

PICO(T) and PCD formats of clinically relevant questions in the conceptualization of special education research

(overview essay)

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Abstract: *The paper defines basic clinically relevant questions in the standardized PICO(T) and PCD formats, their application, stages and components. The objective is to describe the importance of the components of a clinical question applied in the preparatory and conceptual stage of (not only) special education research. Evidence Based approaches represent a well-defined methodological approach to the practice (assessment, intervention, diagnosis, evaluation), as well as a basic procedure for the preparation of research activities (literary research, definition of objectives, searching for the best relevant studies – evidence). The content of the paper might be used for high-quality preparation of a theoretical framework of qualitative research approaches, theoretical background of quantitative research approaches, as well as a framework for the selection of adequate relevant publication outputs. The paper contains the methods of analysis/synthesis and description of the findings that can be applied in special education reality. Therefore, the paper defines and describes the two most common formats of clinically relevant questions – PICO(T) a PCD. The paper can also be used as a methodological procedure in the areas mentioned above, as well as an educational approach applicable in teaching future professionals at university (the Evidence Based process starts by formulating clinically relevant questions).*

Keywords: *PICO(T), PCD, clinically relevant questions, Evidence Based Practice, design, special education*

1 Introduction

The preparatory stage of a research study, the choice of its design, as well as the conceptualization of its approach are very significant for the subsequent research activities. One of the possibilities supporting the aspect mentioned above is the use of *clinically relevant questions* (also referred to as *clinical questions*). These questions can be used to make precise and unify the scientific approach with an emphasis on its correctness and subsequently the accuracy of application. An emphasis is on the topicality of scientific findings, their relevant selection, and also the support of the knowledge of existing findings in a specific area of research. Regarding the fact that the approach to the definition of clinically relevant questions uses key words (and their combinations), this is a highly correct and comprehensive approach that particularly supports the necessary elements of conceptualization and operationalization of the concepts, variables, or the correctness of the use of theoretical concepts for empirical research application. A clearly defined procedure of methodological work is achieved by *Evidence-Based Decision Making*.

The described approach of practice based on evidence (*Evidence Based* or *Evidence-based*) approach is used primarily in the areas of *Evidence Based Practice* (EBP), together with *Evidence Based Medicine* (EBM), which has been used since 1992. Later the following approaches were defined: *Evidence Based Nursing* (EBN), *Evidence Based Dentistry* (EBD), *Evidence Based Health Care* (EBHC), *Evidence Based Public Health* (EBPH) and other approaches based on evidence. Evidence-based practice combines the best evidence obtained through a research activity and clinical experience, and also “patient values”, which facilitate clinical deliberation or clinical decision-making.

The founder of EBM is believed to be A. Cochrane (1909–1988). Currently, EBM research centres are located in the USA, Canada, Australia, New Zealand and Great Britain (Santos, Pimenta, Nobre, 2007). EBP “communicates” the results of research and integrates *the best possible evidence* for individualized care (intervention) for the patient (client, recipient of support, care, etc.) (Jarošová, Zeleníková, 2014). The best evidence reflects case studies, opinions of experts and basic scientific principles. Evidence-Based approaches are conscious, attentive, clear and deliberate applications of current best evidence (facts) in the process of decision-making on the optimum care/support/interventions regarding a specific client (care recipient).

The concept is widely applicable, and although the text above mentions the term “patient” (due to initial EBP and EBM approaches), today the concept can be applied to a wide range of target groups of recipients of care, support, interventions (sick, client, pupil, etc.) All EBP approaches tend to achieve a clearly defined objective – to improve the care (effectiveness of interventions, quality of support, etc.) provided through the best research results in the field. Due to the dynamic development of EBP

approaches, today there are more approaches such as the *Evidence Based Education*, or *Evidence Based Special Education* (sometimes, special education disciplines are ranked among the main category of “Education”) and others. At the same time this is a great tool applicable in education (university, continuing professional), and a basis for a case report seminar or supervision (Yan et al., 2010).

2 Stages of the Evidence-Based concept

As already mentioned, the Evidence-Based approach is a systematic, methodological procedure designed to achieve a clearly predefined objective. Therefore, it is imperative to respect the five (seven since 2010) stages specified below (Líčeník, 2009; Yan et al., 2010):

- 1) Assume and reflect on a *critical attitude to practice, procedures, approaches* etc. (this means to teach professionals/students to be aware of and accept the uncertainty and ambiguities in the provision of care/intervention/diagnostics, etc. All persons involved should be able to assume a critical attitude to their own practice, as well as the practice of other professionals participating in the delivery of care).
- 2) Choose a *clinical question* – problem (i.e. “*clinically relevant question*”). This stage uses the standardized PICO(T) format and its alternatives, or other formats.
- 3) *Search for the best relevant evidence* (it is essential to know appropriate databases and search strategies, this stage uses (well) formulated clinical questions according to the standardized PICO(T) format (or another format). Individual elements (components) of a clinical question can be the keywords for initiating the search procedure. Keywords generated from the clinical questions only direct the search procedure; for a comprehensive search they must be appropriately combined with a controlled dictionary (the best known example in the health care area is “*Medical Headings – MeSH terms*”) (Santos, Pimenta, Nobre, 2007).
- 4) *Critically appraise the evidence*, information (has to be up-to-date) – important attributes of this stage are *validity, clinical relevance and applicability*. Prior to application into practice, the evidence that was searched and identified (fulltexts of published studies and research) must be critically appraised on the basis of predefined criteria – in this way the evidence is subjected to fundamental questions, particularly: “Is the evidence valid?”; “Is the evidence important enough to change something?”; “Is the evidence applicable to ‘my’ client or situation/conditions?”; “What type of text is it (meta-analysis, clinical recommendation, controlled trial, case report)?” and others.
- 5) *Apply the evidence (results) of research to practice* + evaluate changes.

Another alternative is the 5 stages of clinical decision making – the “5A model”. These stages include the following (according to Žiaková, Gurková, 2010; Yan et al., 2010):

- 1) Formulating an answerable question (*Asking*).
- 2) Getting the best information (*Accessing*).
- 3) Critical evaluating of the cogency and relevance of the information (*Appraising*).
- 4) Applying the information in practice (*Applying*).
- 5) Assessing the practical implication of application (*Assessing*).

To evaluate the quality of searched evidence (study), the following aspects are significant (Santos, Pimenta, Nobre, 2007):

- 1) *For what reason (for what purpose) was the study carried out, and what hypothesis did the team of authors test?* (The initial parts of the research paper should briefly summarize the context – background of the research. This should be followed by a brief overview of published literature on the issue. The hypothesis should be clearly defined).
- 2) *What type of study was used?* It is necessary to find out what type of study the publication describes, whether primary or secondary. (A *primary study* is the author’s own research. In contrast, secondary study summarizes and concludes on the basis of on the results of published primary studies. A *secondary study* is built on the highest level of evidence).

Primary studies include *experiment – randomized controlled trial (RCT)*, – *cohort study – case-control study – cross-sectional study – case report – series of cases*. Secondary studies include:

- 1) *Non-systematic reviews* (summarize two or more primary studies), *systematic reviews* (summary of all available original studies, published and unpublished), *meta-analyses* (combine numerical/statistical data from multiple studies).
- 2) *CPG – clinical practice guidelines*.
- 3) *Decision-making analyses*.
- 4) *Economic analyses*.

The most famous (and most used) databases for searching for findings (evidence) include Cochrane Library, EBSCO host, ProQuest, Ovid Medline, CINAHL (Cumulative Index To Nursing and Allied Health Literature), MEDLINE, PubMed, PsycInfo, BioMedNet, Medscape, Gale PowerSearch, Journals@Ovid, Health and Wellness Resource Center, SAGE Full – Text Collections, OVID Proquest Best Evidence, Czech database BiblioMedica and many others. The resources that can be used in searching for “evidence” include books, journals, and guidelines, but also high-quality studies, case reports and expert opinions (Gu, Dyserinck, Loep, Frijns, 2004; Santos,

Pimenta, Nobre, 2007). The top database containing world quality research is the Web of Knowledge (formerly “Web of Science”).

3 Designing a clinical question using the standardized PICO(T) format

To formulate a clinical question means to define hypotheses, i.e. associations that are searched for, explored and described. Clinical questions are usually of the following two types (according to Hoogendam et al., 2012):

- 1) *Basic questions* (“asking”) – are of a general nature: “who, what, when, where, how, why?”
- 2) *Specific questions* (“foreground questions”), which are more comprehensive, and usually compare *two variables*.

To design clinical questions, most frequently the standardized *PICO(T)* format is used. The name combines the initial letters of the main components of a clinical question: P – I – C – O – (T). The “T” component in brackets (“Time”) is an optional constituent/alternative, therefore, another version of the standardised format is “*PICO*”. In designing a clinical question according to the *PICO(T)* standard, numerous didactic aids and guides can be used (Melnyk, Fineout-Overholt, 2005) (e.g. *PICO Worksheet and Search Strategy* or *Template for the formulation of a PICO(T) question* and many others). Individual components of the *PICO(T)* format are listed below – see Figure 1.

Designing a clinical question using the PICO(T) format		
P	<i>Patient – Population – Problem</i>	definition of a client or a group of clients affected by the problem
I	<i>Intervention – Issue of Interest</i>	intervention/action with a selected client, subject of interest
C	<i>Comparison Intervention/C. Group</i>	comparison of interventions or groups
O	<i>Outcome</i>	expected result (to be evaluated)
(T)	<i>Time</i>	time framework, for which the question is defined (“in what time?”)

Figure 1: Designing a clinical question using the PICO(T) format

On the basis of the above, a clinical question designed according to the PICO format might be for example as follows: *“In the case of adult clients in residential social institutions – retirement homes (P), is the application of the IADL scale for the assessment of daily activities (I) a better prevention of the dependence on another person (O) than the overall evaluation of the condition during a planned assessment by an ergotherapist (C) in an adult client?”*. The next two examples (according to Žiaková, Zeleníková, 2010) using the PICO standard are described below – Figure 2.

P	I	C	O
Clients with dementia (<i>specify</i>)	Short range of cognitive functions (SPMSQ)	Test of mental functions (MMSE)	Chronic confusion Memory disorder
Clients with Parkinson's syndrome (<i>specify</i>)	(Barthel) ADL Index	Lawton-Brody IADL, HAW	Self-sufficiency in activities of daily living

Figure 2: Application of the PICO standard – examples

In this way, questions can be formulated using the format also for other purposes (classification of findings, working with significance of evidence, level hierarchy, etc.), not only for the purposes of teaching (using e.g. case studies), such as:

- 1) *“Can the Vojta method of reflex locomotion in children with central cerebral palsy improve the subjective component of the quality of life?”*
- 2) *“Do centrally acting muscle relaxants in adult clients with the medical diagnosis of cerebral palsy (G84) influence chronic spasticity of the lower extremities?”*
- 3) *“Does the application of antiedema preparations in children with non-communicating hydrocephalus reduce the risk of sudden death?”*
- 4) *“Can the presence of a family member of a client with dementia in the case of Alzheimer's disease reduce the risk of admission to a specialized facility or a hospital?”*

Over time, as a result of the development and the dynamic nature of Evidence-Based approaches, other applicable standardized clinical questions (based on the PICO format) have been defined. They include for example (Jarošová, Zeleníková, 2014; Shardt et al., 2007; Yan et al., 2010):

- 1) “Mandatory” basic format: **PICO**.
- 2) **PICO(T)** format: T = “time”.
- 3) **PICO(TS)** format: time + S = “settings”.

- 4) **PICOTT** format: T1 = “*Type of question (being asked)*” (therapy/diagnosis/harm/prognosis/prevention) + T2 = (*the best*) “*Type of study/study design (for that particular question)*” (systematic review/RCT/cohort study/case control).
- 5) **PICO(M)** format: M = “*methodology*” (methods, approaches).
- 6) **PECO** format: E = “*exposure*”.
- 7) **PICo** format: Co = “*context*” (defined for qualitative studies).
- 8) Other formats.

Examples of formulated clinical questions (according to Gurková, Žiaková, 2009) are as follows:

- 1) *Which diagnostic procedure (test, scale) ... can be used for more precise diagnosing of...?*
- 2) *Are ... more precise for diagnosing ... than...?*
- 3) *How to interpret the results of a test of...?*
- 4) *Which diagnostic features are significant for diagnosing ... in clients with...?*
- 5) *What is the clients' experience with ... disease ... in the time of...?*
- 6) *Does ... prevent a future risk of ... in...?*

The questions usually reflect one of these areas (Jarošová, Zeleníková, 2014; Yan et al., 2010): a) Therapy/intervention; b) Etiology, “damage”; c) Diagnostics, assessment, diagnosis; d) Diagnostic tests, tools, etc.; e) Forecasting, predicting; f) Meaning, importance; g) Prevention; h) Others.

The current practice of publishing research results also includes (based on Evidence Based approaches) definitions of the use (non-use) of searches (evidence, studies) – *Evidence Based Searching* (Guyatt, 2002; Schardt et al., 2007; Straus, 2005) such as:

- 1) *Unguided, i.e. non-PICO searches.*
- 2) *PICO-guided searches.*

(Not only) for the needs of the application of Evidence Based approaches in teaching (and educational practice), there are tools that evaluate the accuracy of the definition and application of various components of a clinical question. Such tool is for example *The Fresno Test of Competence in EBM* (where “0 = no definition”; “1 = limited definition”; “2 = partial definition”; “3 = complete definition”) (Lai, 2009).

4 PCD format of a clinical question

The PCD format of a clinical question is an alternative way of formulating using the above mentioned approach and procedures. It consists of the initials of the main components – “P – C – D” (Levin, Lunney, 2004):

- 1) P = “*Population*” (group of clients, patients, recipients of support/care, etc.)
- 2) C = “*Cue Cluster*” (significant set of data about the client/patient).
- 3) D = “*Differential Diagnosis*”.

Examples of the application of the PCD format as a clinical question for finding relevant evidence are described in the table below (according to Žiaková, Gurková, 2010) – see Figure 3.

P	C	D
Clients with an oncological diagnosis (<i>specify</i>)	Lack of initiative, absence of confidence in own abilities, lack of activity	Hopelessness Helplessness Inefficient burden management
Clients with dementia in the case of Alzheimer’s disease (<i>specify</i>)	Outbursts of anger, dissatisfaction with care, insomnia	Sleeping disorder Anxiety Fear

Figure 3: Application of the PCD format – examples

5 Barriers to the application of the EBP concept

The main barriers include the following (Hrstková, 2011; Greenhalgh, 2003; Mandysová, Hlaváčková, 2009):

- 1) Smaller selection of databases in the Czech language.
- 2) Impossible access to organizations (fee), language barrier.
- 3) High fee for database access.
- 4) Insufficient theses-based evidence.
- 5) Insufficient knowledge about EBP and its strategy.
- 6) Poor understanding and negative view of EBP.
- 7) Conservative approach to EBP.
- 8) High number of assigned patients/clients.
- 9) Administrative and organizational problems of the department.
- 10) Time lag between the publication of the results of the research and the application of these results into practice.

- 11) Lack of time to gather information, lack of information.
- 12) Complexity of the content of the findings, poor understanding of the research, negative view of the research.

6 Conclusion

Evidence-Based approaches are highly effective in the process of improving the quality of care (support, interventions) care for various patients, clients, etc., as well as a methodological process of searching for relevant findings – evidence of the highest level of relevance. Although there are numerous barriers to the application of evidence-based practice, in the area of conceptualization of the design of special education research this is a very effective, systematic and methodologically designed “tool”. I see its application primarily in searching for (literary research) relevant, specific and unique findings (evidence, studies, fulltexts), which can be further used. The findings can be sorted, classified, and/or eliminated in order to use the most valid outcomes to develop the background of research or publication activities. Currently, another format allowing wide applicability in everyday practice is the *PIO format of a clinical question* (the “control/comparison group” component is not applied), another frequent format is the *PECO format* (patient – exposure – control/comparison – outcome) (McKeon, McKeon, 2015), or other completely new formats *LIS Question*, *PESICO*, *ECLIPSE*, *SPICE* and others (Davies, 2011).

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