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Searching for health information for academic and clinical purposes: possibilities and challenges

Busca de informações em saúde para fins acadêmicos e clínicos: possibilidades e desafios

Búsqueda de información de salud con fines académicos y clínicos: posibilidades y desafíos

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Abstract
Studies in different countries indicate that students and health professionals have difficulties in seeking scientific information for academic and clinical use. This article aims to present the main intellectual stages of information search for clinical and academic purposes, as well as the possibilities and challenges that arise in each of the stages. We used a descriptive qualitative design based on a selective literature review, presentation of practical examples and some solutions to doubts related to health information seeking. The following stages of information search were presented: defining what the researcher wants to know; transforming the PICO research question into a database search strategy; defining where to search for the information; sources used in the health field for clinical and/or academic purposes. The process of information search demands specific intellectual decisions for each clinical or research situation. Therefore, just following information search manuals may not be enough to achieve a satisfactory result. It is necessary to bring to the level of consciousness the objectives of the search, the choice of sources, and the selection of the best information to answer the initial research question.
Keywords: Access to information; Information seeking behavior; Evidence-based practice; Information retrieval; Information service; Teaching.

Resumo
Estudos em diferentes países indicam que estudantes e profissionais de saúde têm dificuldades em buscar informações científicas para uso acadêmico e clínico. O objetivo do artigo é apresentar as principais etapas intelectuais da busca de informação para fins clínicos e acadêmicos, bem como as possibilidades e desafios que surgem em cada uma das etapas. Para tanto, utilizou-se um desenho de pesquisa qualitativo descritivo baseado em uma revisão seletiva da literatura, apresentação de exemplos práticos e algumas soluções para dúvidas relacionadas à busca de informações em saúde. Foram apresentadas as seguintes etapas de busca de informações: definição do que o pesquisador deseja saber; transformar a pergunta de pesquisa PICO em uma estratégia de busca em banco de dados; definir onde buscar as informações; e fontes utilizadas na área da saúde para fins clínicos e/ou acadêmicos. O processo de busca de informações demanda decisões intelectuais específicas para cada situação clínica ou de pesquisa. Portanto, apenas seguir os manuais de busca de informações pode não ser suficiente para obter um resultado satisfatório. É necessário trazer ao nível da consciência os objetivos da pesquisa, a escolha das fontes e a seleção das melhores informações para responder à questão inicial da pesquisa.
Palavras-chave: Acesso à informação; Comportamento informacional; Saúde baseada em evidências; Recuperação de informação; Serviço de informação; Ensino.

Resumen
Estudios en diferentes países indican que los estudiantes y profesionales de la salud tienen dificultades para buscar información científica para uso académico y clínico. El propósito del artículo es presentar las principales etapas intelectuales de la búsqueda de información con fines clínicos y académicos, así como las posibilidades y desafíos que se presentan en cada una de las etapas. Para ello, se utilizó un diseño de investigación descriptivo cualitativo, basado en una revisión selectiva de la literatura, presentación de ejemplos prácticos y algunas soluciones a dudas relacionadas con la búsqueda de información en salud. Se presentaron las siguientes etapas de búsqueda de información: definir lo que el investigador quiere saber; transformar la pregunta de investigación PICO en una estrategia de búsqueda en una base de datos; definir dónde buscar la información; fuentes utilizadas en el campo de la salud con fines clínicos y/o académicos. El proceso de búsqueda de información exige decisiones intelectuales específicas para cada situación

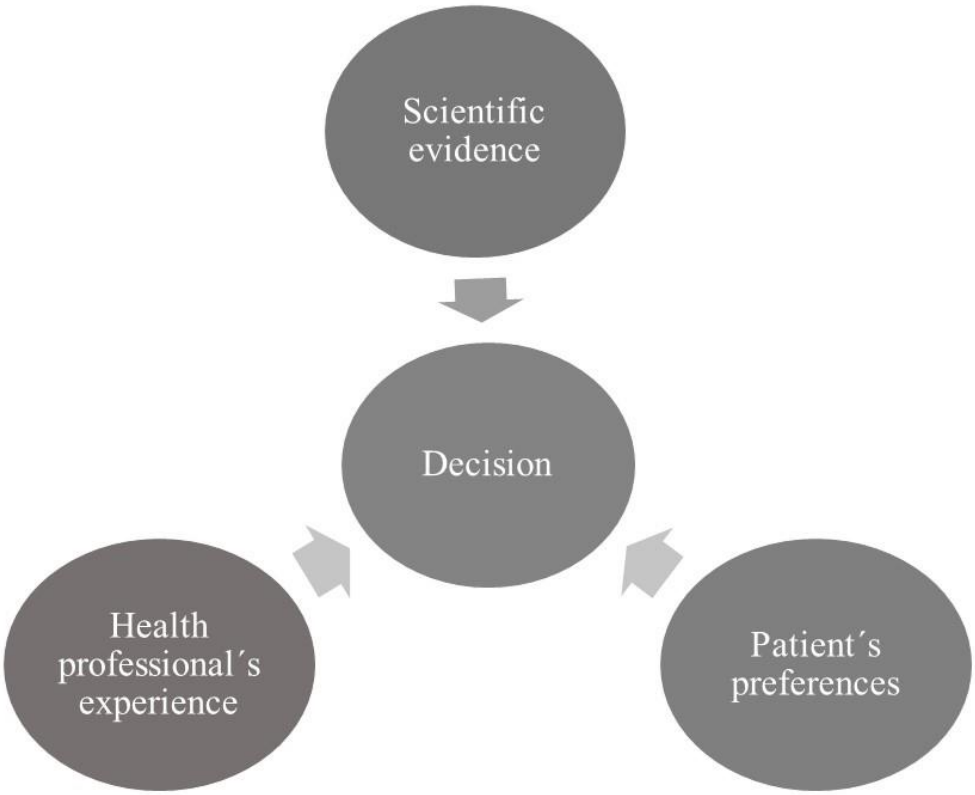
clínica o de investigación. Por lo tanto, seguir los manuales de búsqueda de información puede no ser suficiente para lograr un resultado satisfactorio. Es necesario llevar al nivel de conciencia los objetivos de la búsqueda, la elección de las fuentes y la selección de la mejor información para responder a la pregunta inicial de investigación.
Palabras clave: Acceso a la información; Comportamiento de búsqueda de información; Practica basada en la evidencia; Recuperación de información; Servicio de información; Enseñanza.

1. Introduction

Society has been experiencing periods of development and progress since the dawn of humanity. Substantial progress has been taking place since the 15th century, when scientific knowledge began to be widely disseminated through books and documents printed on a large scale (Loscalzo, 2016). Information is the basis for the production of new knowledge, driving progress in all areas of human activity. In the Biomedical Sciences, this has been occurring notably in recent decades, as we witness an increase in the number of scientific journals to meet the exponential growth of scientific productions, which are likely to advance even more, as the pay-to-read logic gives way to the pay-to-publish system of open access journals (Hotta, 2020).

In the context of health care, communications resulting from scientific research represent an important source of information to guide decision-making both in clinical practice and in health management (public and private). Knowledge gained by means of clinical research, selected through the professional's scrutiny and employed in solving problems, considering the patient's perspective, are the premises of Evidence-Based Medicine (EBM), summarized in Figure 1.

Figure 1. Principles of Evidence-Based Medicine.



Source: Based on Sackett et al. (1996).

EBM is the "conscientious, explicit and judicious use of the best current evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating professional clinical experience with the

best external clinical evidence obtained through systematic research"(Sackett et al. 1996).

The reasoning guided by the best evidence has brought a new perspective to clinical practice and teaching in the health field. However, given the increasing amount of available scientific information and the need to rely on the best possible evidence, it has become essential to know what valid and reliable information is, where it is and how to obtain it.

The amount of produced and published scientific information - approximately 1.6 million new articles indexed in PubMed per year - also has specific impacts and demands within the academic context. Before starting new studies that will effectively contribute to the advancement of scientific knowledge in a certain area, researchers and students need to search the literature on a daily basis to check if any studies have already been carried out or are in progress, thus avoiding duplication of efforts and optimizing the scarce resources allocated to science. Still in the academic context, the selection and use of information for the training and continuing education of professionals also represents a challenge.

For this reason, the process of searching for and recovering the best health information has deserved the attention of several researchers and institutions. Undergraduate and graduate curricula that do not include this type of content, lack of training of the actors involved with teaching and research, traditional pedagogical approaches that do not encourage students to search for answers in databases, and informational behaviors of digital natives have been pointed out as the main factors that affect this process.

Panahi et al. (2020) found in their study that Iranian medical students have an insufficient level of information literacy skills for carrying out research, for educational development, and for performing clinical practices. This may derive from the fact that the theme of information skills is not included in the curricula of medical courses. Thus, it is important to raise the awareness of students, teachers, and course coordinators about the need to learn and teach these skills, so that they can make effective and efficient use of information resources.

Mexican medical students use various information technologies to update their knowledge, to have access to theoretical information, medical guides and articles, and to use medical calculators. However, this usage is not uniform throughout the course: in the final years, usage decreases due to lack of time, lack of access to the Internet, and also because many teachers prohibit such technologies in their classes and practice settings (Rodríguez-Ríos et al. 2020).

In Pakistan, Ullah and Ameen (2019) found that the information literacy skills of medical students were inadequate. The authors suggest that university librarians should train medical students through mandatory programs for the development of information skills defined in conjunction with the medical faculty through proper planning.

Abdekhoda et al. (2016) highlight the skills acquired by Korean graduate students in the field of Medicine after a four-month course that focused on the processes of active searches for information in databases, showing the importance of training to improve the information literacy skills of medical students.

Huang et al. (2019), through a cross-sectional study with 1,065 Chinese graduate students in the health field, found that more than 90% of them have not had any training about the use of information and communication technologies (ICT), three quarters have not taken an online course and 31% do not use ICT in their current research. However, more than 65% of participants think that a research training curriculum using ICT is important.

On the other hand, Loda et al. (2020) report that German medical students can find reliable health information online, regardless of the search engine they use. According to the authors, medical students who are digital natives seem to have adequate Internet skills and knowledge of how to use them. They enter specific medical terms (evidence-based diagnostic steps) or names of trusted webpages in search engines to gain correct information.

In light of the importance of the theme, this article aims to present the main intellectual steps to search for information for clinical and academic purposes, as well as the possibilities and challenges that arise in each of these steps. The following aspects will be covered: defining what the researcher wants to know; transforming the research question into a database search strategy; defining where to search for the information; and sources used in the health field for clinical and/or academic purposes.

2. Methodology

Traditionally, qualitative descriptive designs typically are an eclectic combination of sampling, and data collection, analysis, and re-presentation techniques employed when straight descriptions of phenomena are desired (Sandelowski, 2000). Considering the diversity of descriptive qualitative studies, Kim et al. (2017) encourage researchers to provide as much detail as possible about the methods of their qualitative descriptive study, so that readers can determine whether the procedures used were reasonable and effective in producing useful findings.

Thus, this study has a descriptive qualitative character based on a selective literature review with focus in main intellectual steps to search for information for clinical and academic purposes. Throughout the text, we present practical examples and some solutions to doubts related to health information seeking. We also tried to explain in this work some issues commonly ignored by traditional informational search manuals, such as the absence of standardized terms for certain research topics. Our approach considers several worries we commonly hear as teachers and professionals who work daily in the clinical and academic context over the last decades.

3. Results

3.1 Defining what the researcher wants to know

The search for information is an admittedly complex task. Faced with an information need, we establish several mental relationships or semantic networks between subjects, a fact that can generate some confusion of thoughts (Belkin, 1980). To make the information search process more efficient, the first step the researcher must follow is to define clearly what they want to know, the main question to be clarified, or what information needs to be retrieved. At this stage of the process, especially in the field of health, it is recommended to systematize the process through the creation of a research question using the PICO strategy (Brown, 2020). **PICO** is the acronym formed from the main aspects that represent the clinical context or the problem situation:

P means *population*, which can be defined by the patient or condition. It should include all relevant aspects that help to adequately characterize the accessible population. Thus, if the main question is related to *teenage pregnancy*, the **P** of the PICO strategy will consist of the terms *pregnancy* and *adolescence*. If the question is related to *obesity in women over 40 years of age*, **P** will consist of *obesity*, *women*, or *women over 40*; the origin or locality can also be included.

I means *intervention*, which may include medication, health policy, prevention program, educational program, diet, procedures, and other therapies. Thus, if the main question is the *impact of sex education on teenage pregnancy*, then **I** will be *sex education*. If the main question is related to the *effectiveness of the high-protein diet for weight loss in women over 40*, **I** will be *the high-protein diet.*

C means *control*, including any comparison to the main intervention mentioned in **I**. The comparator must be the standard treatment or the best treatment currently available for a given disease or even placebo when its use is acceptable. Thus, one may want *to compare the effectiveness of a sexual education program with religious orientation in decreasing teenage pregnancies*. In this case, **C** will be *religious orientation.* Another example would be *to compare the effects of a new diet with the practice of physical activity on weight loss in women over 40 years of age.* In this example, the comparator would be *physical activity*.

O means *outcome*, which can be gauged. It can be mortality rate, reduction or improvement in conditions, satisfaction, quality of life, efficacy and effectiveness of technologies, drugs and procedures, health policy, prevention program, educational program, diet, procedures, and therapies. Therefore, in the question *"is sex education more effective than religious orientation in decreasing teenage pregnancies?"*, **O** will be *a reduction in the number of teenage pregnancies*.

Some authors add **T** and **S** to the PICO strategy, forming the acronyms PICOT and PICOTS, where **T** is the time and **S** is the study design, objective, place, or context where the study was developed.

McGarrigle et al. (2018) presented the definition of their research question for the topic "risk prediction models for familial breast cancer" in the PICOTS format, as shown in Table 1.

Table 1: Example of the use of the PICOTS strategy in cancer research.

Population	Cancer-free women (pre- and post-menopausal). Cancer-free women with a family history of breast cancer are of particular interest for subgroup analysis
Intervention (model)	All breast cancer risk prediction models that include family history of breast cancer as a predictor
Comparator	Models will be compared to each other
Outcome	Breast cancer occurrence
Timing	Timespan of prediction will vary. Some models predict lifetime risk, some risk to a certain age, some risk within 10 years etc.
Setting	Models to be used in asymptomatic adult females to predict their future personal risk of developing breast cancer

Source: McGarrigle et al. (2018).

Vernooij et al. (2021), on the other hand, presented the definition of their research question for the topic "the added value of different biomarkers to the Revised Cardiac Risk Index to predict the main adverse cardiac events and all-cause mortality after non-cardiac surgery" in the PICOTS format, as shown in Table 2.

Table 2: Example of the use of the PICOTS strategy in research on cardiac risk.

Population	Patients undergoing noncardiac surgery
Intervention	Prognostic model; Revised Cardiac Risk Index (RCRI)
Comparator model	Addition of biomarkers to the RCRI or comparison of biomarkers alone to the RCRI
Outcome(s) to be predicted	Major adverse cardiac events (MACEs) and all-cause mortality
Time span of the prediction	All time spans
Setting (intended role and use of the model)	To inform physicians preoperatively of the patient's risk of developing events after noncardiac surgery

Source: Vernooij et al. (2021).

An important remark that arises from the previous examples is that the use of the PICO, PICOT, or PICOTS strategy must be understood as a facilitator to define what will be sought, rather than a barrier to be overcome that generates additional difficulties. Generally, in the first times this strategy is used, it is interesting to have an interlocutor to check if the elements were well presented. With the repetition of this exercise, its use tends to become easier. To better understand how to employ this strategy, it is equally important to analyze articles that employ it. This is interesting to see how different authors unfolded different themes. Also, courses on how to search for health information and on evidence-based medicine or evidence-based health are important environments for group discussions about the development of the competence to apply the PICO strategy. In other words, the use of the PICO strategy involves study and dedication, as it does not occur automatically based on manuals and generic guidelines.

Eriksen and Frandsen (2018) argue that the PICO framework is primarily centered on therapy questions, and although it can be adapted to formulate research questions related to prognosis or diagnosis, it is less suitable for other types of clinical information needs. Therefore, adjustments and adaptations in the use of PICO may be required.

3.2 Transforming the PICO research question into a database search strategy

In theory, technical or specialty language establishes a monosemic relationship between term, concept and object, that is, each term has its established meaning and refers to a single object. Another characteristic of technical language is that it refers to a domain. Therefore, a term used in the context of medicine can have a different use in the context of nursing, nutrition, or any other specialty (Galvão, 2021). In any specialty language, there is also an important phenomenon called terminological variation, in which different terms refer to the same concept and the same object, or can be interchangeable because they are conceptually equivalent. For example, the terms *headache*, *cephalea*, and *hemicrania* have a very similar concept and can be used equivalently.

As a result of these linguistic phenomena, an important step in the search for health information is the use of standardized descriptor terms, which can be found in specific terminological instruments such as *Health Sciences Descriptors (DECS)*, available in Portuguese, English, Spanish and French (Biblioteca, 2022), and *Medical Subject Headings (MeSH)*, available in English (National, 2022). Such instruments provide a structure in which the standardized term adopted for the information search is defined, as well as the other terminological variations of the term. Table 3 presents an example of a standardized term for information search based on DeCS.

Table 3: Example of standardized descriptors for information search.

Standardized descriptor term in English	Headache
Standardized descriptor term in Portuguese	Cefaleia
Standardized descriptor term in Spanish	Cefalea
Standardized descriptor term in French	Céphalée
Alternative or equivalent terms in English	Bilateral Headache Bilateral Headaches Cephalalgia Cephalalgias Cephalgia Cephalgias Cephalodynia Cephalodynias Cranial Pain Cranial Pains […]
Scope note or concept	The symptom of pain in the cranial region. It may be an isolated benign occurrence or manifestation of a wide variety of headache disorders.

Source: Based on Biblioteca (2022).

An important issue that is not usually addressed in information search manuals is the fact that instruments such as DeCS and MeSH are updated once a year. Therefore, very recent terms may not have gone through the process of analysis and incorporation as a standardized term yet. To exemplify, in the update made to DeCS, in 2020, 118 descriptors were modified in English; 152 descriptors were modified in Spanish; 166 descriptors were modified in Portuguese; 145 descriptors were eliminated; 243 scope notes were updated in English, Spanish and Portuguese; 1042 indexing annotations were updated in English, Spanish and Portuguese.

Thus, if the information search includes a recent topic, the researcher may have to carry out information searches with non-standard terms, which may require specific terminological mapping, using current reference texts and consultations with specialists to try to map possible occurrences of terminological variation. Also, the researcher will need to expand the search strategy considering the fields title of the document, words in the abstract, and words in the full text. In short, if the term has not been standardized, searching for information using only the standardized descriptor field (subject) will probably result in few retrieved articles or none at all.

Another relevant aspect is that information search manuals usually disregard the fact that instruments such as DeCS and MeSH do not cover all the contents existing in the health field, highlighting only the most frequently researched themes. In this sense, the difficulty in finding standardized search terms increases depending on the topic: for example, it is hard to find standardized search terms related to topics such as health innovations, health technologies, and social, psychological, and human aspects of health. In these situations, the researcher may have to perform a separate terminological survey to develop a search strategy based on the document's title, words in the abstract, and words in the full text. Table 4 shows that the term "religious orientation" does not exist in DeCS, and "religion" or "religion and sex" are the closest standardized terms. In this case, the researcher will have to verify if, when

using the standardized terms, the results meet their search objective. If not, the researcher will have to conduct a specific terminological study to find the texts they want using fields in the database other than the standardized subject field.

Table 4: Example of standardized descriptors for information search.

PICO strategy	Term	Equivalent term	Standardized descriptor
Population	Pregnancy	Adolescent Pregnancy Gestation Pregnancies Preteen Pregnancy Teen Pregnancy Teenage Pregnancy	Pregnancy Pregnancy in Adolescence
Population	Adolescence	Adolescents Adolescents, Female Adolescents, Male Teenagers Teens Youth	Adolescent
Intervention	Sex Education	Family Planning Education Family Planning Instructors Family Planning Training	Sex Education
Comparison	Religious Orientation	Prayer Religious Beliefs Religious Ethics	Religion Religion and Sex
Outcomes	Effectiveness		Effectiveness

Source: Based on Biblioteca (2022).

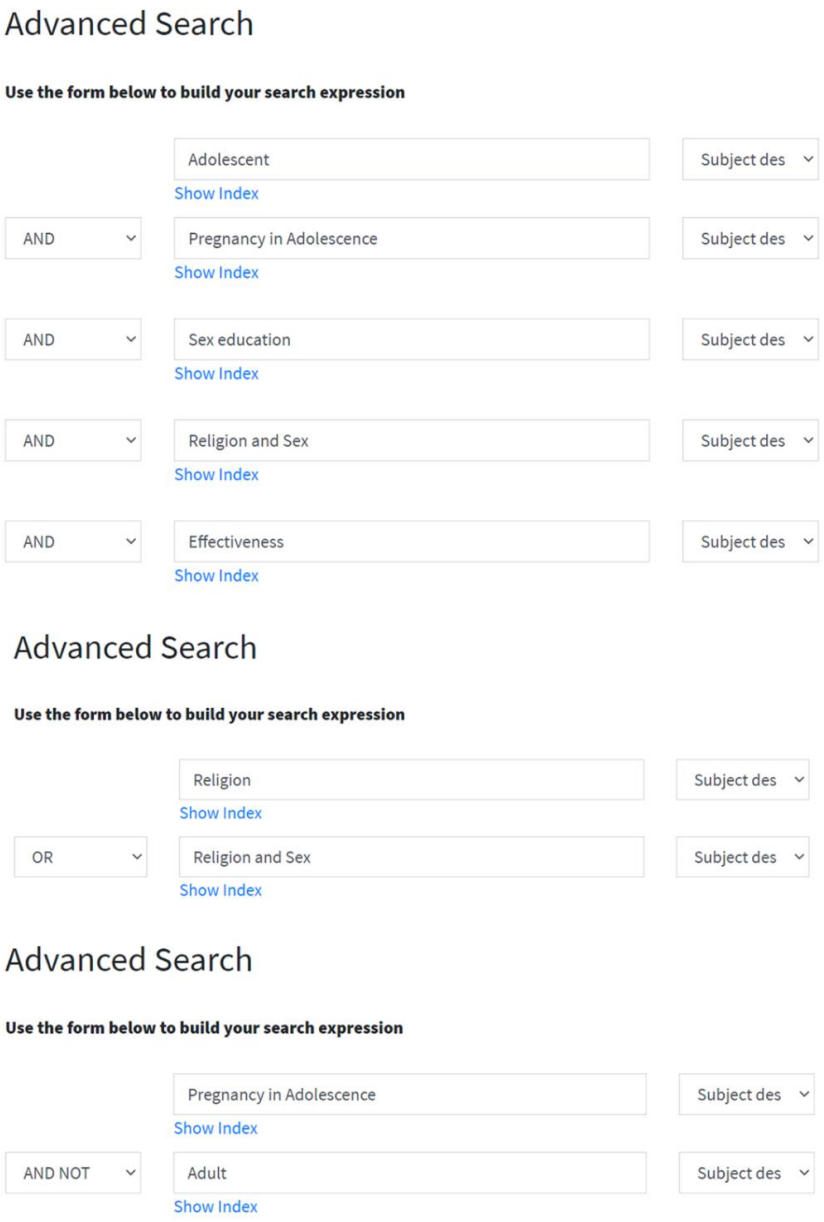
Once the terms that will be used in the information search are defined, it will be necessary to develop a search strategy in the database that usually employs three Boolean operators, namely AND, OR, AND NOT.

When using AND, all terms used in the search must be present in each record retrieved from the database. For example, if the AND operator is used as shown in Figure 2 (based on Table 4), this will indicate that, in all retrieved documents, the following standardized terms must be present: Adolescent; Pregnancy in Adolescence; Sex education, Religion and sex; and Effectiveness. If there are no documents with all those terms, the researcher can decide if they will really use all the terms, as they can still search through the title and abstract fields. Thus, it is necessary to emphasize that the information search is not automatic; it is a process that demands reflections and iterative intellectual decisions. Constantly and in various situations, it will be necessary to review the entire process and improve it.

When employing the OR operator, at least one of the terms must appear in each retrieved record. This feature is useful when there are semantically close terms that may be of interest for the information search. Figure 2 shows an example based on Table 4.

Finally, when using the AND NOT operator, the specified term should not appear in the retrieved records. This feature is useful when it is necessary to exclude a subject that will not be covered in the search. As shown in Figure 2, still based on Table 4, pregnancy in adolescence is sought, but no studies that, in some way, also address adults.

Figure 2: Use of the Boolean operators AND, OR and AND NOT in the search interface of the Virtual Health Library Regional Portal.



Source: Based on Biblioteca (2022a).

In addition to the Boolean operators, the databases provide several types of filters that can be used to make the information search more specific. The most common search filters are time interval, type of publication, language, availability of access to the full text (free or not), publisher, and country.

It is important to define what information will be used to answer the research question to be sure of the validity and reliability of the information. Another relevant aspect is to what extent the available information is up to date. For this reason, defining the time interval can be an interesting resource to guarantee access to the most up-to-date information. On the other hand, in some situations, data from pivotal studies, which are considered classic, can always be used to contextualize the theoretical framework or the discussion of findings and, in this case, when well used, they can enhance the study even more.

Figure 3 presents an advanced search strategy used by Vernooij et al. (2021), where all Boolean operators (OR, AND, AND NOT) were used to locate the desired information. In search 1, the authors used the OR operator to search for records related to the cardiac risk index. In search 2, the authors also used the OR operator, but this time to search for records related to calibration. In search 3, the authors combined the results found in search 1 and search 2 using the AND operator. In search 4, the authors conducted a search related to animals. Finally, in search 5, the authors combined search 3 with search 4 using the AND NOT operator and, thus, excluded from their search all results that were not related to human beings.

Figure 3: Advanced search strategy employed by Vernooij et al. (2021).

Search strategy

Search 1:
("Revised Cardiac risk index" or RCRI or "Lee index" or "Lee-index" or "Lee's index" or "revised goldman index" or goldman or detsky or LCRI or RCI or "revised cardiac index" or "pre-operative variable*" or "preoperative variable*" or "revised cardiac risk" or "cardiac risk factor*").ti,ab,kf.

Search 2:
Reproducibility of Results/ or calibration/ or Area Under Curve/ or Validation Studies.pt. or (validat* or stratification or overfit* or overpredict* or underfit* or underpredict* or overestimation or underestimation or pooled or recalibration or re-calibration or calibration or discrimination or cohort or discriminate or c-statistic* or "c statistic*" or "Area under the curve*" or AUC or Indices or Algorithm or Multivariable or "added value" or incremental or "receiver operating curve" or roc or "receiver operating characteristic" or "c index" or "cindex" or "predictive accuracy" or "prognostic accuracy" or "reclassifi*" or "prognostic value" or "predictive value" or MACE).ti,ab,kf.

Search 3
Search 1 and Search 2

Search 4
(exp animals/ not humans/) or (equine or cattle or bovine or canine or mice or mouse or rat or rats or guinea-pig* or dog).ti.

Search 5
Search 3 and not Search 4

Source: Vernooij et al. (2021).

Usually, advanced search strategies require a deeper knowledge of databases and Boolean operators. If the researcher does not have this knowledge, they may require the assistance of a reference health librarian at their institution or at the specialized health library closest to their workplace. The reference librarian is a professional who provides this service through previous scheduling, when the researcher has already defined exactly what information they are looking for. In several situations, such as in systematic reviews, the contributions and support of the reference librarian can be quite valuable, justifying their participation as the co-author of the study or publication.

Sometimes, searches through Boolean operators can be complex and require more time than the professional or student has. For these situations, simple and fast clinical tools specially designed for the daily routine of healthcare are available, such as UptoDate, ClinicalKey, Dynamed, and Essential Evidence Plus. These tools usually perform searches through free or natural language. In this search modality, the researcher or health professional writes a term without previous standardization and the tool provides possible results of interest.

3.4 Defining where to search for the information

Throughout the decades, the classification of information sources has been modified due to the use of new technologies and to changes in the process of production, commercialization, and dissemination of information.

Some authors classify information sources as conventional literature and gray literature (Botelho & Oliveira, 2015). Conventional literature is integrated into the publishing industry, is disseminated more widely and is accessible to everyone, encompassing articles in specialized journals, books produced by major publishers, and dictionaries. Gray literature, on the other hand, has a limited distribution that is usually difficult to access, encompassing conference proceedings, technical reports, ongoing research projects, theses, dissertations, monographs, and even commercial catalogs.

Furthermore, some authors classify information sources as restricted access sources and open access sources (Fachin, & Araujo, 2018). Restricted access sources demand payment of a fee or a subscription. Open access sources, on the other hand, are freely available, that is, the outcomes of scientific research that they contain can be accessed free of charge. In addition, there are different open access types, like the green, in which the author can make the published article available in an institutional repository of open access, or the gold, in which the author pays a publication fee and their article can be accessed by anyone, whether or not it is also made available in an institutional repository.

Some authors classify information sources as primary, secondary, and tertiary (Cunha, 2001). Primary sources are produced by the author of the research, like manuscripts in annals, scientific articles in journals, dissertations, monographs, theses, technical standards, patents, ongoing research projects, and technical reports. Secondary sources present information that has already been submitted to some type of analysis and organization, such as bibliographic databases, bibliographies, dictionaries, encyclopedias, indexes, and books. Tertiary sources provide the synthesis of the information contained in the primary and/or secondary sources, including bibliographies of bibliographies, directories, literature guides, library catalogs, information centers, and bookstores.

More recently, Gusenbauer and Haddaway (2020) classify information resources between those that are suitable for carrying out a systematic review and those that are not, because they do not have adequate advanced search tools, such as Google Scholar.

3.5 Sources used in the health field for clinical and/or academic purposes

In different countries, there are many public and private initiatives, with open or restricted access, with conventional or gray literature, to provide high-quality scientific and clinical information. In addition to national initiatives, there are international initiatives financed by different institutions, organizations and by the information industry, whose objective is to systematize and disseminate scientific information to the different audiences that need health information: researchers, students, health professionals, managers, patients, and the general population. Some of these initiatives are presented below. Taken as a whole, they reveal the diversity of databases and information tools currently available to the user and aim to meet different health information needs.

Some information sources best suited for academic purposes are:

- MEDLINE is a publicly accessible database compiled by the National Library of Medicine of the United States of America (US National Library of Medicine - NLM). It contains bibliographic references for articles from scientific journals, books on biomedicine and also from the areas of nursing, veterinary medicine, pharmacology and dentistry, among others. It was launched in 1964 and its data are updated weekly.
- PUBMED is a portal for the United States National Library of Medicine that includes references from the Medline database and from other biomedical and biological sciences journals.

- BVS Virtual Health Library - The VHL Regional Portal integrates several health information sources and promotes broad access to scientific and technical information in the field of health in Latin America and the Caribbean, including the databases: LILACS, MEDLINE, ADOLEC, BBO, BDENF, HISA, LEYES, MEDCARIB, REPIDISCA, PAHO, WHOLIS, and DISASTERS.
- Scientific Electronic Library Online (SciELO) is a digital library that provides free access to several collections of scientific journals and books in different areas of knowledge, including the health area (Garcia & Boing, 2021). It aims to develop a technology for the preparation, storage, evaluation, and dissemination of scientific production in electronic format. New journal titles are being added to its collection. The following countries currently participate in the SciELO network: South Africa, Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Spain, Mexico, Peru, Portugal, Uruguay, and Venezuela.
- LILACS is the most important and comprehensive index of scientific and technical literature in Latin America and the Caribbean. Often accessed via VHL.
- EMBASE is a database aimed at biomedical research and EBM. It also has information on disease treatment, in addition to relevant information on the development of new drugs and the discovery of new applications for existing drugs. References are indexed with Thesaurus Emtree, which also includes MeSH nomenclatures.
- SCOPUS is a multidisciplinary database with daily updates. Its content includes abstracts, references, and indexes of scientific, technical, and medical literature (STM), as well as articles, conference proceedings, books (e-books), patents, and others. It includes quotes and links to the full text. It brings together approximately 23,000 peer-reviewed journals, many with open access to the full text and articles in press (i.e., which have been accepted for publication) from more than 5,000 international publishers. Its content is indexed using the controlled vocabularies for the definition of keywords and/or descriptors. It covers 100% of the content of the literature indexed on Medline.
- CINAHL is a database that indexes academic literature directed to the area of nursing and other health professions, containing titles published since 1937. It provides the full text of articles from journals, books, book chapters, nursing dissertations, conference proceedings, and audiovisual materials.
- PsycINFO is an interdisciplinary database of the American Psychological Association that provides access to psychology, behavioral and social sciences contents from the PsycArticles, PsycBOOKS, PsychoTESTS, and PsycEXTRA collections, aiming to inform about academic research in the area throughout the world.
- WEB OF SCIENCE is a multidisciplinary database that indexes only the most cited journals in their respective areas. It is also a citation index, informing, for each article, the documents cited by it and the documents that cited it. The collections indexed on the Web of Science are Science Citation Index, Social Sciences Citation Index, Arts & Humanities Citation Index, Conference Proceedings Citation Index (Social Science & Humanities), Emerging Sources Citation Index, Derwent Innovations Index, Russian Science Citation Index, and Scielo Citation Index.
- ProQuest Central is multidisciplinary and provides complete databases of the main thematic areas, including health and medicine. It provides the full text of journal articles, books, book chapters, theses and dissertations, conference proceedings, audiovisual materials, and other sources.

Some databases best suited for clinical purposes are:

- Physiotherapy Evidence Database (PEDro) is a database with detailed references, abstracts, and links to full texts (when available) that indexes more than 25 thousand randomized clinical trials, systematic reviews, and guidelines for clinical practices in Physiotherapy.

- OTseeker is a database that contains summaries of systematic reviews, randomized controlled trials, and other research resources for Occupational Therapy interventions.
- Cochrane Library is a collection of databases in Evidence-Based Health with systematic reviews and research protocols, a source of information for clinical research and decision-making in clinical practice.
- ClinicalKey is a clinical tool that provides updated information for all medical and surgical specialties, including e-books, journals, drug descriptions, images, and videos of medical procedures available for download.
- UpToDate is a clinical tool that contains evidence directed to the medical professional to answer clinical questions in daily practice, assisting in decision-making in clinical practice.
- Essential Evidence Plus is a clinical tool that contains evidence directed to primary care, including calculators, systematic reviews, and levels of evidence.
- Dynamed is a clinical tool that focuses on the decision-making of health professionals and contains evidence directed to different levels of care, including calculators, systematic reviews, and levels of evidence.
- IBM Micromedex is a system that supports the clinical decisions of healthcare professionals by providing evidence-based information about medications, drug interactions, and intravenous compatibility. It also provides information on diseases, nomenclatures, and reproductive risk. It represents an important source of information on toxicology, chemical accidents, and medicines used in pediatrics and neonatology.
- Medline Plus is an information service produced by NLM that presents high-quality relevant health and wellness information that is reliable, easy to understand, and free of advertising, in English and Spanish, anywhere, anytime, on any device, for free. It is targeted at the lay population.

Making a classification of information resources for clinical and academic purposes is difficult, because often the clinical question or the scientific question involves an informational search that requires access to several databases. Therefore, the above classification should not be assumed as an absolute truth.

4. Conclusion

At the present moment, we are witnessing great advances resulting from global development, with distances becoming smaller, borders becoming increasingly permeable and knowledge production growing exponentially in all areas of human activity. This has created the need to make information available and accessible to an increasing number of people. In the area of health, information is the basis for decision-making at all levels, from individual care to formulation of public policies. Knowing how and where to properly seek the necessary information is an important step in the process of obtaining high-quality evidence.

To achieve this, different health professionals must be familiarized with the information search process, from the formulation of the research question to the choice of the database, applying it to their daily routine. This can guarantee the best results within the academic, clinical, and management environments.

This article presented some of the main stages of information search in the health field. However, as we reiterated throughout the text, these stages demand specific intellectual decisions for each situation or research. Therefore, just following information search manuals may not be enough. It is necessary to bring to the level of consciousness what decisions are being made during the search and the reasons that underlie them.

This study employed a descriptive qualitative research design. Future studies, using new qualitative, quantitative or mixed methods, will be able to map the direct perceptions of students and health professionals about the main barriers and difficulties for information seeking in academic and clinical contexts today.

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