Improving Literature Searches

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KEY WORDS
abstract review, Boolean operators, critical appraisal of articles, key words, literature search, search strategies

Research is a core competency for all clinical nurse specialists (CNSs). While engaged in clinical practice, questions arise related to best practices, patient outcomes, and effectiveness of therapeutic interventions. Identifying a clinical problem or a clinical outcome that needs improvement is the impetus for conducting a literature search. The initial step to answer a clinical question is conducting a literature review that supports the need for research and/or an evidence-based practice change. The abilities to find and critique the quality of research to improve patient outcomes are skills that take time to develop. At first, the literature search can seem to be a daunting task. In this article, the process will be discussed in manageable steps to guide the CNS through a literature search.

Another consideration for CNSs is examining the literature to discover what research has already been completed and to identify the knowledge gaps in the literature that support the need for future research. This article will also discuss how the CNS conducts a literature search to find relevant articles that help understand what nursing researchers have reported in relation to a specific clinical problem or a clinical outcome.

THINKING UPFRONT: OVERVIEW OF THE PROCESS
To conduct a focused literature search, many nurse researchers start with development of a clinical problem to guide the search. The second step is to identify and organize key words. The third step is selection of relevant library databases to search the topic/problem and to identify primary sources. Fourth, titles are reviewed for relevance to the topic/problem and to ensure the article meets inclusion criteria; review of the abstract follows. Next, the full-text articles are retrieved, followed by critical appraisal. Lastly, the reviewer summarizes and synthesizes strengths and recommendations from each of the articles. Documentation of search results, decisions to include or exclude an article, and final article selection are important throughout the process.

DEVELOPMENT OF THE CLINICAL PROBLEM/ISSUE
The clinical issue should be clearly articulated to conduct a relevant literature search. When narrowing the problem/issue in the question, the variables often become search terms. One model that can be used with identifying the research question is the PICOT format, which assists in identifying searchable concepts. PICOT is an acronym that focuses on the population/patient problem (disease or health status, age, race, sex); intervention: plan for the patient? (specific tests, therapies, medications); comparison: alternative plans? (no treatment or different type of treatment; outcome (what are expectations or what will happen); and time frame (this component may not always be included).1

IDENTIFY AND ORGANIZE KEY WORDS
A standardized (controlled) vocabulary will assist the nurse researcher in identifying key words to search the literature. Also, development of a concept map may assist to illustrate how specific key words relate to each other. A concept map is a graphic depiction to show relationships and ideas. It is best to avoid whole sentences and the use of “a,” “an,” or “the” when conducting a literature search.

An example of a standardized or controlled vocabulary is the Medical Subject Headings (MeSH). Medical Subject Headings is the National Library of Medicine’s
(NLM) controlled vocabulary thesaurus that contains a list of medical terms used by the NLM for its computerized system of storage and retrieval of published medical reports. It consists of sets of terms with descriptors arranged in both an alphabetic and a hierarchical structure to allow the researcher to search at various levels of specificity.\(^2\) It also assists the CNS to search PubMed’s MEDLINE database. The nurse researcher can use MeSH when exploring the literature, on a topic area of interest that may use multiple MeSH descriptors. For example, a search for MeSH descriptors for heart failure yields the terms including "cardiac failure," "cardio-renal syndrome," and "edema, cardiac" (Figure 1).

Most databases provide vehicles for narrowing a search. PubMed/MEDLINE uses the term filters (Figure 2), the Cumulative Index to Nursing and Allied Health Literature (CINAHL) uses limiters Figure 3), and other databases may use other terminology for narrowing a search. Some commonly used narrowing devices are languages, ages of population, journal categories, and dates of publication. Another method to narrow a search is to establish inclusion and exclusion criteria. In addition, the CNS in the nurse researcher role may identify a population group that will benefit from nursing interventions.

Examining the abstracts for key words provided by the authors can provide additional search terms/phrases for concepts that, when entered into the search, broadens retrievability. For example, nurse clinicians often use the term "burnout," whereas nurse researchers commonly use...
FIGURE 2. PubMed search with filters.
the term caregiver stress. When caregiver stress is entered as a search term, even more concepts arise, such as compassion fatigue and moral distress. These are all ways to enhance retrieval of relevant articles while minimizing searches with too broad or nonspecific articles.

**SELECTION OF RELEVANT LIBRARY DATABASES**

The best approach to conducting a literature search is to start with Bibliographic Databases such as PubMed/MEDLINE or CINAHL (available through EBSCO) to locate specific journal articles. These are frequently used databases,
although, depending on the topic, other databases may yield more fruitful searches. EBSCO is considered a provider of multiple databases. In addition to CINAHL, EBSCO provides access to PsycINFO (psychology database), ERIC (education database), and Academic Search Complete (scholarly, multidisciplinary, full-text database). OVID and ProQuest are other providers that offer access to information from the Joanna Briggs Institute and full-text dissertations and theses, respectively. ProQuest also provides access to nursing and allied health sources. The goal is to find primary sources that are peer-reviewed research articles and books by the original author. Bibliographic databases will expose the researcher to titles and abstracts of research studies completed.

PubMed/MEDLINE is a Product of the NLM/National Institutes of Health. PubMed can be used to search for published articles in nursing and other health sciences journals. PubMed/MEDLINE is free to the public and is not restricted to use in a library. MEDLINE is the portion of PubMed that has peer-reviewed journals. It is important to note that PubMed can assist in identifying an article, but the ability to retrieve the full-text article may depend on the users’ library access. Affiliation with an institution may be necessary to access full-text articles at no cost to the individual researcher.

EBSCO, Ovid, and ProQuest provide access to multiple bibliographic databases using proprietary search engines. The CINAHL database is available only from EBSCO and uses subject headings as its controlled vocabulary. Once again, the challenge associated with CINAHL is that the user must be affiliated with a subscribing institution to access the database and/or the full-text articles.

**Search Strategies**

Boolean operators can assist with narrowing or broadening a literature search. The 3 Boolean operators are AND, OR, and NOT. When using PubMed, Boolean operators must be written in all capital letters and can assist with creating relationships among search terms. Other databases do not require capitalizing Boolean operators. The use of AND will aid in narrowing the search because the citation results must contain both key words used. The use of OR will broaden the search by relating 2 or more key words, which can assist in retrieving articles containing either key word or both. The use of NOT excludes key words from the search results. Clinical nurse specialists must be very careful when using NOT so as not to eliminate the ability to retrieve pertinent information and therefore narrow the search. An example of using the Boolean operator NOT is when searching for articles to include hand-washing. If the CNS uses NOT to exclude contact isolation, research with important information may be excluded. An example of search results using the AND Boolean operator is displayed in Table 1.

**REVIEWS OF TITLES AND ABSTRACTS**

Once a database is searched, the first step is to read the titles of the articles found and exclude articles that do not meet inclusion criteria. Of the remaining titles, the abstracts are read to determine if the inclusion criteria are still met. The full-text articles from the list of included abstracts are retrieved and read for applicability and inclusion in the literature review. The search strategy and decision points on the relevance of the study to the clinical problem/issue can be highlighted in a flowchart or decision tree (Table 2).

**CRITICAL APPRAISAL OF THE ARTICLES**

Critical appraisal is the process of examining research to evaluate its methodology, validity, and reliability. Strengths and weaknesses of each study are also identified. A critical appraisal tool such as those developed by the Critical Appraisal Skills Programme can be used. Critical appraisal tools can be accessed for no charge at www.casp-uk.net. Critical Appraisal Skills Programme tools include checklists based on the study’s design. For example, checklists that are available include randomized controlled studies, cohort studies, case-control studies, and qualitative studies. When the critical appraisal is completed, a table can be created that contains key information about the studies reviewed.

**ORGANIZATION, SUMMARY, AND SYNTHESIS OF FINDINGS**

Findings of the literature search can be organized in a collective findings table that outlines the author/s, date of publication, design, sample and sample size, outcomes and outcome measures, results, and level of evidence (Table 3). There are various ratings for level of evidence;

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**Table 1. Example of a Search Results With Key Words and a Boolean Operator for 2 Databases**

<table>
<thead>
<tr>
<th>Key Words and Boolean Operator “AND”</th>
<th>Database PubMed (MeSH), N</th>
<th>Database CINAHL (Subject Headings), N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>65 158</td>
<td>45 098</td>
</tr>
<tr>
<td>Coumadin</td>
<td>Warfarin: 15 343</td>
<td>Warfarin: 5548</td>
</tr>
<tr>
<td>Stroke AND Coumadin</td>
<td>1571</td>
<td>1195</td>
</tr>
<tr>
<td>Stroke AND Coumadin AND elderly population</td>
<td>Aged: 65 + years 807</td>
<td>Aged: 65 + years 486</td>
</tr>
</tbody>
</table>

N = number of articles retrieved. Abbreviations: CINAHL, Cumulative Index to Nursing and Allied Health Literature; MeSH, Medical Subject Headings.
therefore, it is good practice to include a reference to the method used to assign a level of evidence. A collective findings table is used to assist with synthesizing findings and identifying gaps in the literature.

Writing the literature review encompasses a narrative critique of each study. Throughout the process, notes are made related to similarities and differences in study design, sample, sample size, and findings. Gaps in the literature are identified. The literature review concludes with a summary and synthesis of collective findings.

**COMMON ERRORS AND CHALLENGES IN A LITERATURE SEARCH**

One of the most common errors in conducting a literature search is exclusively using Internet resources. The CNS should not solely rely on Internet resources because the results may yield information that is not reliable or has not been peer reviewed. Also, the results may be too broad to focus on the desired research question. If the CNS does not have access to library databases, other ways to gain access to journals include professional membership benefits that include journal subscription, hospital Point of Care Resources from companies such as Elsevier and Lippincott, and access to free articles by registration with the journal.

Another common error in starting a literature search is to have a topic that is too broad. Identification of a patient population and the nursing interventions will facilitate retrieval of appropriate research articles on a specific topic. The CNS should start the search process with a clear understanding of the desired topic to research, to retrieve relevant articles and determine what is known and what is not known about the topic. Although it is important to be specific, the CNS must be flexible and take note of new or unexpected findings that can broaden or narrow the focus of the literature search. Caution should be taken when searching a topic that is too narrow. Bedside report in the emergency department is 1 example. When expanded to shift report or bedside report, more research articles could be retrieved that could focus on the clinical question and client population.

Other errors when conducting a literature search are the overuse or nonuse of limiters or filters for the topic, such as the year of publication, language of the publication, or type of article (eg, research article). Furthermore, it is important to ensure that the information obtained is from articles in peer-reviewed journals.

A major challenge that many nurses encounter is locating recent research articles when access to library databases is lacking. Determining articles that are suitable for the clinical problem is time-consuming; however, by breaking down the literature review into parts that include the clinical question and patient population, retrieval of studies will focus on the various components desired in the literature search. Also, maintenance of a reference sheet and documentation of findings throughout

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**Table 2. Example of a Flowchart**

<table>
<thead>
<tr>
<th>Potentially Relevant Articles Stroke AND Coumadin (n=807)</th>
<th>Articles excluded on basis of title/key words (n=367)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstracts Reviewed (n=440)</td>
<td>Articles excluded after abstract review (n=357)</td>
</tr>
<tr>
<td>Full-text Articles Reviewed (n=83)</td>
<td>Articles excluded after full-text review (n=68)</td>
</tr>
<tr>
<td>Articles included in literature search (n=15)</td>
<td></td>
</tr>
</tbody>
</table>

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**Table 3. Collective Findings Table Example**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Date of Publication</th>
<th>Design</th>
<th>Sample Size</th>
<th>Outcomes</th>
<th>Results</th>
<th>Level of Evidence</th>
</tr>
</thead>
</table>
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the search process are essential components of organization of the findings.

SUMMARY
The ability to conduct a literature search is often viewed as a formidable task by nurse clinicians and nurse researchers. The CNS is in a position to mentor and lead the healthcare team through the process of a literature search. Guided by the clinical problem and research question, the CNS establishes key words, selects databases, retrieves and reads articles meeting inclusion criteria, and synthesizes and summarizes the results. When there are few studies or low levels of evidence found on a topic/clinical problem, the literature review supports the need for nursing research.

REFERENCES