

THE PICO STRATEGY FOR THE RESEARCH QUESTION CONSTRUCTION AND EVIDENCE SEARCH

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Evidence based practice is the use of the best scientific evidence to support the clinical decision making. The identification of the best evidence requires the construction of an appropriate research question and review of the literature. This article describes the use of the PICO strategy for the construction of the research question and bibliographical search.

DESCRIPTORS: nursing; evidence-based medicine; nursing research; decision making; review literature; bibliographic databases

ESTRATEGIA PICO PARA LA CONSTRUCCIÓN DE LA PREGUNTA DE INVESTIGACIÓN Y LA BÚSQUEDA DE EVIDENCIAS

La práctica basada en evidencias permite la elección de la mejor evidencia científica para subsidiar la toma de decisión clínica. Para lo cual, se requiere de una adecuada construcción de la pregunta de investigación y de la revisión de la literatura. Este artículo describe el uso de la estrategia PICO para la construcción de la pregunta de investigación y la búsqueda bibliográfica.

DESCRIPTORES: enfermería; medicina basada en evidencia; investigación en enfermería; toma de decisiones; literatura de revisión; bases de datos bibliográficas

A ESTRATÉGIA PICO PARA A CONSTRUÇÃO DA PERGUNTA DE PESQUISA E BUSCA DE EVIDÊNCIAS

Prática baseada em evidências é a utilização da melhor evidência científica para subsidiar a tomada de decisão clínica. Identificar a melhor evidência requer adequada construção da pergunta de pesquisa e de revisão da literatura e este artigo descreve o uso da estratégia PICO para a construção da pergunta de pesquisa e busca bibliográfica.

DESCRIPTORES: enfermagem; medicina baseada em evidências; pesquisa em enfermagem; tomada de decisões; literatura de revisão; bases de dados bibliográficas

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INTRODUCTION

The first randomized clinical trial (RCT) was published in the British Medical Journal in 1948⁽¹⁾.

In the course of the twentieth century, health research techniques have been refined and clinical trials have improved. Today, there are several clinical trials available in the databases.

RCT studies have showed conflicting results in situations with similar research objectives and objects and generate doubts regarding effectiveness, fundamentation, indications and results of several health practices. These doubts motivated the construction of a new paradigm, called Evidence Based Medicine (EBM). As the EBM precepts were incorporated into other disciplines, it started to be called Evidence-Based Practice (EBP)⁽²⁾. The EBP previews methodologies and processes in order to identify evidence of whether a certain treatment or diagnosis is effective, strategies to evaluate the quality of studies and mechanisms to implement it in care. This article focuses on the initial stage of EBP, the identification of evidence, which requires the adequate construction of the research question and bibliographic search.

The EBP movement simultaneously occurred at McMaster University (Ontario, Canada) and at the University of York (United Kingdom)⁽³⁾. Evidence is what is clear, the confirmation of a truth that elicits no doubt. Scientific evidence represents a proof that certain knowledge is true or false. In order to have scientific evidence, a previous research is necessary, conducted according to scientific precepts⁽⁴⁾.

Archie Cochrane (United Kingdom) exerted a profound influence on the assessment of medical interventions, establishing the importance of RCT in the evaluation of treatment effectiveness⁽⁵⁾. The classical definition of EBM is credited to David Sackett (Canada): conscious, explicit and sensate use of the best evidence available in decision making about patient care, added to the physician's experience and the patient's preferences⁽⁶⁾. EBP aims to improve care through the identification and promotion of workable practices and, at the same time, through the elimination of inefficient and prejudicial ones⁽⁷⁾, minimizing the gap between the generation of evidence and its application in patient care.

Table 1 presents the stages of EBP⁽⁷⁻¹¹⁾.

Table1 – Stages of Evidence Based Practice

1 - Identification of a clinical problem;	
2 - Formulation of a relevant and specific clinical question;	Systematic Review
3 - Search of scientific evidence;	
4 - Evaluation of available evidence;	
5 - Evaluation of the clinical applicability of evidence;	
6 - Implementation of evidence in the patient care;	
7 - Evaluation of the changing results	

Stages 1, 2, 3 and 4 represent the development of studies called systematic review, a fundamental research model inside EBP. Systematic review represents the use of a standardized method to synthesize data from multiple primary studies⁽⁸⁾.

Traditional literature reviews (nowadays called narrative reviews) have been criticized for a long time because the bibliographic search and study selection method is not standardized and made explicit. The results obtained through such reviews are biased, do not exhaust all the literature available about the theme and are usually inconclusive.

The search for evidence requires an adequate definition of the research question and the creation of a logical structure for the bibliographic search of evidence in literature, which facilitates and maximizes the research scope⁽¹²⁻¹³⁾.

CONSTRUCTION OF THE RESEARCH QUESTION

EBP proposes that clinical problems that emerge from care practice, teaching or research be decomposed and organized using the PICO strategy^(7,11-12). PICO represents an acronym for Patient, Intervention, Comparison and Outcome. These four components are the essential elements of the research question in EBP and of the construction of the question for the bibliographic search of evidence^(7,9-10,13-15). The PICO strategy can be used to construct several kinds of research questions, originated from clinical practice, human and material resource management, the search of symptom assessment instruments, among others. The adequate (well constructed) research question allows for the correct definition of which information (evidence) is needed to solve the clinical research question^(7,11-12), maximizes the recovery of evidence in the database, focuses on the research scope and avoids unnecessary searching.

Table 2 presents the four components of the PICO strategy and Table 3 presents an example of its use to construct a research question^(13,15).

Table 2 – Description of the PICO strategy

Acronym	Definition	Description
P	Patient or problem	Can be only one patient, a group of patients with a particular condition or a health problem
I	Intervention	Represents the intervention of interest, which can be therapeutic (e.g. several kinds of dressings), preventive (e.g. vaccination), diagnostic (e.g. blood pressure measure), prognostic, administrative or related to economic issues
C	Control or comparison	Defined as a standard intervention, the most used intervention or no intervention
O	Outcome	Expected result

Data from the systematic review by Bergin and Wraight⁽¹⁶⁾ are used to exemplify the construction of the research question using the PICO strategy. The authors of this systematic review demonstrated that the incidence of foot ulcers in diabetics is high and that this is a predictor of amputation in these patients. When analyzing the dressings available, they detected that modern dressings possess silver in their composition (anti-microbial) but are not widely used. The research idea emerged in this scenario, questioning why dressing/topical agents with silver in the treatment of foot ulcers in diabetic patients were not being used. The authors used PICO to describe all the components related to the identified problem and to structure the research question, which was: What is the effect of dressing/topical agents with silver in their composition on the treatment of diabetic foot ulcers?

Table 3 – Description of the components of PICO in the systematic review by Bergin e Wraight⁽¹⁶⁾

P	People with type I or II diabetes, with neuropathic kind, ischemic or neuroischemic foot ulcers. No restriction regarding the presence of infection at baseline. Studies that included people without diabetes at baseline were included and studies that used other kinds of ulcers (e.g. venous or vasculitis) were used, provided that they were specified in the result analyses (diabetes x no diabetes, diabetic ulcer x no diabetic ulcer)
I	Any kind of topical agent or dressing that contained silver in its composition, used alone or in combination for the treatment of foot ulcers in diabetics. There was no restriction regarding studies that simultaneously used treatments with antibiotics, equipment to alleviate the pressure or secondary dressings.
C	The comparison could be with no dressing, placebo dressing (identical, but with no silver) and dressings/topical agents without silver in their composition.
O	Proportion of completely healed ulcers, time spent until complete recovery or changing in the total area and signs/symptoms of clinical infection.

Once the research question is formulated, the following stage is the beginning of the bibliographic search for evidence, which allows for the recovery of evidence in the databases, and can be schematized in the following stages^(7-8,12-15).

Selection of the search terms: identification of terms (descriptors) related to each component of the PICO strategy. The descriptors are classified as:

Controlled: known as “medical subject headings” or “subject descriptors”, which are used for the indexation of articles in the databases. The most known vocabularies of controlled descriptors are: MeSH (MEDLINE/PubMed), DeCS (BIREME) and Emtree (EMBASE). An example of controlled descriptors for the P component of the PICO strategy: (foot ulcer), (diabetic foot).

Not controlled: represent the textual words and their synonyms, orthographic variations, acronyms and correlates. An example of not controlled descriptors for the P component of the PICO strategy: (*diabetic ulcer*), (*diabetic wound*).

Use of Boolean operators: represented by the connector terms AND, OR and NOT. These terms allow for combinations of descriptors that will be used in the search, with AND for a restrictive combination, OR for an additive combination and NOT for an excluding combination. One example of the use of Boolean operators for a combination of descriptors of the P component of the PICO strategy:

P = (foot ulcer) OR (diabetic foot) OR (diabetic ulcer) OR (diabetic wound) NOT (venous wound).

Combination of components of the PICO strategy for the finalization of the search strategy: after the selection of the search terms and use of Boolean operators for each of the four components of the PICO strategy, these must be inter-related in the following final strategy:

(P) AND (I) AND (C) AND (O). Such final strategy must be inserted in the search box existent in the databases, so that evidence is located by means of a bibliographic search.

The use of the PICO strategy reveals to be that efficient in the effective recovery of evidence that the main electronic database, MEDLINE/PubMed, already offers an interface, in a beta (test) version, for the direct insertion of the four components of the PICO strategy. This interface can be accessed on <http://askmedline.nlm.nih.gov/ask/pico.php>.

CONCLUSION

Nowadays, there exists a large quantity of many times contradictory scientific information. It is also very easy to access studies developed all

over the world. Having access to the knowledge produced about a certain subject is essential for the development of good research and adequate clinical action. The internet and the portals of open-access journals allow for accessibility to knowledge, but this is not enough, because it is necessary to know what to select from this immense source of information

and how to do it. The PICO strategy helps in these definitions, because it orients the construction of the research question and of the bibliographic search, and permits clinical and research professional, in case of doubt or questioning, to rapidly and accurately locate the best scientific information available.

REFERENCES

1. McDonald S, Westby M, Clarke M, Lefebvre C. Number and size of randomized trials reported in general health care journals from 1948 to 1997. *Int J Epidemiol.* 2002 February; 31(1):125-7.
2. Young S. Evidence-based management: a literature review. *J Nurs Manage* 2002 10(3):145-51.
3. Magarey JM. Elements of a systematic review. *Int J Nurs Pract* 2001 December; 7(6):376-82.
4. Cruz DALM, Pimenta CAM. Prática baseada em evidências, aplicada ao raciocínio diagnóstico. *Rev Latino-am Enfermagem* 2005 maio-junho; 13(3):415-22.
5. Claridge JA, Fabian TC. History and development of evidence-based medicine. *World J Surg* 2005 May; 29(5):547-53.
6. Sackett DL, Straus S, Richardson S, Rosenberg W, Haynes RB. Evidence-based medicine: how to practice and teach EBM. 2a ed. ed. Londres: Churchill Livingstone; 2000.
7. Akobeng AK. Principles of evidence based medicine. *Arch Dis Child* 2005 August; 90(8):837-40.
8. Stevens KR. Systematic reviews: the heart of evidence-based practice. *AACN Clin Issues* 2001 November; 12(4):529-38.
9. Antes G, Galandi D, Bouillon B. What is evidence-based medicine? *Langenbecks Arch Surg* 1999 October; 384(5):409-16.
10. Sackett DL. Evidence-based medicine. *Semin Perinatol* 1997 February; 21(1):3-5.
11. Flemming K. Critical appraisal. 2. Searchable questions. *NT Learn Curve* 1999 April 7; 3(2):6-7.
12. Bernardo WM, Nobre MR, Jatene FB. Evidence-based clinical practice. Part II—Searching evidence databases. *Rev Assoc Med Bras* 2004 January-March; 50(1):104-8.
13. Nobre MR, Bernardo WM, Jatene FB. Evidence based clinical practice. Part 1—well structured clinical questions. *Rev Assoc Med Bras* 2003 October-December; 49(4):445-9.
14. Wyatt J, Guly H. Identifying the research question and planning the project. *Emerg Med J* 2002 July; 19(4):318-21.
15. Stone PW. Popping the (PICO) question in research and evidence-based practice. *Appl Nurs Res* 2002 August; 15(3):197-8.
16. Bergin SM, Wraight P. Silver based wound dressings and topical agents for treating diabetic foot ulcers. *Cochrane Database Syst Rev* 2006(1):CD005082.