Developing Your Search Question using PICO/PIO/PEO

For Evidence Based Practice (EBP) searches, you will often be expected to break down your question into its key concepts using an EBP formula such as PICO, PIO or PEO.

- **PICO:** Population/Problem/Patient; Intervention/Issue; Comparison; Outcome
- **PIO:** Population/Problem/Patient; Intervention/Issue; Outcome
- **PEO:** Population/Problem/Patient, Exposure, Outcome

Example PICO/PIO Questions and Structures

Intervention/therapy:

In _____ (P), what is the effect of _____ (I) on _____ (O) compared with _____ (C)?

In _____ (P), what is the effect of _____ (I) on _____ (O)?

In _____ (P), how does _____ (I) compared to _____ (C) affect _____ (O)?

Example: In obese females (P), how does weight loss (I) compared to daily administration of ACE inhibitors (C) affect blood pressure (O)?

Etiology:

Are _____ (P) who have _____ (I) at (increased/decreased) risk for/of _____ (O) compared with _____ (P) with/without _____ (C)?

Are _____ (P) who have _____ (I) compared with those without _____ (C) at (increased/decreased) risk for/of_____ (O)?

Example: Are adopted children (P) who have parents with elevated BMI (I) compared with those parents with normal BMI (C) at increased risk for obesity (O)?

Diagnosis or diagnostic test:

Are (is) _____ (I) more accurate in diagnosing (O) _____ (P) compared with _____ (C)?

In _____ (P) are/is _____ (I) compared with _____ (C) more accurate in diagnosis (O)?

Example: In patients at high risk for gallbladder dysfunction (P) is a HIDA scan (I) compared with an ultrasound (C) more accurate in diagnosis (O)?

Prevention:

For _____ (P) does the use of _____ (I) reduce the future risk of _____ (O) compared with _____ (C)?

For _____ (P) does the use of _____ (I) compared with _____ (C) reduce the future risk of _____ (O)?

Example: For obese children (P) does the use of community recreation activities (I) compared to educational programs (C) on lifestyle changes reduce the risk of diabetes mellitus (O)?

Prognosis/Predictions:

Does _____ (I) influence _____ (O) in patients who have _____ (P)?

In _____ (P) how does _____ (I) compared with_____ (C) influence or predict _____ (O)?

Example: In adults with prostate cancer (P) how does surgery (I) compared with not undergoing surgery (C) influence lifespan and quality of life (O)?

Meaning:

How do _____ (P) diagnosed with _____ (I) perceive _____ (O)?

How do _____ (P) with _____ (I) perceive _____ (O)?

Example: How do elderly patients in orthopaedic rehabilitation (P) who have been separated from significant pets (I) perceive their motivation to progress (O)?

(Adapted from Melnyk and Fineout-Overholt, 2019)

EBSCO (2019) have also produced a handout with some example PICO questions which you can view here.

PICO – database search strategy example

In patients at high risk for **gallbladder dysfunction** (P) is a **HIDA scan** (I) compared with an **ultrasound** (C) more accurate in **diagnosis** (O)?

This PICO statement contains four key concepts (the P, the I, the C and the O).

The database search strategy could look like:
Search 1 (P): gallbladder dysfunction OR gallbladder disease OR gallbladder inflammation
Search 2 (I): HIDA scan OR Hepatobiliary Iminodiacetic Acid scan OR cholescintigraphy OR hepatobiliary scintigraphy
Search 3 (C) ultrasound OR sonogram OR sonograph
Search 4 (O): diagnosis OR assessment OR screening
Search 5: Search 1 AND Search 2 AND Search 3 AND Search 4

However, as you are comparing 2 different interventions, you should also consider doing separate searches for each intervention: i.e. one search just for the HIDA scan terms e.g. Search 1 AND Search 2 AND Search 4 – and one search just for the ultrasound terms e.g. Search 1 AND Search 3 AND Search 4.

PIO – database search strategy example

For **obese children** (P) do **educational programs** on **lifestyle changes** (I) reduce the risk of **diabetes mellitus** (O)?

This PIO statement contains three key concepts (the P, the I and the O) but in this case the P and the I both have two parts.

The database search strategy could look like:
Search 1 (P): obese OR overweight OR high BMI OR high Body Mass Index
Search 2 (P): children OR young people OR youth
Search 3 (I): education OR teaching
Search 4 (I): lifestyle OR healthy eating OR exercise OR healthy living
Search 5 (O): diabetes mellitus OR type 2 diabetes OR non-insulin dependent diabetes
Search 5: Search 1 AND Search 2 AND Search 3 AND Search 4 AND Search 5

PEO Questions – for qualitative research

P: Who are the affected population - patients, family, practitioners or community? What are their symptoms, condition, health status, age, gender, ethnicity? What is the setting e.g. acute care, community, mental health?

E: Is the population exposed to a condition or illness (e.g. dementia), to a risk factor (e.g. smoking), to screening, to rehabilitation or to a service?

O: What are the outcomes or themes? Consider the experiences, attitudes, feelings, changes in condition, mobility, response to treatment, quality of life or daily living.

(Adapted from Bettany-Saltikov, 2016)

PEO – database search strategy example

What are the **attitudes** (O) of **health professionals** (P) towards caring for **older patients** with **dementia** (E) in an **acute setting** (P)?

The PEO statement contains three key concepts (the P, the E and the O), but in this case the P and the E have two parts.

The database search strategy could look like:
Search 1 (P): Acute care OR acute setting OR hospital
Search 2 (P): Nurse OR professional OR practitioner OR staff OR personnel
Search 3 (E): older patient OR older person OR elderly OR geriatric
Search 4 (E): Dementia OR Alzheimer
Search 5 (O): Attitude OR opinion OR perception OR perspective OR belief
Search 6: Search 1 AND Search 2 AND Search 3 AND Search 4 AND Search 5

(Adapted from University of Suffolk, no date)

Top Tips!

1. "Asking a searchable, answerable question is a basic step in the EBP process" (Fineout-Overholt and Johnston, 2005, p.160). In order to identify a suitable question it would be beneficial to carry out a scoping search for your area of interest first (based on the clinical situation you have identified) to ensure that there is published research available on your topic.
2. If you struggle to identify additional keywords for your search terms you could:
    a. use a textbook to get an overview of your subject
    b. use a medical dictionary or encyclopaedia for a definition of your key concept
    c. check references you already have - what terms have they used to describe your topic?
    d. look online – The University of Suffolk have produced a helpful [health thesaurus](#) (Holmes, no date)
3. The intervention or exposure is usually the easiest to define. If you get too many results you could consider redoing this search string as a title or abstract search.

This will limit and focus the search results. Alternatively if you are not getting enough results, try searching just for the intervention or exposure.

4. You may not need to search for each part of the PICO, PIO or PEO formula. If you are not getting enough results, consider leaving one part out of your search. For example, outcomes can be difficult to define (e.g. improving patient care) and may make your results too specific.

5. If you are comparing an intervention to standard care or no intervention – you may need to do more than one search. One which includes the intervention and one which does not. Simply searching for terms like 'standard care' or 'no intervention' may not be effective on their own.

6. It does not matter if your database search does not follow the same order as your PICO, PIO or PEO statements.

7. Some terms may require more than one search string e.g. if your population is **dementia patients** in an **acute setting.** You will need to search for dementia and acute setting separately, before combing them together e.g.:
   Search 1: Acute care OR acute setting OR hospital
   Search 2: Dementia OR Alzheimer OR cognitive impairment OR memory loss
   Search 3: Search 1 AND Search 2

References:

Bettany-Saltikov, J. and McSherry, R. (2016) *How to do a systematic literature review in nursing: a step-by-step guide.* 2nd edn. London: Open University Press.

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Fineout-Overholt, E. and Johnston, L. (2005) 'Teaching EBP: asking searchable, answerable clinical questions', *Worldviews On Evidence-Based Nursing*, 2(3), pp. 157-160.

Holmes, K. (no date) *Thesaurus for Nursing & Health Sciences.* Available at: https://libguides.uos.ac.uk/ld.php?content_id=31641668 (Accessed: 15 November 2019).

Melnyk, B.M. and Fineout-Overholt, E. (2019) *Evidence-based practice in nursing & healthcare: a guide to best practice.* 4th edn. Philadelphia, PA: Wolters Kluwer.

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