Incorporating Gray Literature in an Evidence-Based Nursing Curriculum: A How-To Guide

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abstract: Librarians and educators have a unique opportunity to develop and incorporate gray literature instruction into nursing curricula, with specific focus on its definition, value, discoverability, and evaluation. This article presents a structured and hands-on approach to the collection of gray literature and its use in evidence-based nursing. Citation analysis provides empirical evidence identifying the types of such literature most used in nursing scholarship. Based on these findings, a method of gray literature instruction for nursing learners is established and presented.

Introduction

At the heart of health care is a commitment to "first, do no harm," treating patients with kindness, compassion, and empathy. While this widely recognized affirmation is not actually part of the original Hippocratic Oath, its principle has become woven into the medical profession and remains a guide for many in practice.[1] This rule is echoed in the original Florence Nightingale Pledge, the oath created by nurses and for nurses in 1893. In the pledge, practitioners promise to be "devoted towards the welfare of those committed to my care."[2] Over time, health-care reform has shaped how nurses and other medical professionals practice medicine and has revamped nurses' roles in research and patient care. These changes, in turn, have influenced the educational landscape, shifting the focus of curricula to stay abreast of modern health care. From Nightingale's work in military hospitals during the 1800s,[3] to Archie Co-

chrane's 1972 observation that "we've always done it this way" was more likely the reasoning behind most treatment-related decisions instead of a systematic review of the clinical evidence,[4] to the 1991 coining of the phrase "evidence-based medicine," the improvement of patient outcomes by using sound evidence has been a common goal of nurses and physicians alike. Evidence-based medicine's definition as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" established this concept within medical education, kick-starting the evidence-based movement.[5] Now known as evidence-based practice, this method has been adopted and adapted by other health-care professions.

Evidence-based practice follows a five-step model: (1) assess the patient; (2) ask a searchable clinical question; (3) acquire the best evidence to answer the question; (4) appraise the evidence; and (5) apply the findings to the patient.[6] Nursing uses this model and includes four additional elements specific to the profession: best available external evidence, clinical expertise, patient preferences, and context.[7] This holistic approach is known as evidence-based practice in nursing, or, more simply, evidence-based nursing.[8] Nurses make up one of the largest groups of health-care workers in the world, and their practice is essential for effective health care and improved patient outcomes.[9]

The gold standards for the synthesis and dissemination of evidence-based research are systematic reviews and meta-analysis. A systematic review uses orderly methods, such as collecting evidence that meets predetermined criteria, to identify and summarize the findings of similar but separate studies. A meta-analysis uses statistical methods to combine the results of multiple studies and thus develop a conclusion that is statistically stronger. Such research guides clinical practice and decision-making and is a key component of evidence-based nursing.[10] Evidence-based nursing stands at the forefront of nursing education, with systematic reviews or similar projects embedded into graduate nursing curricula as a requirement for an advanced degree.[11] Evidence-based nursing instruction has been found to increase nursing students' critical thinking skills and cultivate the ability to "put forward questions, acquire knowledge actively, identify authenticity, and use rationally."[12]

Information literacy is one pedagogical aspect of evidence-based nursing instruction. It includes education in systematic searching of bibliographic databases and other relevant resources, critical assessment of identified research and information, transfer of findings into practice, and evaluation of outcomes.[13] "Other relevant resources" refers to a category of information known as gray literature, also spelled *grey literature*. Gray literature is information "produced on all levels of government, academics, business and industry in print and electronic formats . . . but not controlled by commercial publishers."[14] The inclusion of grsay literature is a required component of systematic reviews as it

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has the potential to reduce publication bias, incorporate relevant information or findings not published in peer-reviewed sources, and shorten the time between clinical trials and dissemination of results.[15] Nurses may find more information concerning specific populations or regions in gray literature resources than in a database such as CINAHL (*Cumulative Index to Nursing and Allied Health Literature)* or PubMed. Gray literature's importance in evidence-based nursing, the barriers to finding and accessing it, and the learning curve associated with its identification and evaluation confirm the need to produce a plan for gray literature instruction geared toward nurses.

The library profession has seen an uptick in the call for services related to evidence-based practice and evidence-based nursing.[16] In response to this increased demand, librarians have become key partners in the production of evidence-based research[17] and serve as embedded educational partners within medical and allied health programs.[18] As both health care and evidence-based nursing have evolved, library instruction has advanced with them. Librarians in the field of nursing have an opportunity to leverage educational partnerships and incorporate gray literature instruction to support evidence-based nursing curricula. Such instruction establishes a solid foundation for evidence-based nursing, creating lifelong skills and informing systematic searching for relevant sources.

This article aims to address the following questions:

- How has gray literature instruction evolved, and how does it apply to evidence-based nursing?
- What types and components of gray literature intersect with evidence-based nursing?
- What should information professionals incorporate into the teaching of gray literature to support an evidence-based nursing curriculum?

Literature Review

Gray Literature Instruction Overview

Gray literature instruction has been well-documented in the literature. Some early discussions about such instruction frowned on including it as a formal learning outcome. In 1998, Julia Gelfand stated that the dynamic and technological changes associated with gray literature and electronic publishing made it difficult to create a curriculum for gray literature. Rather, Gelfand argued, scholars and librarians should learn by doing through their involvement in the emerging ways that individuals and organizations disseminate, acquire, and deploy knowledge.[19]

Over time, scholars became more favorable to gray literature instruction. The book *Grey Literature in Library and Information Studies*, edited by Dominic Farace and Joachim Schöpfel, offers insights from several authors about topics related to gray literature, including production and publishing, collections and processing, channels for accessing and distribution, applications for use, and future trends.[20] Debbie Rabina's exploration of learning objectives related to gray literature in a library information course provides insight into possible structures for such teaching. The recommendation to consider a

cross-curricular approach to teaching gray literature within library science suggests that this approach may be useful in other disciplines.[21] Sarah Bonato's 2018 book *Searching the Grey Literature: A Handbook for Searching Reports, Working Papers, and Other Unpublished Research* provides learning outcomes and aids for teaching gray literature. Bonato describes learning objectives as well as approaches for introducing the material. This work addresses teaching the strengths and limitations of using bibliographic databases to discover gray literature; provides learning objectives for specific types of such literature; includes objectives for using Google and Google Scholar; and discusses creating checklists, plans for evidence-based research, and identification of existing strategies from other organizations.[22] Bethany McGowan, Jason Reed, and Jane Yatcilla discuss gray literature in the development of a course to teach strategies in knowledge synthesis or systematic reviews,[23] prominent aspects of evidence-based nursing in graduate nursing curricula.[24] These works provide a foundation for developing a gray literature instruction plan, but a carefully structured approach is necessary.

Elements within Gray Literature

Some scholars have taken a more nuanced approach to gray literature's many facets. In 2007, Karen Blackhall and Katherine Ker suggested a technique to tackle issues of discoverability. They identified six ways to search for gray (unpublished) literature: (1) the Cochrane Central Register of Controlled Trials, (2) hand searching, (3) databases of unpublished and ongoing studies, (4) the Internet, (5) reference lists, and (6) subject experts. They found that reviews of methods for injury prevention by the Cochrane Injuries Group included more gray literature sources than did other appraisals. Over 50 percent of the resources included in six studies of interventions for preventing traffic crashes were gray literature.[25] This finding, coupled with the inclusion of gray literature in systematic reviews and meta-analyses, strengthens the position that gray literature instruction deserves a place within evidence-based nursing curricula.

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AcademyHealth's Grey Literature Web Conference Series offered a suite of three librarian-led workshops focusing on gray literature for health services.[26] Highlights of this workshop included definitions and assumptions about gray literature and its value,[27] best practices for searching and incorporating such literature in large research projects,[28] and types of gray literature and their purposes, major producers, discovery, and preservation.[29] Providing further insight into gray literature's role within an evidence-based research curriculum, Erica Lenton and Kaitlin Fuller identified six instructional objectives for their workshops for graduate students conducting knowledge syntheses. The goals included developing a strategy for identifying appropriate sources; utilizing a methodical, transparent approach to searching; demonstrating best practices for supplementary search techniques; incorporating gray literature and supplementary search techniques into the review workflow; and evaluating search methods to identify accurate reporting.[30] Both AcademyHealth and Lenton and Fuller recommended a series of three sessions to

convey the breadth of gray literature identification, retrieval, and use. They advocated breaking the topic down into manageable parts over a series of sessions because this instruction may require more time than a single one-shot session.

Gray Literature Instruction for Specific Groups

Another aspect of gray literature instruction to consider is the audience. The instructional approaches described in this article target health sciences audiences, but even within this field, the spectrum of gray literature is large. Further focus on gray literature in relation to individual groups, such as nurses, will provide more tangible learning opportunities.

Recent studies demonstrate the necessity of targeting gray literature instruction by field. A 2019 investigation by Rosie Hanneke and Jeanne Link on the research needs of public health students and researchers noted that because "public health research is published in nontraditional outlets . . . public health students must learn the skills that are necessary to locate these publications."[31] Shanda Hunt and Caitlin Bakker proposed that public health researchers "may need more in-depth training on grey literature search strategies."[32] Katherine O'Clair, writing about information literacy needs in the life sciences, described learning objectives and activities for gray literature identification in environmental sciences and explained the role of such literature in the field.[33] Yongtao Lin and Marcus Vaska employed problem-based learning in gray literature instruction to medical students and health-care practitioners. They attempted to enhance critical thinking and use of information so that the learner could "take control of his/her own learning." Students and practitioners find value in this method because they can immediately apply the learning to their own real-world situations.[34] These approaches and objectives highlight the need for a customized teaching approach to gray literature for specific disciplines.

In a review of both published and gray literature, the authors found little information at the intersection of gray literature and nursing. Several library guides provide structures for teaching gray literature within the context of evidence-based research and nursing. These guides cover discovery, such as using Google and Google Scholar to find gray literature; documentation; and evaluation tools such as the AACODS (authority, accuracy, coverage, objectivity, date, and significance) checklist and the Quality Evaluation Scoring Tool (QUEST).[35] Throughout their search, the authors found no structured approach to teaching gray literature to nursing students and researchers. Gray literature's role in evidence-based nursing nevertheless argues for including such instruction within the curriculum. The following approach to gray literature education specifically focuses on the needs of nursing students. Consequently, each section will be framed around resources and strategies that are relevant to the field.

Gray Literature Instruction for Nursing Students

Not having the information you need when you need it leaves you wanting. Not knowing where to look for that information leaves you powerless. In a society where information is king, none of us can afford that.

—*Lois Horowitz*[36]

The gray literature landscape is vast, and learners new to it risk not knowing where to look and not finding the information they need. GreyNet International, the leading organization "facilitating dialogue, research, and communication . . . in the field of gray literature," has classified close to 100 different types of gray literature.[37] Addressing all types in instruction is an unrealistic goal; it would overwhelm learners and detract from the overall educational objectives. One challenge in teaching to any group or profession is to understand the types of gray literature used in that discipline.[38] Further complicating matters, each type of gray literature has its own unique value, discovery methods,

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and, in some cases, idiosyncratic evaluation criteria.[39] To provide a focused perspective to the nursing profession, it is important to identify the types of gray literature used by nursing researchers and to design instruction accordingly.

Through citation analysis, Stephen Woods, Kathleen Phillips, and Andrew Dudash provide empirical evidence that the following six types of gray literature are most often used by nursing researchers: (1) conference proceedings, (2) government documents, (3) news reports, (4) corporate organizations, (5) theses and dissertations, and (6) higher education.[40] The authors merged Bonato's work with the six identified types of gray literature and applied the focus of evidence-based nursing to establish the following goals for instruction:

Goal 1: Define. Understand what gray literature is broadly, as well as each of the identified types.

Goal 2: Value. Understand the value and contribution of each type of gray literature.

Goal 3: Discover. Understand where and how to look for gray literature.

Goal 4: Evaluate. Understand how to assess gray literature resources.

Goal 5: Operationalize. Understand how to customize a search process for the selection, assessment, and organization of gray literature resources based on a specific research question.

Proposed Method of Instruction

This proposed method of instruction was intended for nursing students ranging from upper-level undergraduates to graduate students. The flexibility of this plan allows instructors to adapt the content into a one-shot session, workshop series, asynchronous learning module, or other type of instruction. This method can be modified to include varying amounts of information about the types of gray literature, to choose which goals to incorporate into a lecture, or to provide an interactive session or sessions. The authors recommend thinking outside the box, as creatively as possible; looking for gray literature

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is like going on a treasure hunt. They also encourage instructors to engage learners in discussion of their perceptions and understandings of gray literature within the goals of define and value, and then for students to "learn by doing" through discover, evaluate, and operationalize.

Goal 1: Define

A basic overview of gray literature will place it in a broader context before focusing on specific types. The introduction may include a short history or survey of the varying definitions and the role gray literature plays in research, communication, and information sharing. The introduction may also describe the unique value such literature brings to a world plagued with unreliable sources of information. To counter the possible misconception that there are only six types of gray literature, instructors should explain that many more types exist, such as patents, lectures, or satellite data. Addressing several primary producers of gray literature in health care will provide a segue into identifying and defining the six categories of gray literature most relevant to evidence-based nursing. To keep this discussion from becoming overwhelming, the authors recommend addressing each type's general definition with an overview of key creators and specific examples.

Conference Proceedings

Conference proceedings are publications distributed through professional societies or associations or through commercial publishers. They include conference abstracts, posters, and published proceedings that possibly have some level of peer review.[41] These sources communicate information to members of societies, associations, and professions in an expedient manner, typically quicker than the rigorous peer-review process of scholarly communication. Conference proceedings may be followed up or accompanied by a more painstaking and thoughtful discussion of the topic, such as a paper accompanying a talk or a peer-reviewed publication produced later. Because conferences often have themes, researchers can find multiple authors or presentations treating a topic that reflects a conversation happening in a community. The professional society or association invites and vets the speakers, identifying both experts and new voices in the field.

Government Documents

Government documents are resources collected, produced, and disseminated at a government's expense or by other publishing partners as required by law. Frequently, the authors are the government departments, services, or groups that publish these materials. Although reports are drafted by individuals, they are written on behalf of local, state, or national entities. Examples of groups responsible for these resources might include a county health department, a state or province's board of nursing, the Centers for Disease Control and Prevention (CDC) of the United States, and the Nursing and Midwifery Board of Australia. Some groups, like the CDC, host alternative venues for information such as the Public Health Matters Blog, where public health professionals serve as guest authors.[42] Nurses utilize multiple types of government documents. For example, evidence-based practice reports and fact sheets by the Agency for Healthcare Research and Quality provide information on medical conditions and new health-care

technologies. The National Registry of Evidence-Based Programs and Practices has a library of white papers, research-to-practice briefs, and policy announcements.

News Reports

News reports include newspapers, newsletters, and other forms of media communication, such as blogs and social media. Traditional newspapers, in print or online, disseminate timely information about research or opinions about policy, and are written for the public. Newsletters can be produced by organizations, academic institutions, or commercial entities. The credibility of information in news sources may be uneven. Blogs, videos, and podcasts authored by, hosted by,

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or featuring accredited experts in the field are excellent gray literature resources. Similar sources created by or featuring nonexperts could provide potentially wrong or harmful information, however.

Organizations

Organizations are either not-for-profit or for-profit. Think tanks, associations, and charities are typically, but not always, nonprofit, whereas corporations, businesses, and some research organizations often seek to make money. Nongovernmental organizations (NGOs) have features of both. NGOs are recognized for their "on the ground" interaction with the problems they address. The information they share can be rich; and, in general, they disseminate information in a timely manner in the form of bulletins and briefing or policy papers.[43] Other resources within the organization category include technical reports and data sets. Organizations such as the National Association of Social Workers Foundation (NASWF) exemplify the type of freely available information that intersects with nursing practice and research. The foundation's Social Work Policy Institute advocates for individuals with multiple, complex needs, and their podcasts feature experts in the field.[44]

Theses and Dissertations

Theses are created by students pursuing a master's degree; dissertations are written by doctoral students. Dissertations generally take one of two research approaches. Professional doctorates such as a doctor of nursing practice (DNP) or doctor of education (EdD) tend to focus on the application of nursing scholarship, whereas a traditional doctorate (PhD) is often theoretical.

Higher Education

Higher education citations include any type of information from academic institutions not published in a commercial form, including correspondence, curricula, departmental and research institution reports, and unpublished research.[45] These materials may include

learning objects, working documents, preprint manuscripts, and scientific or research data sets. For example, Purdue e-Pubs presents "Purdue-affiliated articles, reports, conference proceedings" providing researchers access to a plethora of gray literature and scholarly resources, many with links to full-text versions.[46]

Goal 2: Value

Introducing the contributions of gray literature to evidence-based nursing and acknowledging the need for it in evidence-based research set the stage for a discussion of value. Gray literature can meet a spectrum of needs, offering global perspectives on some issues, while providing a more intricate picture on others. Often free, it provides information to a broader audience and serves as an important outlet for communication to the public as well as researchers.[47] Broader values gray literature might provide to evidence-based nursing include the reduction of publication bias and the inclusion of Indigenous knowledge in health-care policies or procedures.[48]

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Conference Proceedings

Conference proceedings provide a valuable venue in which to search for ideas and themes, and a way to identify experts within the field. Such records encompass global perspectives and voices; account for the total body of research, not just large studies; and examine all results, not just positive findings. Nursing conferences present both practical applications and theoretical discussions. They provide updates to research; report negative, null, or prepublication findings; and demonstrate practice. Not all conference proceedings get published; a 2018 Cochrane study found that less than half of results from abstracts and about two-thirds of randomized trial results make it to full publication. Factors correlated to a lack of publication include negative results, small sample sizes, clinical research, or nonrandomized control trials. Research originating outside North America and Europe or produced by non-English-speaking countries may also be published less often.[49]

Government Documents

Government documents reflect current law, data, and public policy. Their existence may depend upon executive direction, legislative process, judicial interpretation, and a practical implementation of government agencies through regulations and policies. In sum, government information is not simply the research interest of a single individual but is shaped through a different process that nonetheless offers an important perspective on issues. For example, an Executive Order from the president of the United States, House and Senate hearings, or Congressional Research Service reports can provide valuable information for evidence-based nursing research focused on health policy change.

News Reports

News has value on many levels. It can serve as a primary resource for historical and current events. As a secondary resource, it offers viewpoints on topics relevant to nurses and nursing and provides a way to look at those perspectives over time. News sources offer a glimpse into the cultural and geopolitical attitudes of a period. Like conference proceedings, news outlets quickly disseminate information to the public. Unlike conference proceedings, however, news is often written for consumers, not experts. As a result, news stories tend to be shorter and use simpler language, and they may carry an agenda or slant. The authors of this article recognize the inherent problems with fake news, misinformation, and disinformation but believe it important to communicate the value of news and its limitations. A resource is neither "good" or "bad." News allows researchers to learn about a culture or place, and can factor into industry changes. For example, students researching opioid addiction or overdose rates may consider reading the work of Eric Eyre, a journalist with the *Charleston Gazette-Mail* in West Virginia. He won the Pulitzer Prize for Investigative Reporting for exposing "the flood of opioids flowing into depressed West Virginia counties with the highest overdose death rates in the country."[50] The news has influenced health-care policy time and time again. In 2005, for example, the British Broadcasting Corporation (BBC) investigated and reported on hospital-acquired MRSA (methicillin-resistant *Staphylococcus aureus*) infections, initiating changes to hygiene policies and practices.[51] Asking nursing students to consider the value of news sources and to think about how the information interacts with their profession will endow them with the skills to stay on top of local or global events.

Organizations

Organizations often focus on a topic or hire researchers to do it, so reports and briefs authored by organizations frequently have a rich repository of other published materials. Like conference proceedings and news, these resources may cut across time barriers by rapidly publishing a report or white paper. In many cases, the researchers themselves are scholars. The connection that organizations have to public policy is important; their representatives are often invited to speak at congressional hearings and can influence the trajectory of issues. These groups influence not just federal or state governments but also intergovernmental organizations such as the United Nations (UN). Academics not employed at institutions of higher education often wind up at research organizations. The quality, creditability, and reputation of these researchers are often high, equaling those found in academia. An organization's mission can bias its information output, but students should learn to identify the important organizations and people within this sometimes complex landscape. For example, the Center for American Progress may have a liberal bent, so it is important to identify organizations or groups with other viewpoints and those that are nonpartisan. Understanding how to identify and navigate information provided by groups is critical to learning. Whether readers believe what an organization says, many people do trust this information, so it is important to understand how organizations influence policy in public health, nursing, and other fields.

Theses and Dissertations

Theses and dissertations have a distinctive structure based on institutional expectations, international standards, and the graduate student's individual approach. Dissertations typically have more citations than an average scholarly article and can run well over 100 pages. Theses and dissertations as a form of nursing scholarship have an established history. Professional doctorates emphasize public policy, theoretical approaches to nursing scholarship, and evidence-based nursing in the creation of procedures and guidelines.[52] While the level of review is different than the peer-review process in publishing, theses and dissertations are still evaluated by a committee of experts in the field

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and members who have vested interests in these topics. Within scholarly writings, nursing researchers may find material with great practical value offering timely, real-world applications of nursing practice, policy, or advocacy.

Higher Education

Higher education publications may have themes tied to grants and funding from government organizations. They often lack a political bias because they can operate free of political pressure, but they may reflect academic specialties, focusing on a specific field of research within a broader discipline (for example, geriatric nursing or violence and trauma within nursing). Higher education publications provide avenues for faculty researchers to communicate working papers and ideas at an early stage of research, thus disseminating information in a timely manner, and the ideas may be refined as researchers engage with one another.

Goal 3: Discover

The discoverability of gray literature has been identified as one of the barriers nurses face in the collection of resources to support evidence-based nursing research. Gray literature is often indexed in bibliographic databases as well as housed across a variety of platforms distinctive to each specific type. Nurse researchers can consult OpenDOAR (Directory of Open Access Repositories), a list of academic repositories, to search for higher education resources. This database can identify whether an institution has an open repository, and if so, will provide a link for easy access. Clinical registries house information on a global scale. Nurses conducting research within the United States would do well to use ClinicalTrials.gov, a resource typically recommended for systematic reviews. Information from other countries may be found in a handful of international clinical registries, such as the Brazilian Clinical Trials Registry or the Pan African Clinical Trials Registry.[53] Google Scholar or ProQuest's Dissertations & Theses database would be useful in identifying theses and dissertations. While this is not an all-encompassing list of directories or databases, it is a manageable introduction to a larger body of discovery tools.

Conference proceedings can be found in a variety of locations, including association, organization, and annual conference websites and web pages, institutional repositories, and databases such as Scopus, CINAHL, and Embase. A Google Images search can be employed to identify conference posters, and researchers interested in medicine or biology can search the F1000 Posters: The Open Poster Repository site.[54] The discovery of conference proceedings can be hindered by paywalls, however. Browsing through citations in scholarly articles is another way to identify conferences, associations, or organizations and links to potential resources.

Government documents are ubiquitous but widely dispersed geographically and by level of government, so it is recommended that researchers consider three important questions:

1. What is the geographic area or areas of my research question?

Government organizations belong to different levels of government jurisdictions, such as national, state, regional, county, and city governments. Agencies within each jurisdiction are bound by the information policies of their own laws and codes. Consequently, smaller jurisdictions may publish government reports that are not part of the legal responsibilities of larger jurisdictions. State and national governments play an important role in reconciling information with the governments of regions, counties, and cities. International government organizations such as the United Nations or the World Health Organization coordinate comparable geographic information between countries.

2. What government agency or agencies publish information related to my research question?

A useful strategy is to look at what government agencies are cited in scholarly articles. Often, these agencies publish other related materials as well as updates to previous reports. Following citations to government information will help researchers find entities for the geography of their research question. For example, if a scholarly article cites the Allegheny County Department of Health in Pennsylvania, other counties likely have similar health departments. Or a scholarly article might mention Queensland Health in Australia; each of Australia's six states has its separate department of health.

3. What type of government information will help answer my research question?

Finding government information requires an understanding of the type of information and its purpose. Many government organizations publish statistical reports and provide access to the raw data. Other types of government information include technical reports, cases, hearings, regulations, maps, scientific records, and educational materials.

News access varies. Traditional newspaper databases, such as LexisNexis or Pro-Quest Newspapers, cover both domestic and international news sources and offer robust search functionality. Newspapers provide much online content free or at low cost, and news aggregators, press services, and news feeds offer broad access to sources that report recent events.

Organizations lack a standardized process for indexing or discovery, and they are, literally, all over the place. Strategies learners can employ in the search for organization publications include identifying researchers or industry professionals recognized in

nursing associations, and conducting a Google search including ".org" in addition to the keywords.

Theses and dissertations can be found in institutional repositories and subscription-based databases such as ProQuest Dissertations & Theses. Open access to these sources is provided by the Networked Digital Library of Theses and Dissertations and Open Access Theses and Dissertations. Google Scholar can be useful in identifying titles and authors, but the accessibility of each source may vary.

Higher education materials are typically found in institutional repositories or departmental sites but could disappear for any number of reasons, such as being pulled from a department website, unit restructuring, or future contracts or embargoes. Searching for institutions with strong open access initiatives or identifying associations such as the Big Ten Cancer Research Consortium will allow researchers to discover shared papers and data sets, reports, and the like, creating a holistic view of research in nursing. Further discoverability measures include looking at specific university institutes and searching their sites for materials related to the topic or theme to gain insight into ongoing research.

Google and Google Scholar can be employed strategically to search for gray literature. For Google, common search strategies familiar to librarians include the use of quotation marks to search for exact phrases and employing the asterisk wild card allowing the search engine to fill in the placeholder, for example, *nurs** in place of *nurse*, *nurses*, *nursing*, *nursed*, *nursery*, and related words. Adding a tilde in front of a keyword (~) will search for synonyms, while a minus symbol (–) excludes terms. While these tips may be familiar to librarians, instructors should not assume learners are familiar with them. Researchers interested in finding documents can apply the filetype function by adding to their search such phrases as *filetype:PDF*, *filetype:doc*, and *filetype:ppt*. Such identifiers indicate the type of information and should eliminate web pages, instead retrieving only uploaded files. Researchers in evidence-based nursing might employ this method to focus on conference proceedings or presentations, white papers, or reports. Google Scholar searches can be refined with phrase searching and the minus symbol, as well. Boolean operators can be included to further structure a search, and adding a year will limit results to that time frame. While there are other tricks to strategically searching in Google and Google Scholar, this discussion should not encumber the overall goal of teaching the nuances of discovering the types of gray literature used in nursing.

Goal 4: Evaluate

The critical evaluation of sources and information to determine their credibility and usefulness is a required component of research in general. Evidence-based nursing researchers apply a more structured approach to this process. Objectivity in searching for, selecting, and evaluating information is important, but pure objectivity is almost impossible. One step in the production of systematic reviews and meta-analyses is performing a critical appraisal of selected full-text resources, checking each study's quality, reliability, and relevance in relation to the research question.[56] Numerous tools to critically appraise quantitative, qualitative, and mixed-methods research exist, such as the Critical Appraisal Skills Programme (CASP) and JBI (formerly Joanna Briggs Institute) checklists. These tools provide a reliable, structured process to assess peer-reviewed manuscripts,

which generally follow similar formats. Gray literature resources, on the other hand, are seldom structured like peer-reviewed publications, and so the critical appraisal models may not work for them. Several tools have been developed to help evaluate gray literature.[56] AACODS, the Quality Evaluation Scoring Tool (QUEST), and DISCERN are three tools currently used in such appraisal.[57] AACODS assesses the authority, accuracy, objectivity, coverage, date, and significance of gray literature sources.[58] QUEST quantitatively measures six aspects of the quality of online health information: authorship, attribution, conflict of interest, currency, complementarity, and tone.[59] DISCERN evaluates the quality of consumer health information about treatment, measuring publication reliability, quality of information on treatment choices, and the overall caliber of the publication.[60] Other appraisal tools exist, and the authors encourage instructors to research methods specific to their needs. Instructors could select one tool and demonstrate its use with a health sciences gray literature resource.

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Goal 5: Operationalize

The final goal of gray literature instruction is the application of this learning to individual research needs. The operationalization of a strong search plan includes several key components: determining the types of resources relevant to the research question or needs; identifying specific producers of these resources; documenting and tracking the search process; and critically appraising the final selection of material.

Once researchers have developed an evidence-based nursing research question, they can examine more closely the types of gray literature most likely to address their topic. For example, research on a vulnerable population could begin with searching government documents for population data or with identifying organizations that serve or advocate for these people. In addition, theses and dissertations and higher education sources could provide valuable information on the same population.

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The documentation of one's work should start as soon as gray literature searching begins. Researchers should track types and producers, build a search strategy, create bibliographies as they go, and identify an appropriate critical appraisal tool. As they look at resources, patterns and trends will begin to emerge. Reports from agencies frequently include partner agencies collaborating on topics of mutual interest. The Agency for Healthcare Research and Quality, for example, often collaborates

with the CDC. Researchers should evaluate selected resources using the tool best suited to the type of literature they are reviewing. A researcher examining alternative pain management therapies would likely use the DISCERN tool to critically appraise consumer health information about treatment. This goal establishes good searching habits and practices that will transition with learners as they move from higher education into professional research or employment.

Conclusion

From its first documented inception in the 1800s to today's health-care practices and research, evidence-based practice has grown within the nursing profession, positioning nurses as leaders in evidence-based research and patient care. As evidence-based nursing has evolved, so have the roles of information professionals in providing advanced research services and instruction. Gray literature has made its mark as a valuable and necessary part of evidence-based research, but the elusive and complex nature of such literature sets it apart from traditional scholarly resources. Its identification, selection, and evaluation require a new set of information literacy skills, and information professionals must develop specialized instruction to teach those skills.

The goal-based instructional method described in this article is structured on the six identified types of gray literature found in top nursing publications. Citation analysis to identify specific types of gray literature could be applied across a variety of disciplines. Gray literature instruction could be developed by examining citation analyses in a field and focusing learning objectives on the types of gray literature identified while still incorporating the goals proposed in this study.

Gray literature instruction has evolved from simply defining such resources to breaking them down into manageable parts and incorporating them with subject-specific learning outcomes. With an established intersection between gray literature and evidence-based nursing, the partnership between librarians and nurses can be strengthened by the inclusion of an organized and structured approach to gray literature instruction in an evidence-based nursing curriculum. The identification of gray literature resources frequently used in nursing research provides the foundation on which information professionals can build a nursing-specific instruction program. Once these resources are identified, they can be defined, valued, discovered, evaluated, and operationalized.

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