Evidence based practice as a Process – lecture 4

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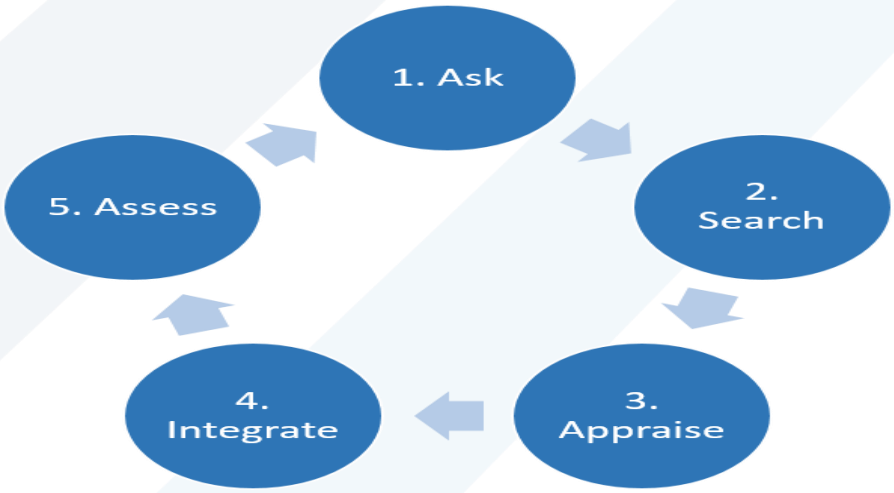
EBP as a Process

Evidence based practice incorporates best practice research as the reasoning for clinical decisions

- it is a way of keeping current with new developments
- it involves lifelong, self-directed learning
- facilitates knowledge translation

The EBP Process involves these five steps:



1. Asking a well formed clinical question that can be answered using best available research evidence.
2. Using the PICO acronym to determine appropriate keywords to conduct the search.
3. Appraise and synthesise the evidence to ensure reliability and validity.
4. Integrate the evidence along with your clinical expertise and the patients' values.
5. Assess the effectiveness of the intervention or decision.

1- Ask a Clinical Question

A good question will:

- Define your information need
- Identify key search concepts
- Enable you to decide appropriate resources to search

Background questions:

Address general queries about a disease, condition, test or treatment that can be answered sufficiently using medical textbooks or point-of-care tools. Use these resources to answer this type of question:UpToDate, Access Medicine ClinicalKey or ClinicalKey for Nursing

Foreground questions:

Address aspects of care, therapy options or possible outcomes in relation to a specific patient or situation and require a more in-depth literature search to find the answer. Foreground questions are best answered using the Finding the Evidence page of this guide.

Answering foreground questions involves developing well-formed, focused clinical questions. The **PICO framework** is commonly used to translate and structure patient dilemmas into focused questions. Using PICO helps to identify the important concepts for your search strategy and makes searching for evidence easier and more time effective.

Determining the type of clinical question will influence how you structure your PICO framework, the databases you use, and how you search them to find the most appropriate level of evidence. The most common types of clinical questions are:

- **Aetiology:** the relationship between an exposure or causal factor and a patient developing a condition
- **Diagnosis:** the validity and reliability of a diagnostic test or screening method
- **Therapy:** the most beneficial treatment or prevention for a condition (intervention could be drug therapy, surgery, physical therapy, etc.)
- **Prevention:** How to reduce the chance of disease through identification and modification of risk factors
- **Prognosis:** the likely disease progression for patients with or without treatment

PICO

Use the PICO acronym to break down your question.

PICO is an acronym used to breakdown a clinical question or problem into appropriate keywords that enables effective searching within a database. Each letter of the acronym represents a different component of the clinical question.

P	I	C	O
Population Patient Problem	Intervention or Exposure	Comparison	Outcome
Who are the patients? What is the problem?	What do we do to them? What are they exposed to?	What do we compare the intervention with?	What happens? What is the Outcome?

2- Find the Evidence

For most types of clinical questions, a well-done systematic review or meta-analysis of all available studies is the best level of evidence.

The following list outlines the best study methodologies to answer different clinical questions

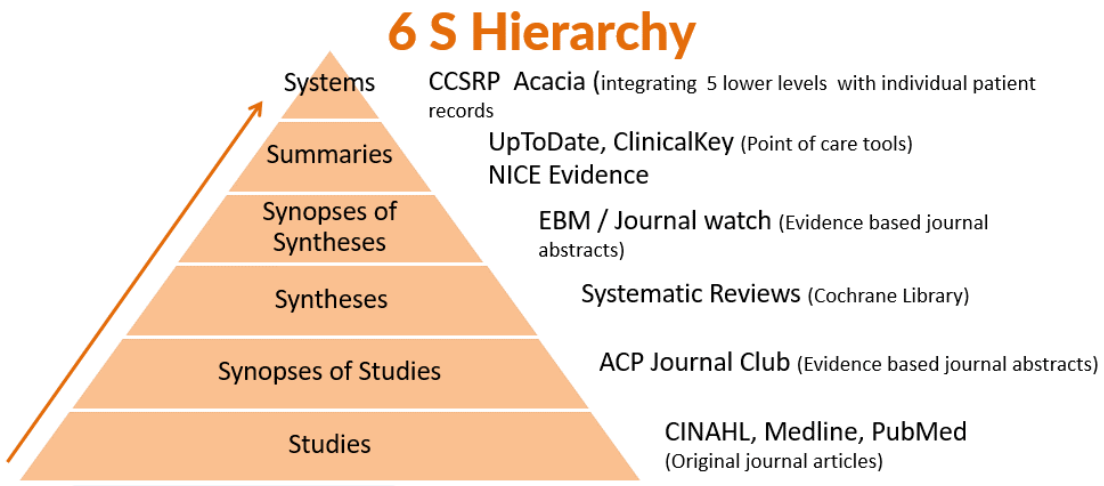
Type of question	**Ideal type of study**
Therapy	Randomised control trial (RCT)
Prevention	RCT | Cohort Study | Case Control

Diagnosis	Prospective, blind controlled trial comparison to gold standard
Prognosis	Cohort study | Case Control | Case series or Case report
Etiology/Harm	RCT | Cohort study | Case control
Cost analysis	Economic analysis

Once you identify the study type that will best answer your PICO question, plan your search. A good search strategy should include advanced search syntax and alternative search terms. Use resources containing pre-appraised evidence, where the information you find in these have already undergone a filtering and critical appraisal process.

The Evidence Pyramid below shows the levels of evidence that can be used to answer your question and along side the appropriate Library databases available to search for your results.

This pyramid shows the reliability of Primary and Secondary Research within the evidence hierarchy. When searching for evidence you should search for evidence at the highest level and progressively work down the pyramid if higher levels do not exist. Critical appraisal is required for all studies used at the Primary Research Level



- A piece of evidence's ability to guide clinical action increases as you move up the pyramid
- Topics become more specific as you move down the pyramid.

Conducting the Search.

- **Advanced search syntax:** such as truncation and wildcards, can be used to improve the results of your database searches.
- **Alternative search terms:** when searching for evidence based literature, it's important to include synonyms and alternative terms to find all relevant literature. This can include words that are spelled differently overseas (e.g. paediatric and pediatric), concepts that are referred to differently (e.g. physiotherapy and physical therapy), conditions with both formal and informal names (e.g. heart attack

and myocardial infarction) and terms that have changed over time (e.g. exercise induced asthma and exercise induced bronchospasm).

- **Refining a search:** add limits to your results (date range, study type, etc.), add more concepts (location, age range, etc.), use broader or more general search terms.

3- Appraise the Evidence

Critical analysis is a way or examining the research to assess its validity and relevance. It is an essential step in making sense of the research evidence. You should ask the following questions:

- What are the key terms and concepts?
- Importance of the research question being answered
- How relevant is this article to my specific question?
- Strengths and weaknesses of the articles study design and methodology
- How authoritative and credible is this source?
- Any potential conflicts of interest
- Legitimacy of conclusions

Terminology

Understanding Terminology

The following terminology is important in critical appraisal and will be helpful to determine the validity of research. Additianal terms can be found in the Centre for Evidence Based Medicine Glossary

Applicability	Whether a particular treatment or form of care that was demonstrated as effective in a trial could be expected to provide the same effect for an individual or group in a specific clinical or population setting
Bias	Any influence that may cause a distortion of results in a study and undermine validity. Bias may originate from various sources, such as allocation of patients, measurement, interpretation, publication, and review of data
Confidence interval (CI)	Confidence Interval (CI) is the interval within which the population parameter (the 'true' value) is expected to lie with a given degree of certainty, for example 95%
External validity	External validity is the degree to which the results of a clinical study can be applied to a setting other than the one studied.
Generalisability	The ability to reliably apply the results of a study to other populations, based on the characteristics of the subjects, size of the sample, the setting, and trustworthiness of the study
Intention-to-treat	A method of analysis for randomized trials in which all patients randomly assigned to one of the treatment groups is analysed with that assigned group, regardless of whether or not they completed or received the treatment.
Internal validity	A study has internal validity if it is free from bias or systematic error and the results seen are due only to the intervention.

***p* value**	p value is the probability that a particular result would have happened by chance.
Power	Ability to detect a difference between two experimental groups if a difference exists.
Relative risk (RR)	Relative Risk (RR) is the ratio of the probability of outcome in the treatment and control groups. This expresses the risk of the probable outcome in the treatment group relative to that in the control group.
Reliability	The extent of the measurement of trustworthiness of the results.

Critical Appraisal Tools

Below is a list of critical appraisal tools used in evidence-based medicine:

- Checklists for Assessing Study Qualities - checklists to assess study design, risk of bias and reporting
- Critical Appraisal Skills Program checklists (CASP) - offers checklists for 8 different types of research, including systematic reviews, qualitative studies, randomised controlled trials, case control studies, and diagnostic studies. Each checklist contains both yes/no and open ended questions.
- Joanna Briggs: Critical Appraisal Tools - produces 13 tools used to appraise different studies or levels of evidence. Each checklist contains a series of critical appraisal questions and ends with an overall appraisal decision.
- A Measurement Tool to Assess Systematic Reviews (AMSTAR) - a tool to appraise systematic reviews of randomised controlled trials. Systematic reviews made up of non-randomised trials can be assessed using AMSTAR 2.
- Newcastle-Ottawa scale (NOS) - a tool for appraising and assessing non-randomised studies included in a meta-analysis.
- Oxford Centre for Evidence-Based Medicine (CEBM) - critical appraisal tools for systematic reviews, randomised controlled trials, and diagnostic and prognostic studies.
- QUADAS-2 - a tool for assessing the quality of diagnostic accuracy studies.
- RoB2.0 tool - Cochrane risk of bias tool for randomized trials.
- Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) - evaluation checklists for cohort, case-control and cross-sectional studies.

4- Implement Research Into Practice

When you have asked your question (step 1), found the evidence (step 2), and critically appraised the evidence (step 3), it is time to implement that evidence into your practice. The research based evidence should be integrated with your own clinical experience and expertise and the patients' preferences. Implementation of evidence into practice may be challenging.

Description of different implementation strategies can be found in these books:

- Greenhalgh, T. (2010). Getting evidence into practice. In Greenhalgh, T. How to read a paper (4th ed., pp. 199-220).
- McCluskey, A. & O'Connor, D. (2017). Implementing evidence: closing research - practice gaps. In Evidence-Based Practice Across Health Professions (3rd ed., Chapter 16, pp. 384-408)
- Guyatt, G. et.al. (2015). Users' guides to the medical literature : A manual for evidence-based clinical practice. New York: McGraw Hill.

Transferability Questions

Below is a list of questions that when answered in relation to a local context, may help you decide whether results from a study can be applied to your practice

- Is the test affordable, accurate and available in my hospital?
- Can I estimate the pre-test probability of the disease in question?
- Will the post-test probability affect my management?
- Is my patient so different from those in the study group that the results can not be applied?
- According to the study results, how much would my patient benefit from the treatment?
- Can the study results be applied to my patient?
- What is my patient's risk for adverse affects?
- Are there alternative therapies?
- Is my patient similar to the patients in the study group?
- How will the evidence influence my choice of treatment?

5- Assess the Impact

To complete the cycle of practising evidence based medicine clinicians should evaluate their own performance, and this fifth step of self evaluation allows clinicians to focus on earlier steps that may need improvement in the future. Clinicians can evaluate their progress at each stage by asking some or all of the following questions:

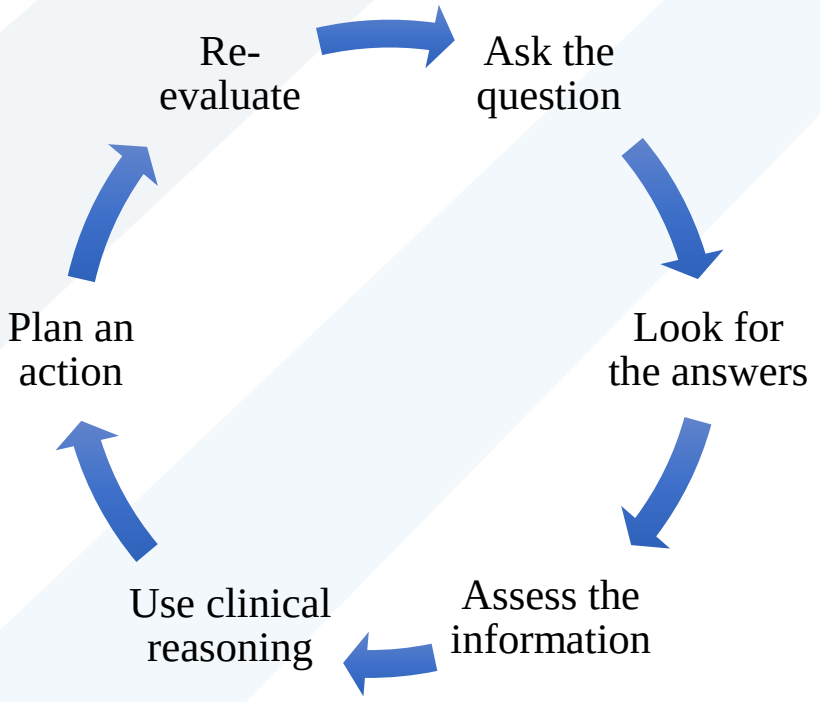
Was the question answerable?
How quickly was good evidence located?
How effectively appraised was the evidence?
Is there new information/data in the literature?
Was the diagnosis and treatment successful?
How can I improve/update my clinical decision?
Was the application of the new information or procedure effective?
Should this new information and/or clinical practice procedure continue to be included in day to day applications?
How could any of the 5 steps improve the next time a question is asked?

(Source: Straus, E and Sackett D L 1998, 'Getting research findings into practice Using research findings in clinical practice' BMJ Vol.317 p.339-342) and (Source: Johnson, C 2008, 'Evidence-based practice in 5 simple steps' Journal of Manipulative and Physiological Therapeutics Vol. 31 p.169-170)

- Evidence-Based Medicine Toolbox (Toronto)
- Audit and feedback: effects on professional practice and health care outcomes

5 steps of Evidence Based Practice

1. **Ask a question**
   Converting the need for information (about prevention, diagnosis, prognosis, therapy, causation, etc) into an answerable question
2. **Find information/evidence to answer question**
   Tracking down the best evidence with which to answer that question
3. **Critically appraise the information/evidence**
   Critically appraising that evidence for its validity (closeness to the truth), impact (size of the effect), and applicability (usefulness in our clinical practice)
4. **Integrate appraised evidence with own clinical expertise and patient's preferences**
   Integrating the critical appraisal with our clinical expertise and with our patient's unique biology, values and circumstances
5. **Evaluate**
   Evaluating our effectiveness and efficiency in executing Steps 1-4 and seeking ways to improve them both for next time



Use strong clinical reasoning = client centered, problem solving and adaptive approach, experience, occupation based

Step 1: Asking Questions

Types of Questions

Once you have formulated a focused clinical question using PICO, it is also useful to decide what type of question it is.

Diagnosis	Prognosis	Aetiology	Effects	Experiences
How can we find out whether or not a person has a specific condition or illness?	What happens to a person with a specific condition or illenss?	Why does a person get a specific condition or illenss?	How can we prevent or treat a specific condition, illenss, or problem?	How does it feel to have a specific condition, illness, or problem?

This will help you decide what type of clinical studies to look for in step 2 Finding evidence.

Tool for asking focused clinical questions: PICO

PICO is a useful tool for asking focused clinical questions.

P	I	C	O
Population Patient Problem	Intervention Or Exposure	Comparison	Outcome
Who are the patients? What is the problem?	What do we do to them? What are they exposed to?	What do we compare the intervention with?	What happens? What is the outcome?

Get help from a **librarian** to do your search for clinical research (excludes searches for assignments).

Step 2: Finding Evidence

Why you shouldn't just 'Google it'

Google is good for finding *some* information but evidence-based practice requires that you find and use the **best available evidence from systematic research**. Google will find you lots of information but it doesn't find everything and it won't help you filter the good from the bad.

When looking for answers to clinical questions, you should start with resources containing pre-appraised evidence. The information you find in these have already undergone a filtering and critical appraisal process.

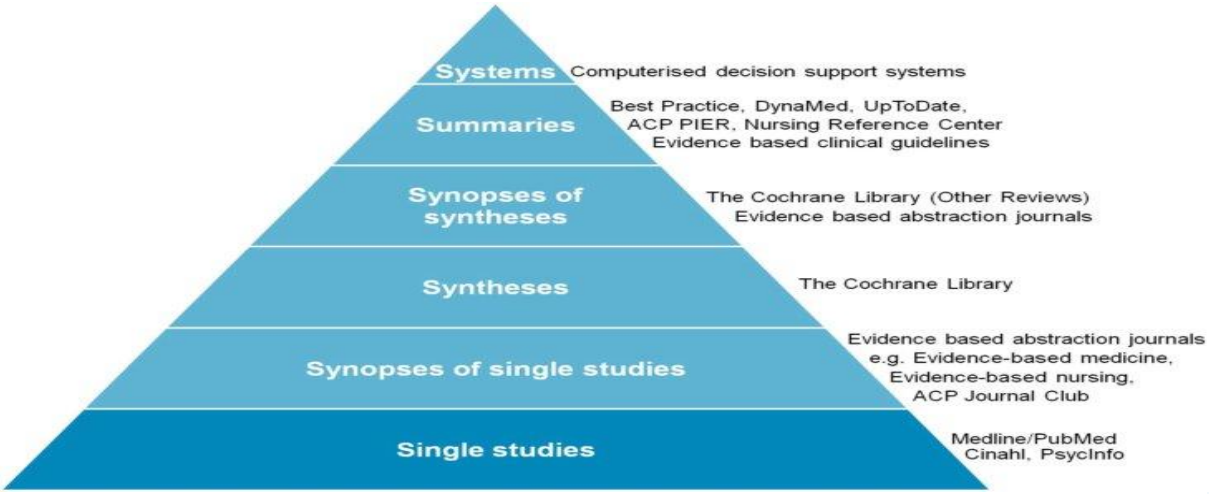
The 6s Model may help you choose the right information resources. The model is explained in these two articles:

DiCenso A, Bayley L, Haynes RB. ACP Journal Club. Editorial: Accessing preappraised evidence: fine-tuning the 5S model into a 6S model. Annals Of Internal Medicine. 151 (6):JC3-2,JC3-3, 2009

DiCenso A, Bayley L, Haynes RB. Accessing pre-appraised evidence: fine-tuning the 5S model into a 6S model. Evidence-based nursing 12(4):99-101, 2009

The below 2 boxes tell you more about the 6s model and which databases to choose when searching for information.

6s Model



As explained by DiCenso A et al. (see references in the box on the left), you should begin your search at the highest possible level in this model. The type of question you have is also important to consider when choosing information resources. Under the Databases tab you will find a table to help you choose information resources for different types of questions.

Step 3: Critical Appraisal

What is Critical Appraisal?

"Critical appraisal is the process of carefully and systematically examining research to judge its trustworthiness, and its value and relevance in a particular context."

Burls, A. What is Critical Appraisal?

Study Designs

Different types of **clinical questions** are answered by different types of study design. Here is an overview of the most common study designs:

Randomised Controlled Trial (RCT): Used to answer questions about effects. Participants are randomised into two (or more) different groups and each group receives a different intervention. At the end of the trial, the effects of the different interventions are measured. Blinding (patients and investigators should not know which group the patient belongs to) is used to minimise bias.

Cohort study: Participants or subjects (not patients) with specific characteristics are identified as a 'cohort' (cohort=group) and followed over a long time (years or decades). Differences between them, such as exposure of possible risk factor(s), are measured. Used to answer questions about aetiology or prognosis. Prognostic cohort studies start with a group of patients with a specific condition and follow them up over time to see how the condition develops.

Case-control study: Looks at patients (cases) who already have a specific condition and match them with a control group who are very similar except they don't have the condition. Medical records and interviews are used to identify differences in exposure to risk factors in the two groups. Used to answer questions about aetiology, especially for rare conditions where a cohort study would not be feasible.

Cross-sectional study/survey: A representative sample of a population is identified and examined or interviewed to establish whether or not a specific outcome is present. Used to answer questions about prevalence and diagnosis. For diagnostic studies, the sensitivity and specificity of a new diagnostic test is measured against a 'gold standard' or reference test.

Qualitative study: Interviews, focus groups, participant observation. Used to answer questions about why people do what they do and how they feel.

Step 4: Implementation

Implementation

When you have asked your questions (step 1), found the evidence (step 2), and critically appraised the evidence (step 3), it is time to **implement that evidence into your practice**. The research based evidence should be integrated with your own clinical experience and expertise and the patients' preferences.

Implementation of evidence into practice may be challenging. **Description of different implementation strategies can be found in these books**:

Greenhalgh, T. (2010). Getting evidence into practice. In Greenhalgh, T. *How to read a paper* (4th ed., pp. 199-220). Chichester, West Sussex, UK: Wiley-Blackwell.

Step 5: Evaluation

Evaluation

The fifth and final step of the EBP process is evaluation. This involves looking at how you perform in the process: Do you ask answerable well formulated **questions** using PICO? Do you **search for evidence** in the right **sources** and do you search them the right way? Do you **critically appraise** the literature? Do you integrate research based evidence with your own clinical experience and expertise and the patients' preferences and **implement** it into your practice?