and “randomized” in the title or abstract.

For the same set of content subject headings, a sensitive (broad) clinical query will identify more possible sources than a specific (narrow) clinical query, and all the sources from the specific query should appear in the sensitive query, as well. Some databases offer a third choice of clinical query, the optimized or “best balance” clinical query. This strives for a balance between sensitivity and specificity and will identify more sources than a specific clinical query but fewer sources than a sensitive clinical query.

General purpose databases for health care, like Medline and CINAHL, contain strong evidence, but they also contain editorials, clinical opinion articles, patient teaching aids, case studies and personal recollections. For this type of database, clinical queries are extremely valuable evidence search tools. Once the subject headings for the content topics are identified, clinical queries will identify the best-designed studies.
Clinical queries are currently incorporated into two major databases of interest to nurses. The EBSCO interface to CINAHL, available by subscription, features therapy, prognosis, etiology and qualitative (addresses human response / meaning questions) clinical queries, as well as a review option on the same menu. The search terms used to create these clinical queries are somewhat different from the ones employed in PubMed for the same question domains.

The PubMed interface to Medline has clinical queries for therapy, harm (etiology), diagnosis, prognosis and clinical prediction guides. The search for systematic reviews has a separate menu just below the clinical queries menu. The direct internet address of these menus is http://www.ncbi.nlm.nih.gov/corehtml/query/static/clinical.shtml. This database, which is provided free by the United States National Library of Medicine, indexes over eighteen million sources, but does not cover nursing literature as completely as the CINAHL database does.

The Health Information Research Unit at McMaster University has also developed clinical queries search strategies for the EMBASE and PSYCHINFO databases. While the strategies have not been incorporated into the EMBASE search engine, searchers can make their own clinical queries in EMBASE by applying the McMaster search terms.

The Cochrane Library does not include a clinical queries feature, because all the sources within it are “best evidence” and no filtering is needed. The Cochrane Database of Systematic Reviews contains nothing but completed systematic reviews (“reviews”) and detailed plans for reviews currently in progress (“protocols”). The Cochrane Database of Reviews of Effectiveness (DARE) contains “5S” synopses of systematic reviews. The Cochrane Central Register of Controlled Trials contains “5S” synopses of single studies that are “best evidence” for therapy questions.

The most effective and efficient evidence search strategy for any clinician depends on what resources are available and how well the clinical questions of interest are addressed at the higher levels of the “5S” hierarchy. Collaboration with a health sciences librarian greatly eases the task of developing that strategy. Much like the skill of framing a clinical question in PICO format, learning to conduct this type of search takes practice but is well worth the effort.

References