



Asking Answerable Questions in Evidence Based Medicine

A new approach to clinical care and research

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A practical EBM skill—not a list of definitions

01 Recognize

Turn uncertainty into a focused information need.

02 Frame

Build an answerable question using the right framework.

03 Search

Translate question components into searchable concepts.

04 Decide

Prioritize questions that matter to patients and practice.



ROADMAP

01	EBM mindset	Why questions are the gateway to evidence
02	Question anatomy	Background vs foreground; what makes a question answerable?
03	Frameworks	PICO—and when NOT to use PICO
04	Practice	Build, critique and improve real clinical questions
05	Search bridge	Move from a question to searchable concepts
06	Take-home	A one-page checklist you can use tomorrow

Before we start... where do your clinical questions go?

“When you face a clinical uncertainty, what do you usually do first?”

Ask a colleague

Search Google

Search PubMed

Check a guideline / point-of-care resource

Do what I usually do

EBM MINDSET

The first EBM skill is not searching—it is recognizing uncertainty

Clinical encounter

A patient presents with a problem, but the next best step is not always obvious.

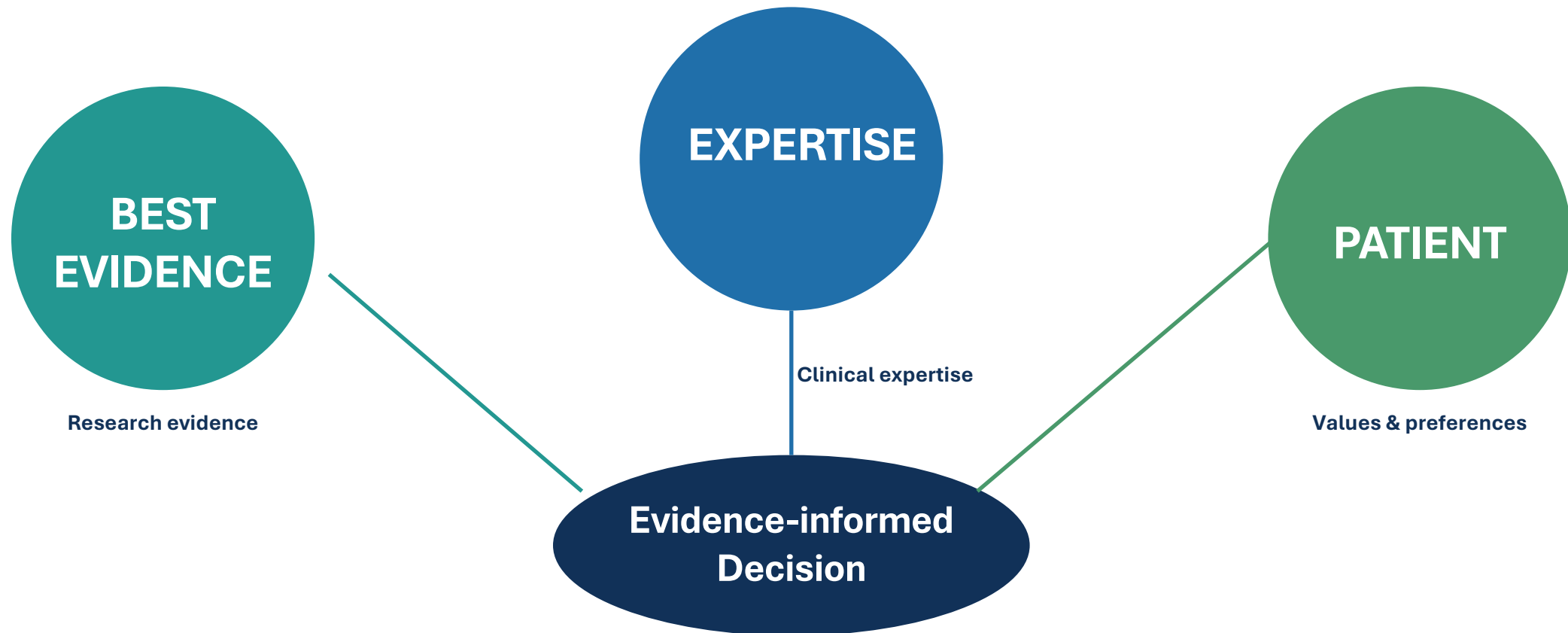
Information need

A gap appears: diagnosis, treatment, prognosis, harm, experience, prevention...

Answerable question

The gap is translated into a focused question that evidence can actually answer.

Evidence-Based Medicine is a decision process



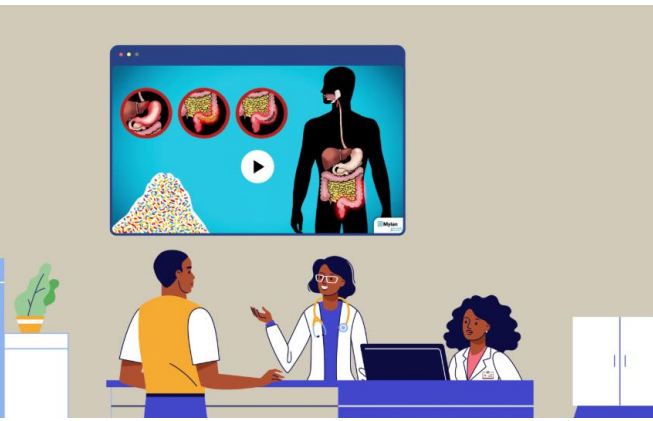


But first, a test...

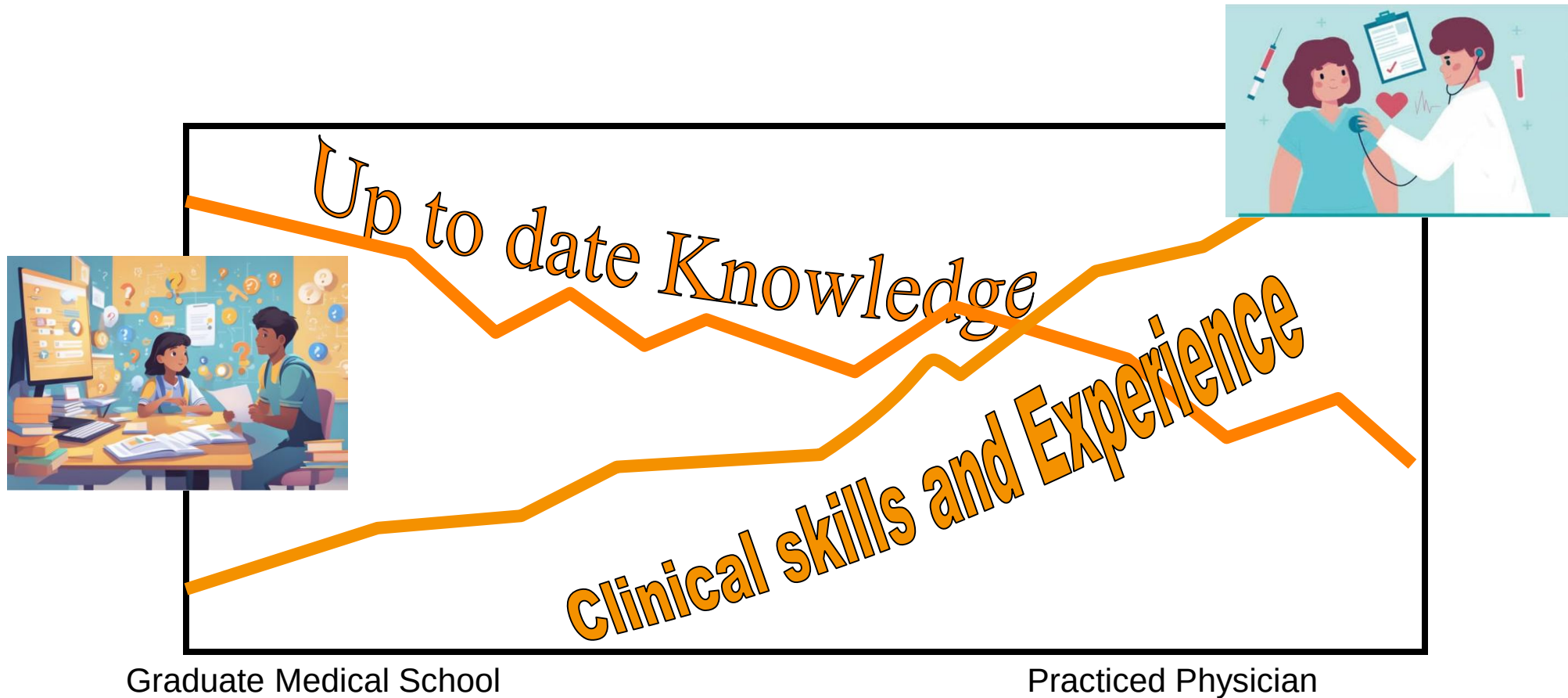


WHAT IS THE BASIS OF YOUR MEDICAL PRACTICE?

- ☐ A. Training, clinical experience and consultation with other professionals
- ☐ B. Convincing evidence (non-experimental) from articles, case reports, product literature, etc.
- ☐ C. Preferences of the patient
- ☐ D. Active search of Randomized Controlled Trials, Systematic Reviews, Meta-Analysis Reports



Past knowledge and practice might
be outdated or inadequate



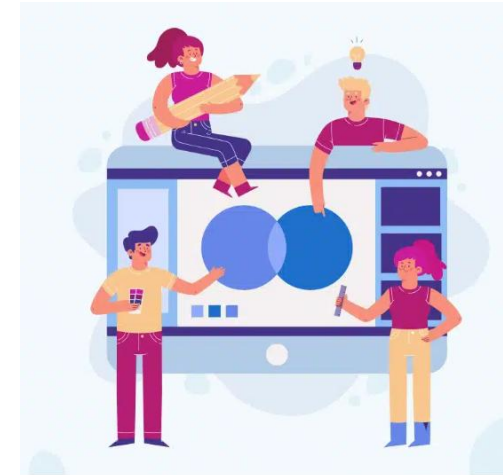
BUT... This evidence may be biased, outdated, incorrect, or not applicable to your patient



ARTICLES



JOURNALS (1987 to present)



ADVERTISEMENTS

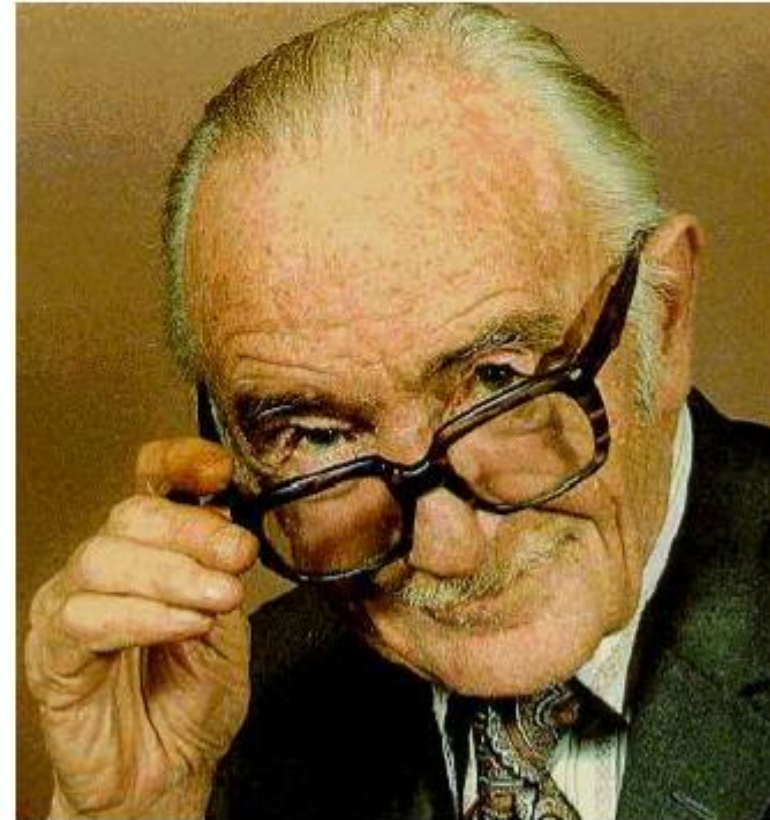
An important rule in Evidence Based Medicine...
It STARTS with the patient and ENDS with the patient.



The patient's preferences **MUST** be considered!

Prof Archibald Cochrane, CBE (1909 - 1988)

- The Cochrane Collaboration is named in honor of Archie Cochrane, a British researcher.
- In 1979 he wrote, **"It is surely a great criticism of our profession that we have not organized a critical summary, by specialty or subspecialty, adapted periodically, of all relevant randomized controlled trials"**



Evidence Based Medicine

It is a change in the way physicians practice medicine, teach and learn, and handle research.

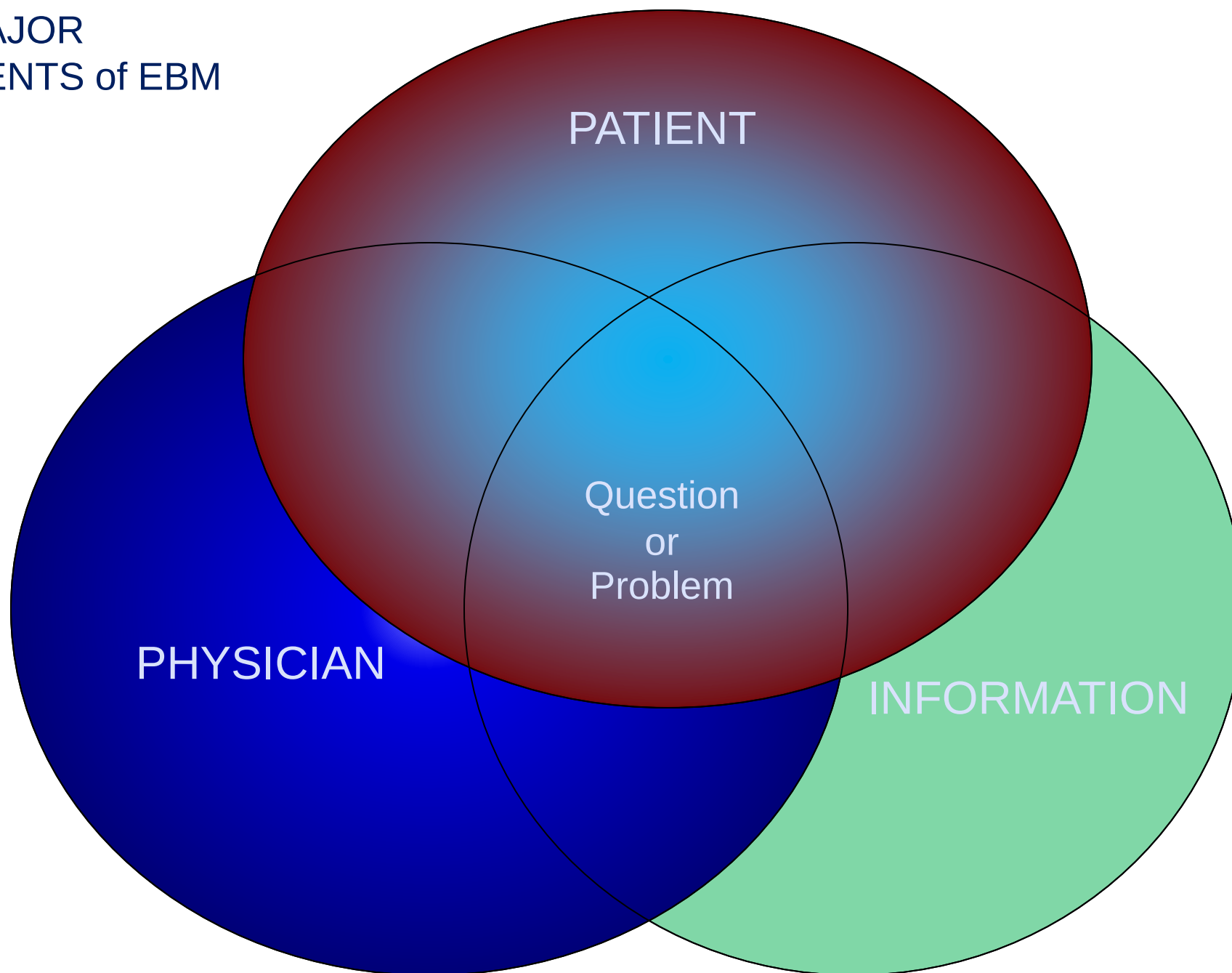
Clinical practice: Based on the best current evidence
(not necessarily on how it's always been done)

Patient Care: Compassionate, patient-oriented
(less authoritarian)

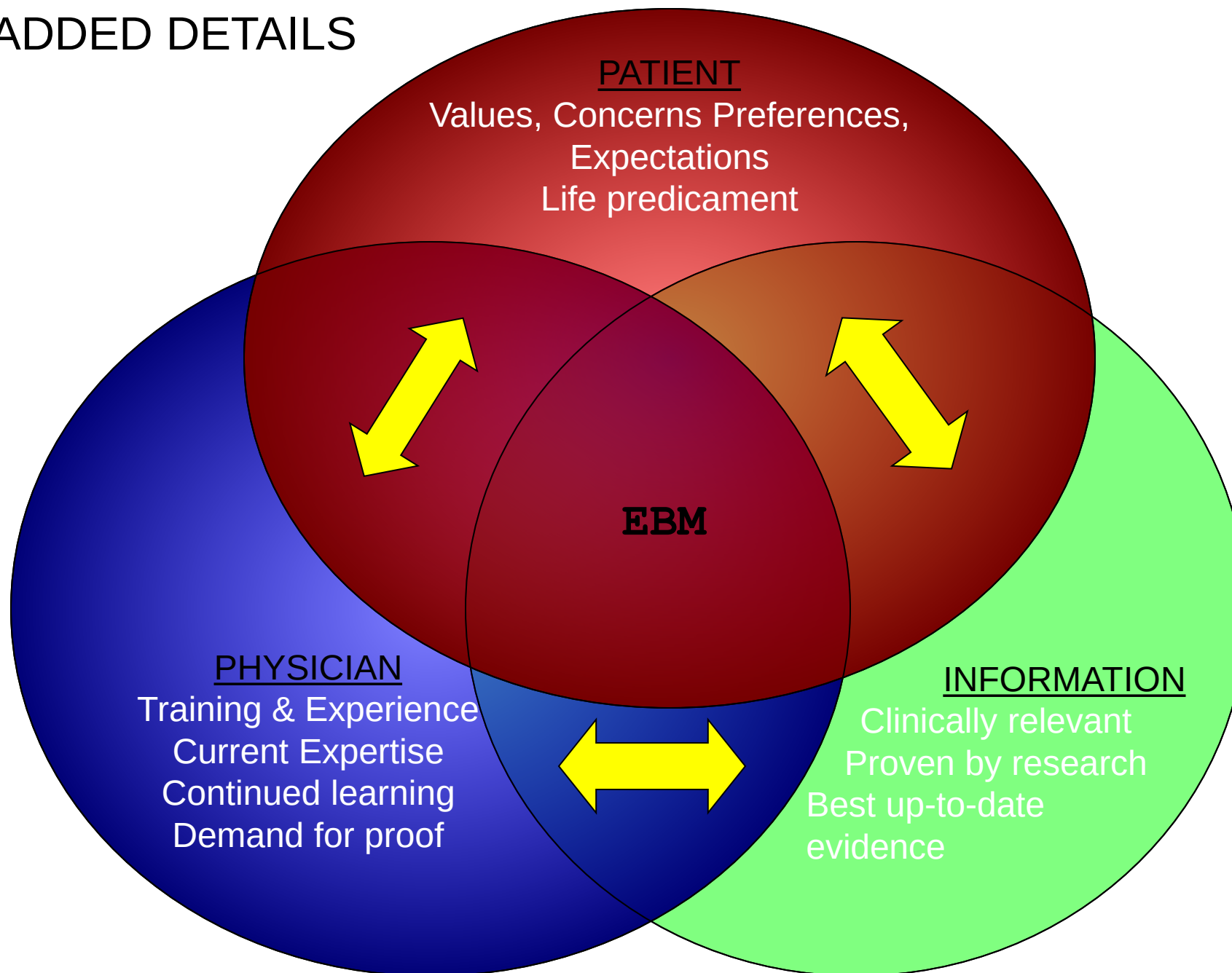
Learning & Teaching: Problem-based, problem-solving
more investigative, less know-it-all-by-yesterday

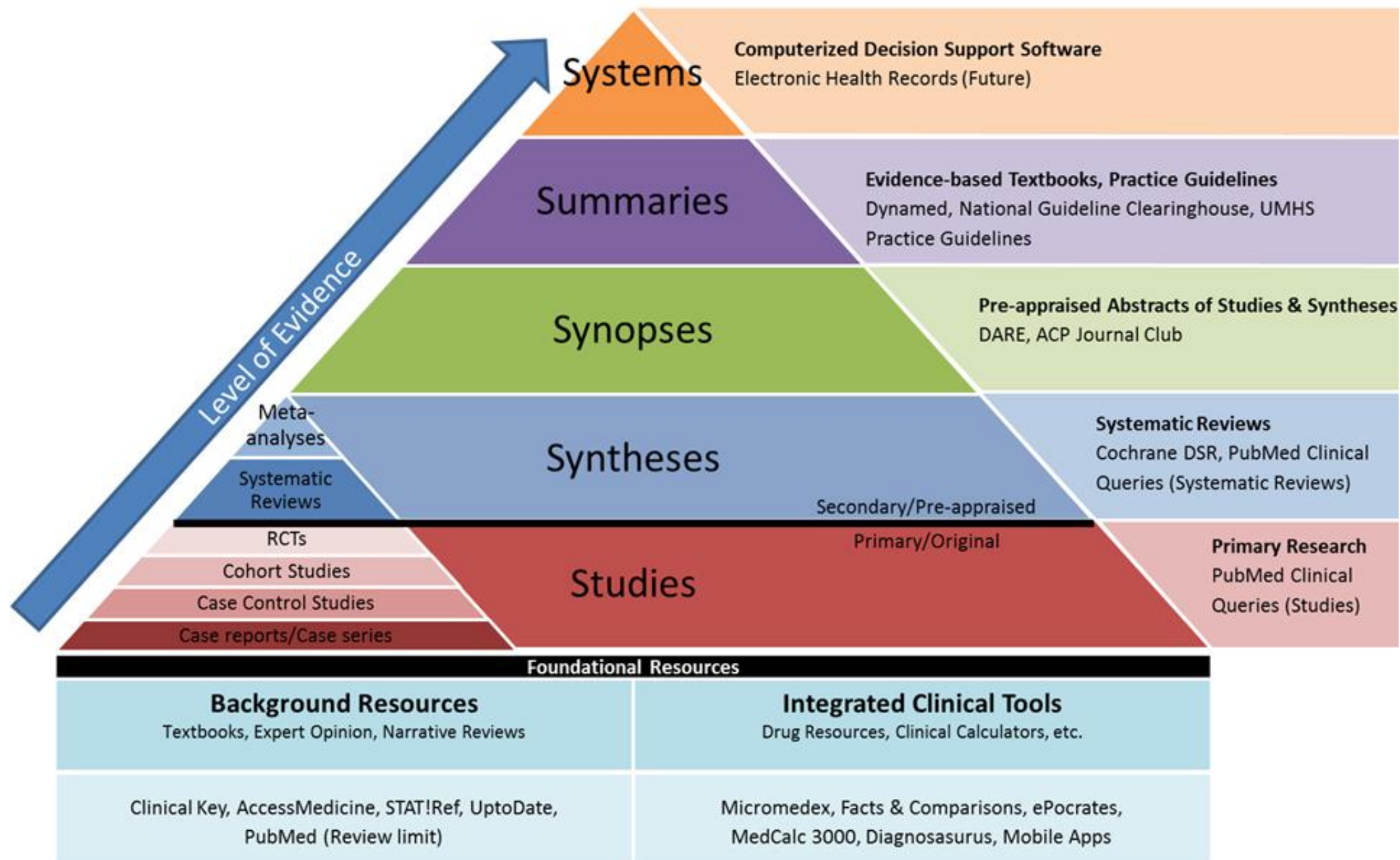
Research: More stringent approach, better proof criteria
(more demanding of proof, less room for error)

THREE MAJOR COMPONENTS of EBM



THE ADDED DETAILS





Resources for Evidence-Based Practice: The 6S Pyramid, McMaster university

The Evidence Pyramid

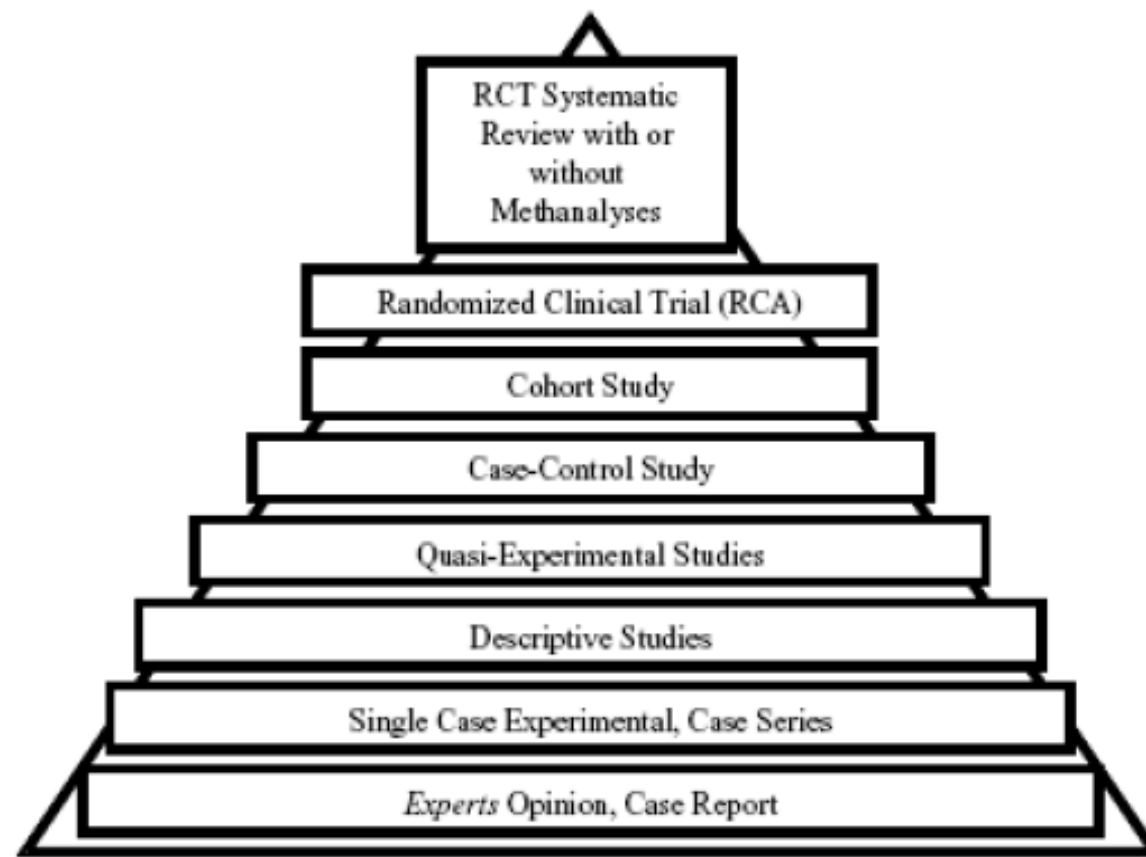
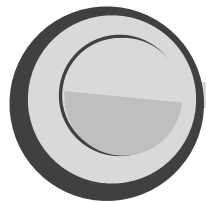


Figure 1. Evidence hierarchy: investigations placed in a superior localization in the hierarchy show greater power of evidence[†].



Types of Questions:

Background questions

Asked for general knowledge about a disorder

Has two essential components:

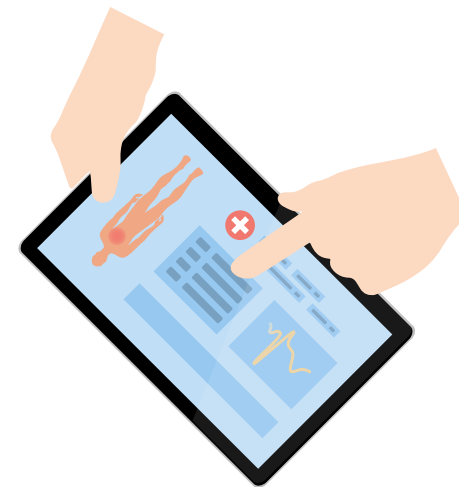
- A question root (who, what, where, how, why) & a verb
- A particular disorder, test, treatment or other aspect of health care.

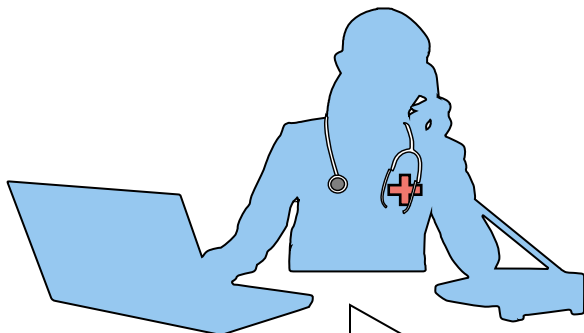
Textbooks usually answer background questions, they contain collected & synthesized wisdom for topics that do not change much often.



Foreground questions

- Asked for specific knowledge about managing patients with a particular disorder
- It has 4 components (PICO analysis):
 - P - Patient/Population
 - I - Intervention
 - C - Comparison
 - O - Outcome





BACKGROUND QUESTIONS BASIC & CONCRETE

1. QUESTION

- Who, What, Where, When, Why, How

2. VERB

- is, causes, does, treats, reduces, cures, prevents, affects

3. GENERAL KNOWLEDGE ABOUT DISORDER

clinical manifestations of disease, patient findings, differential diagnosis, etiology, patient experience, comorbid condition, screening and diagnostic tests, prognosis, therapy, risk factors, etc.

STUDENT

GRAD

EXPERT

Category of Question	Suggested best type of Study
Therapy	RCT > cohort > case control > case series
Diagnosis	Prospective, blind comparison to a gold standard
Etiology	RCT > cohort > case control > case series
Prognosis	Cohort > case control > case series
Prevention	RCT > cohort > case control > case series
Cost	Pharmaco-economic analysis

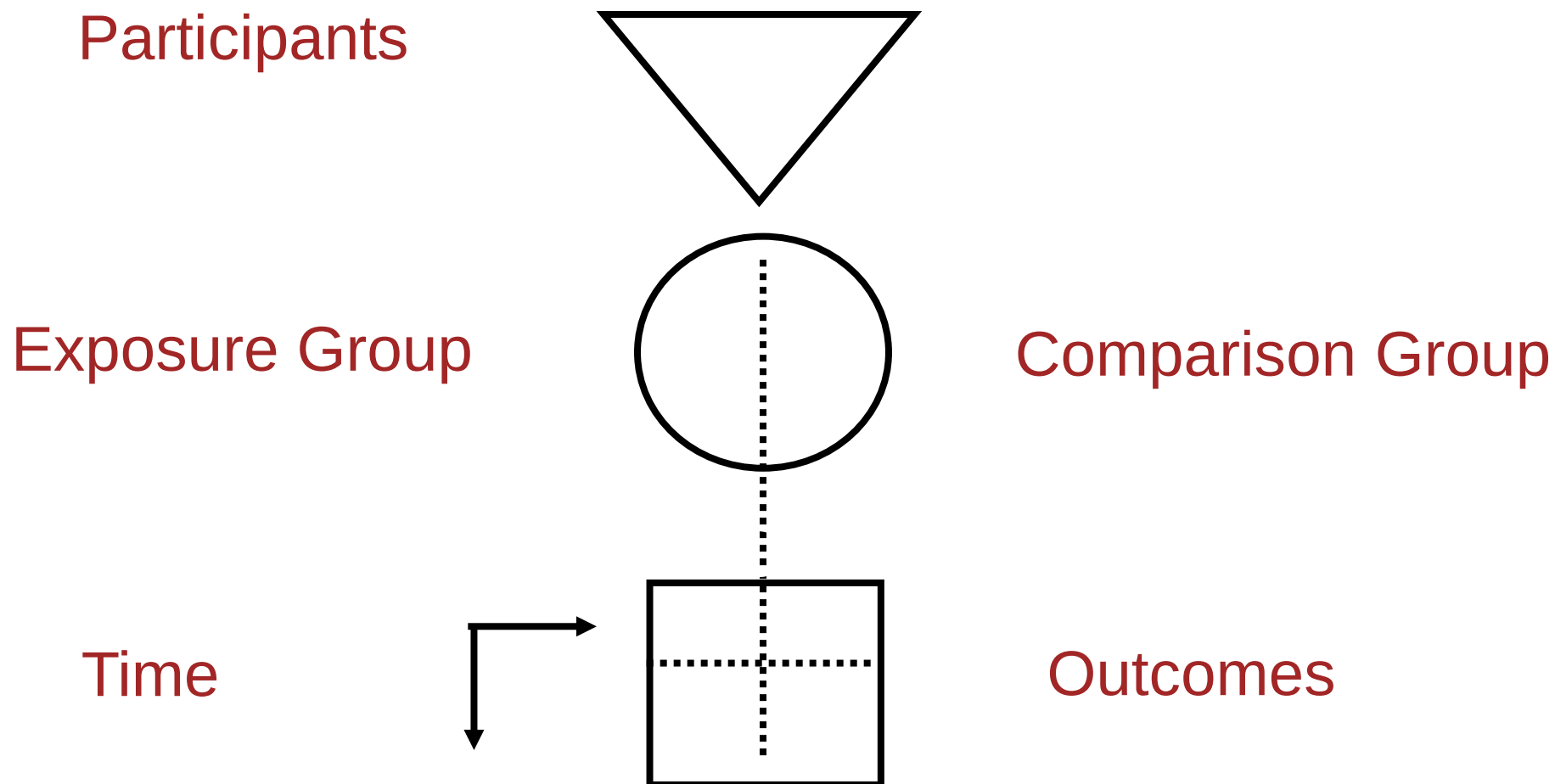
EBM QUESTION: Should include multiple factors

- P PATIENT type of patient or population
Ex: 47 yr male w/DM2 and cellulitis toe, 25 yr female w/DVT and chest pain
- E EXPOSURE environmental, personal, biological
Ex: TB, tobacco, drug, diet, pregnancy or menopause, MRSA, allergy
- I INTERVENTION clinical intervention
Ex: medication, procedure, test, surgery, radiation, drug, vaccine
- C COMPARISON compare alternative treatment
Ex: other prior, new or existing therapy
- O OUTCOME clinical outcome of interest
Ex: Reduced death rate in 5 yrs, decreased infections, fewer hospitalizations

- Alternatives such as SPICE and PECO (among many others) can also be used. Some authors suggest adding T and S, as follows:
 - T - Timing (e.g. duration of intervention, or date of publication)
 - S - Study type (e.g. randomized controlled trial, cohort study, etc.)

The GATE (Graphic Approach To Epidemiology) is a visual framework that uses simple shapes to show the main parts of any **epidemiological study** and how they relate to each other. It was developed mainly to **make concepts like study design, measures of occurrence, and risk comparison easier to understand for students and clinicians**

PECOT: the 5 components of epidemiological study



EBM ≠ “use RCTs for everything”

What EBM asks

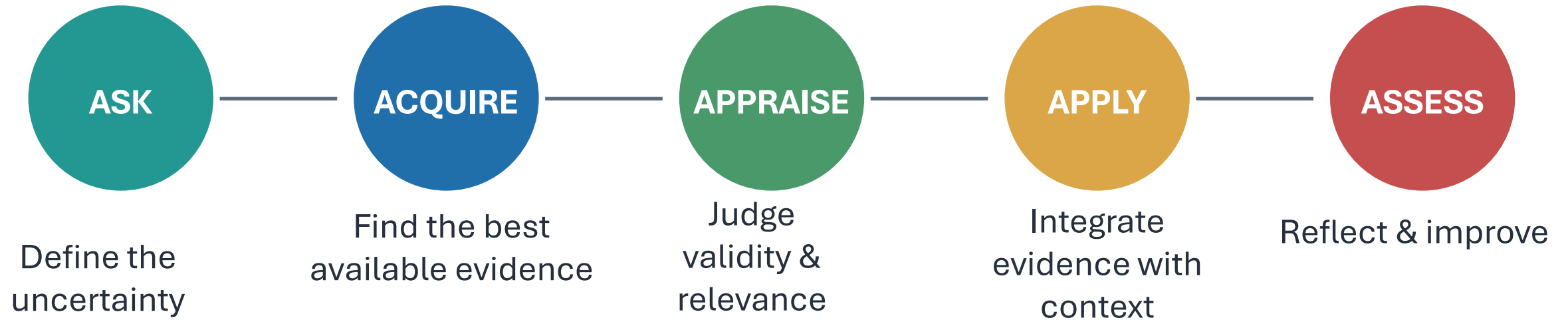
Use the best available evidence for the question at hand—and judge how trustworthy and applicable it is.

Why this matters

The ideal evidence depends on the question:

- Therapy → randomized trials often central
- Diagnosis → diagnostic accuracy studies
- Prognosis → cohort studies
- Experience → qualitative evidence
- Implementation → context + process + outcomes

The EBP cycle: Ask → Acquire → Appraise → Apply → Assess



PICO IN PRACTICE

P — Population: be specific enough to matter

Too broad

“Patients with diabetes”

Problem: huge clinical heterogeneity.

More useful

“Adults with type 2 diabetes and persistent albuminuria despite standard care”

Include characteristics that could modify the decision.

PICO IN PRACTICE

I — Intervention: name the action, exposure or test

Treatment

Drug / procedure / behavioral
intervention

Diagnostic test

Index test or strategy being evaluated

Exposure

Risk factor or environmental exposure

Prognostic factor

Characteristic used to predict outcome

PICO IN PRACTICE

C — Comparator: make the alternative explicit

Usual care

Current standard practice or routine care

Placebo / none

Useful when the clinical question is whether the intervention adds benefit

Alternative strategy

Another active treatment, test or pathway

PICO IN PRACTICE

O — Outcome: ask what matters, not only what is easy to measure

Patient-important

Mortality • symptoms •
function • quality of life •
hospitalization • serious
adverse events

Intermediate / surrogate

Biomarker • imaging
measure • physiologic
marker

Process outcome

Adherence • time to
treatment •
documentation •
implementation fidelity

Question to ask: “If this outcome improves, will the patient actually experience a meaningful benefit?”

PICO IN PRACTICE

Worked example: turn a vague question into PICO

“Does exercise help people with type 2 diabetes?”



P

Adults with
type 2
diabetes

I

Structured
exercise

C

Usual care

O

HbA1c / patient-
important
outcomes

PICO IN PRACTICE

The answerable version

PICO QUESTION

In adults with type 2 diabetes (P), does structured exercise (I), compared with usual care (C), improve glycemic control and patient-important outcomes (O)?

- Focused enough to search
- Specific enough to identify relevant studies
- Open enough to accommodate different exercise protocols
- Clear about what outcome matters

QUESTION QUALITY

A good question is not simply a longer question

WEAK

“Is amoxicillin effective for otitis media?”

Problems:

- Population unclear
- Comparator unclear
- Outcome unclear
- “Effective” is vague

STRONGER

“Among young children with acute otitis media, does amoxicillin compared with placebo/usual care reduce time to symptom improvement without increasing adverse events?”

BEYOND PICO

First identify the type of question

Therapy / prevention

Does X improve Y? | PICO

Diagnosis

How accurate is X for detecting Y? | PIRD
/ diagnostic framework

Etiology / harm

Is exposure X associated with Y? | PECO

Prognosis

What predicts outcome Y? | Population +
prognostic factor + outcome

Experience / meaning

How do patients experience X? | PICO

Implementation

How can evidence be implemented in
context X? | PIECE / implementation-
specific framework

QUESTION FRAMEWORKS

Therapy / prevention → PICO

QUESTION

In adults with hypertension, does home blood-pressure monitoring plus structured feedback, compared with usual care, improve blood-pressure control?

P

Adults with
hypertension

I

Home BP
monitoring +
feedback

C

Usual care

O

BP control

QUESTION FRAMEWORKS

Etiology / harm → PECO

QUESTION

Among healthcare workers, is high occupational noise exposure associated with hearing loss compared with lower exposure?



Healthcare
workers



High
occupational
noise exposure



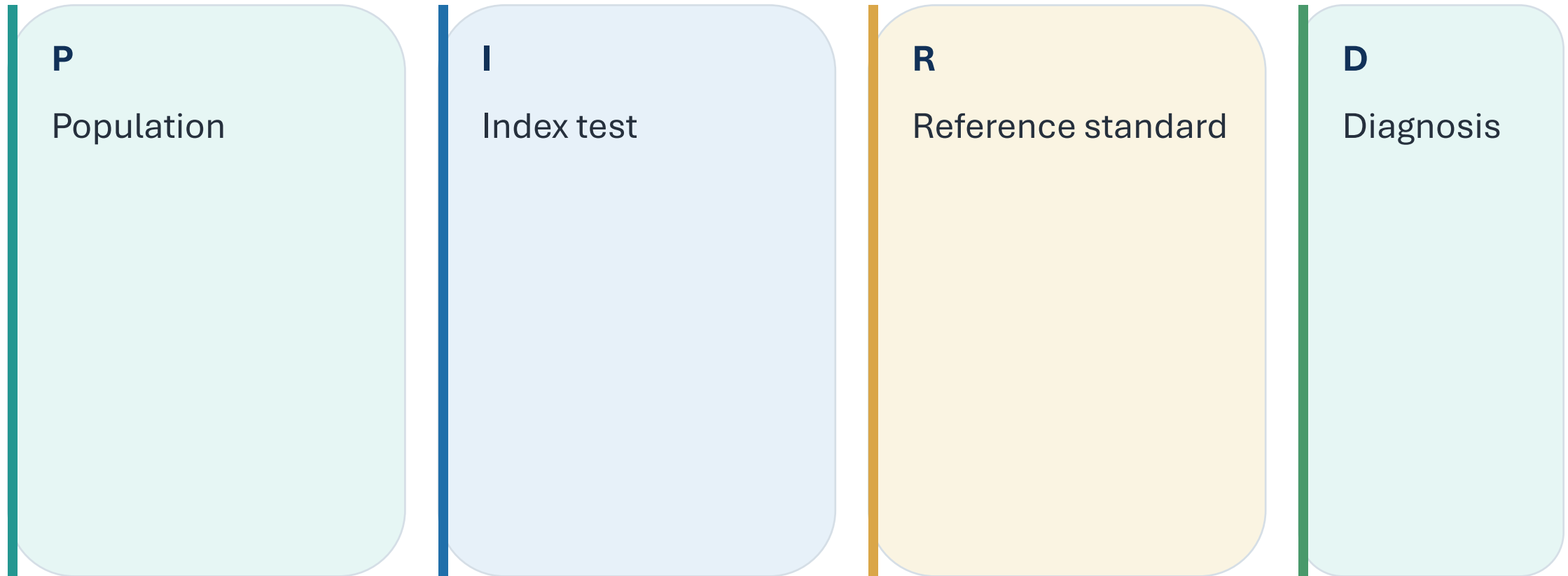
Lower exposure



Hearing loss

QUESTION FRAMEWORKS

Diagnosis → PIRD: define the index test and reference standard



Example: Is point-of-care test X accurate for detecting condition Y compared with the reference standard?

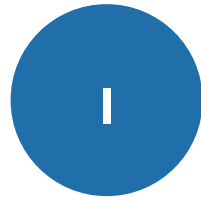
QUESTION FRAMEWORKS

Qualitative experience → PICo



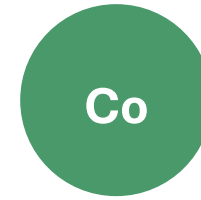
Population

Who is experiencing the phenomenon?



Phenomenon of Interest

What experience / issue?



Context

In what setting or context?

For qualitative questions, forcing a treatment-style PICO can distort the phenomenon of interest.

QUESTION FRAMEWORKS

Implementation questions need context—not just intervention + outcome

PIECE

Practice / Problem of interest
Implementation / Intervention
Evaluation
Context
Engagement

Why add this?

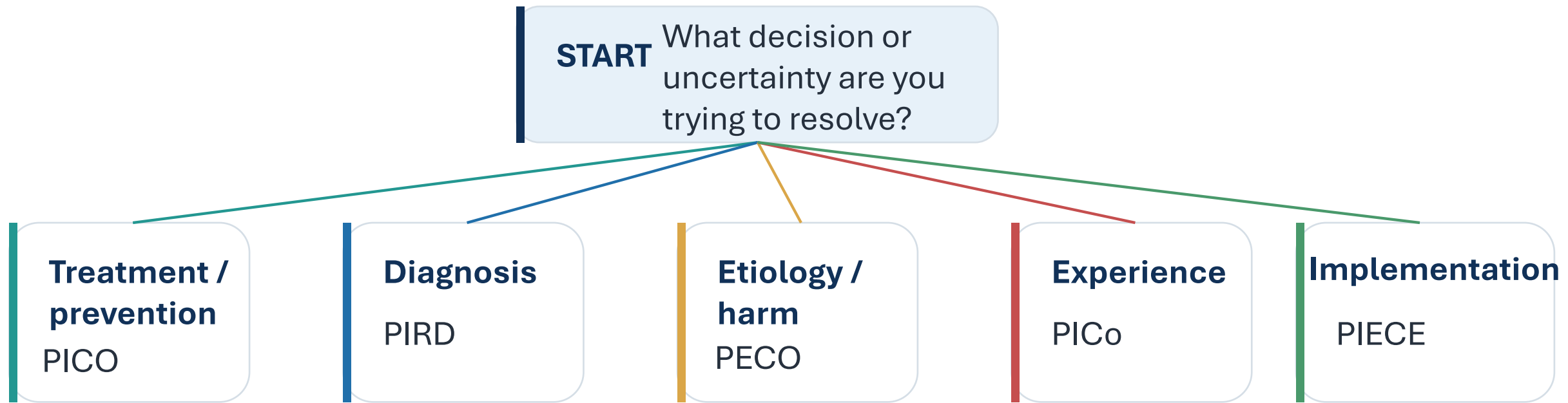
Implementation questions often require explicit attention to:

- local context
- stakeholders
- implementation strategies
- process measures
- outcomes

The framework should fit the decision.

FRAMEWORK SELECTION

Choose the framework after you identify the question type



Frameworks are scaffolds. Use them when they sharpen the question; do not force a framework that distorts it.

Exercise 1 — Fix the question

SCENARIO

A 70-year-old patient with chronic low-back pain asks whether exercise therapy is better than medication for improving daily function.

In 3 minutes, write a PICO question. Then underline the outcome that matters most.

P

I

C

O

Exercise 1 — One possible answer

PICO

In older adults with chronic low-back pain (P), does structured exercise therapy (I), compared with usual medication-based care (C), improve physical function and pain-related quality of life (O)?

- Notice: “better” was replaced with measurable outcomes.
- The comparator is explicit.
- The population is defined enough to guide searching—but not unnecessarily narrow.

QUESTION PRIORITIZATION

You may have 10 questions. You cannot answer all 10 now.

Patient impact

Would the answer change care or matter to the patient?

Decision urgency

Is a decision needed today / this week?

Uncertainty

Is the answer genuinely uncertain?

Recurrence

Will this question arise again?

Feasibility

Can you realistically find and judge the evidence?

Priority $\neq$ interestingness. Start with the question whose answer is most useful now.

PATIENT-CENTERED QUESTIONS

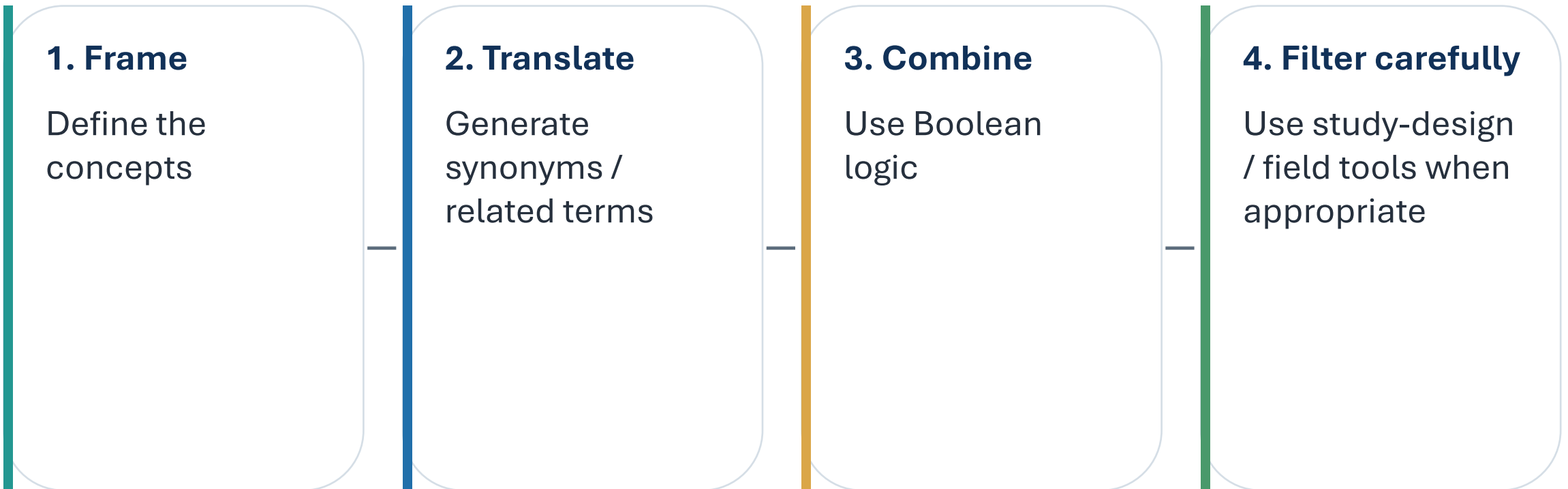
A patient's question is often the starting point

“What are you most worried about? What outcome matters most to you?”

- What do you think is happening?
- What are you hoping treatment will change?
- What trade-offs are you willing—or unwilling—to accept?

FROM QUESTION TO SEARCH

PICO is useful twice: for thinking and for searching



FROM QUESTION TO SEARCH

Build search blocks—not sentences

QUESTION

In adults with type 2 diabetes, does structured exercise improve HbA1c compared with usual care?

POPULATION

type 2 diabetes OR T2D
OR “type 2 diabetes
mellitus”

INTERVENTION

exercise OR physical
activity OR aerobic OR
resistance

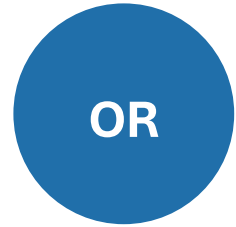
OUTCOME

HbA1c OR glycated
hemoglobin

Search principle: synonyms within a concept are often combined with OR; distinct concepts are combined with AND.

SEARCH BASICS

AND narrows • OR broadens



OR = synonyms

diabetes OR T2D



AND = concepts

diabetes AND exercise

Broad

Focused

SEARCH BASICS

PubMed Clinical Queries: useful, but not a substitute for question formulation

What it can do

Clinical Study Categories include:

- Therapy
- Diagnosis
- Etiology
- Prognosis
- Clinical prediction guides

Each category offers broad vs narrow scopes.

What it cannot do

It cannot rescue a poorly framed question.

Start with:

1. What decision?
2. What population?
3. What intervention/test/exposure?
4. What outcome?

Then choose the search tools.

SEARCH BASICS

Example search string: keep the logic visible

CONCEPT 1

("Type 2 Diabetes Mellitus"[MeSH] OR "type 2 diabetes"[tiab] OR T2D[tiab])

CONCEPT 2

AND (exercise[tiab] OR "physical activity"[tiab] OR aerobic[tiab] OR resistance[tiab])

CONCEPT 3

AND (HbA1c[tiab] OR "glycated hemoglobin"[tiab])

Do not add every PICO element automatically. Add concepts when they improve retrieval and precision.

SEARCH MINDSET

Finding a paper is not the same as finding an answer



QUALITY CHECK

Common traps when writing clinical questions

Too broad

“Does treatment work?”

Too narrow

Adds so many constraints that relevant evidence disappears

Vague outcome

“Improves the patient”

Wrong comparator

No realistic alternative is defined

Surrogate-only thinking

Measures a biomarker without asking whether patients benefit

Framework forcing

Uses PICO when the question is qualitative, diagnostic, prognostic, or implementation-focused

CLINICAL VS RESEARCH

Clinical question $\neq$ research question

CLINICAL / DECISION QUESTION

“For my patient, should I choose X or Y?”

Goal: make a decision now.

May be answered by a guideline, systematic review, RCT, diagnostic study, or other evidence.

RESEARCH QUESTION

“What remains uncertain that a new study should investigate?”

Goal: generate new evidence.

Requires a defensible gap, design, population, outcomes and feasibility.

CAPSTONE CASE

Case challenge — build the question

CASE

A 56-year-old woman with chronic knee osteoarthritis is considering an exercise program. She has tried analgesics with limited relief. She asks: “Would supervised exercise help me function better than continuing my current treatment?”

Your task (5 minutes):

- Identify the question type.
- Write PICO.
- State one patient-important primary outcome.
- Write one-sentence answerable question.

CAPSTONE CASE

Case challenge — one possible answer

QUESTION TYPE

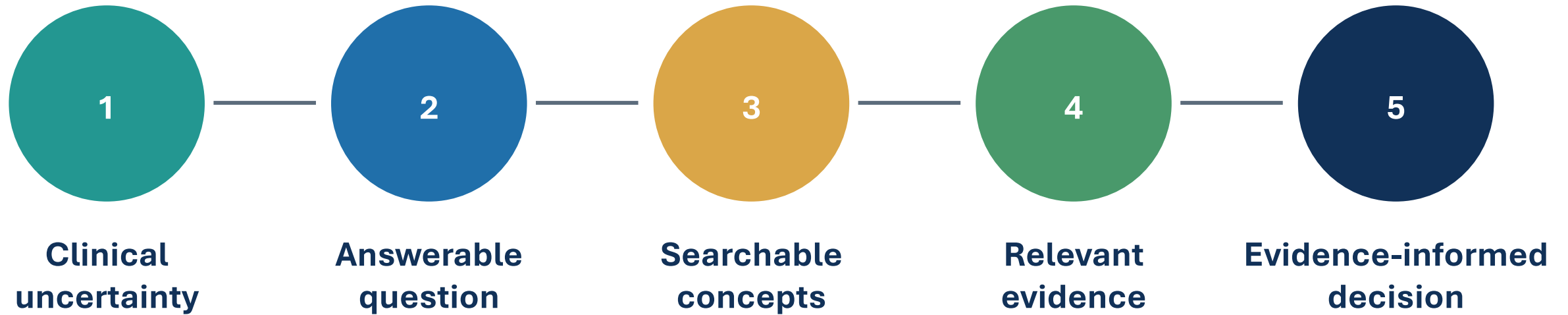
Therapy / management → PICO

ANSWERABLE QUESTION

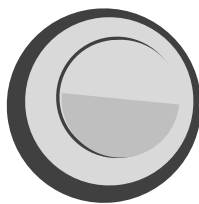
In adults with knee osteoarthritis (P), does supervised exercise therapy (I), compared with usual care / current management (C), improve physical function (O)?

THE BIG PICTURE

A well-built question is a bridge to evidence



Better questions do not guarantee good evidence—but poor questions make good searching much harder.



FRAMING THE QUESTION (Example: PICO)

ELEMENT PROMPTS THE QUESTION:

Patient	How would I describe a group of patients similar to mine?
Intervention	What main action am I considering?
Comparison	What is/are the other options?
Outcome	What do I (or the patient) want to happen (or not happen)?

Example:

- P: In kids under age 12 with poorly controlled asthma on metered dose inhaled
steroids...
- I: would the addition of salmetrol to the current therapy
- C: compared to increasing the dose of current steroid
- O: lead to better control of symptoms without increasing side effects?

CATEGORY OF QUESTION

MAJOR CATEGORIES

1. Diagnosis
2. Prognosis
3. Therapy/ Treatment PICO
4. Harm (iatrogenic, other) PEO

MISCELLANEOUS

- Quality of care
- Health economics
- Office Management
- Etc.



THE FIVE BASIC STEPS OF EBM

1. Clinical Question

____Patient-focused, problem-oriented

2. Find Best Evidence

____Literary Search

3. Critical Appraisal

Evaluate evidence for quality and usefulness

4. Apply the Evidence

Implement useful findings in clinical practice

5. Evaluate

The information, intervention, and EBM process



Five steps of EBM Practice

1. Translation to an answerable question
2. Efficient searching of the best evidence
3. Critical appraisal of the evidence for its validity and clinical applicability
4. Integration of that critical appraisal with clinical expertise and the patient's unique biology and beliefs
5. Evaluation of one's performance.

Where and how clinical questions arise?

Clinical findings

Etiology

Differential diagnosis

Diagnostic tests

Prognosis

Therapy

Prevention

Patient experience and meaning

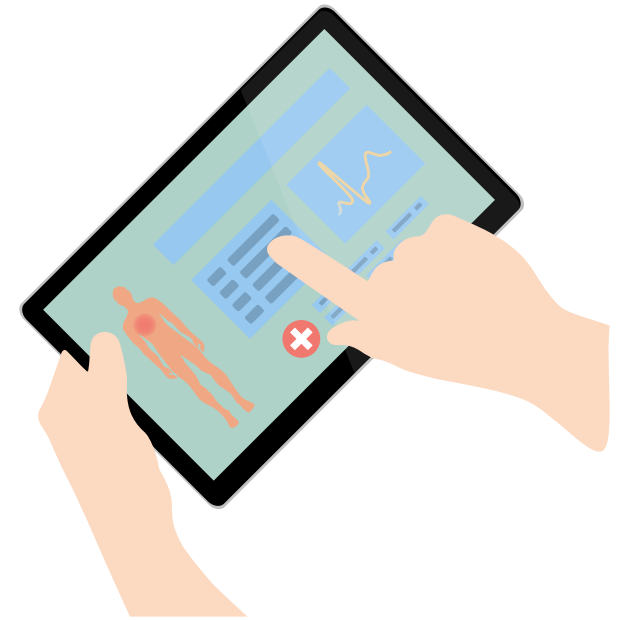
Self-improvement

- PubMed Clinical Queries provides specialized searches for:
 - COVID-19 Articles
 - Clinical Study Categories
 - Therapy, Etiology, Diagnosis, Prognosis, Clinical Prediction Guides



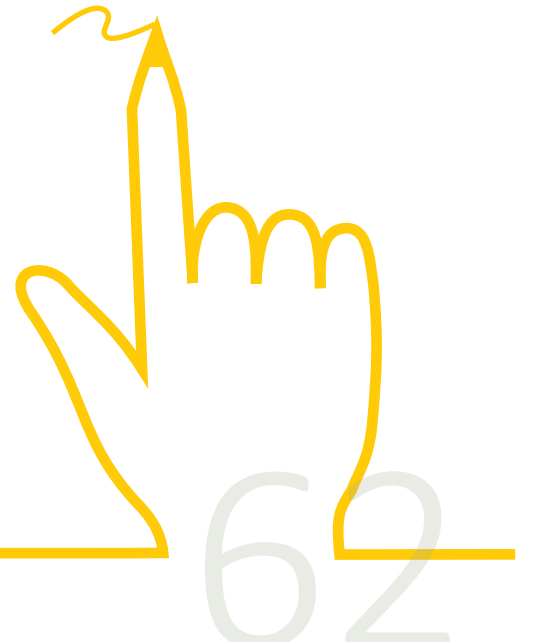
1. Clinical findings:

How to properly gather and interpret findings from the history and physical examination.



2. Etiology:

How to identify causes for disease (including its iatrogenic forms).



3. Clinical manifestations of disease:

Knowing how often and when a disease causes its clinical manifestations and how to use this knowledge in classifying our patients' illnesses.



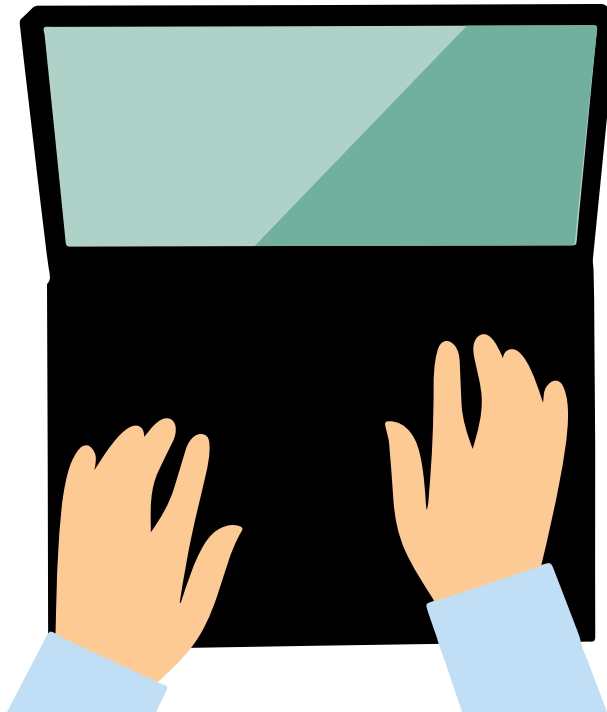
4. Differential diagnosis:

When considering the possible causes of our patient's clinical problem, how to select those that are likely, serious and responsive to treatment.



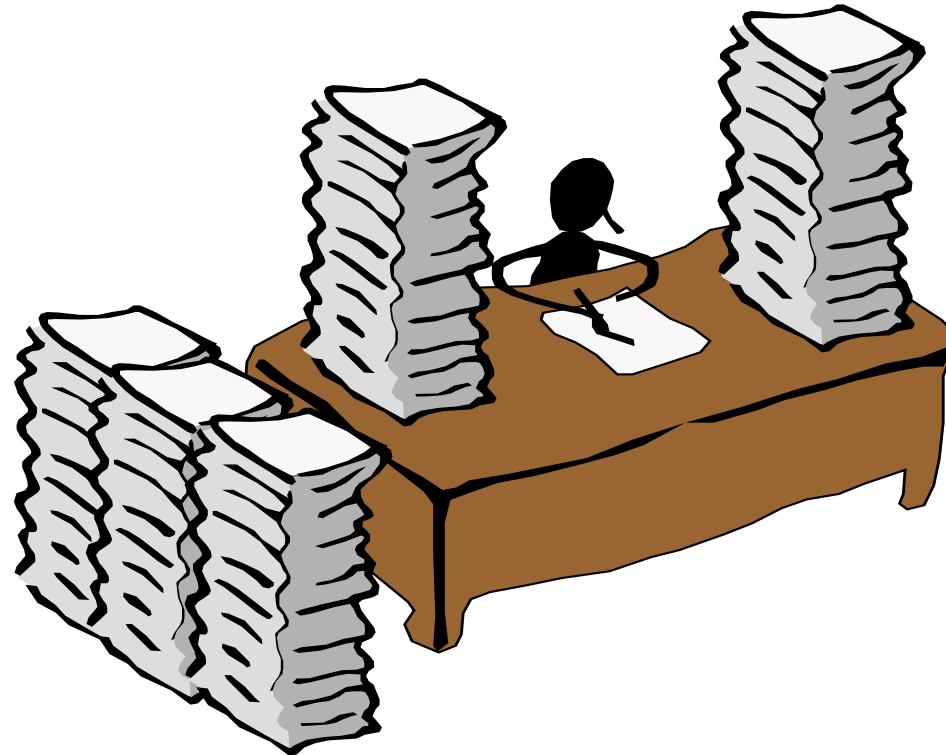
5. Diagnostic tests:

How to select and interpret diagnostic tests, in order to confirm or exclude a diagnosis, based on considering their precision, accuracy, acceptability, expense, safety, etc.



6. Prognosis:

How to estimate our patient's likely clinical course over time and anticipate likely complications of the disorder.



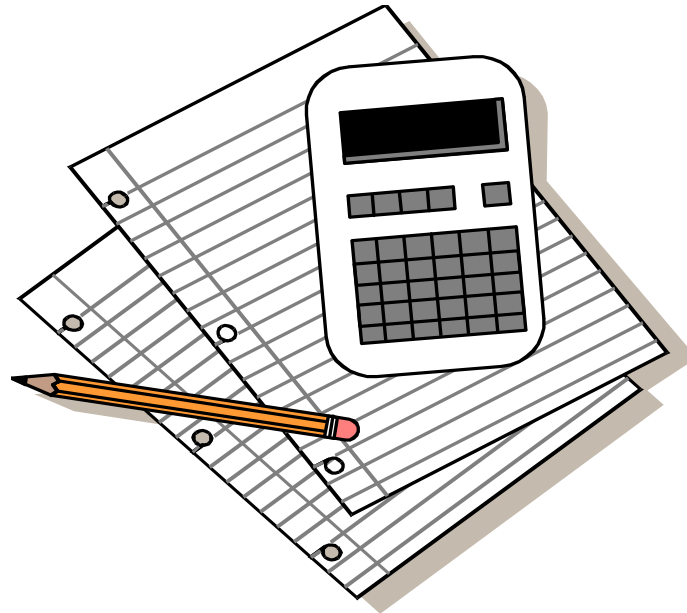
7. Therapy:

How to select treatments to offer our patients that do more good than harm and that are worth the efforts and costs of using them.



8. Prevention:

How to reduce the chance of disease by identifying and modifying risk factors and how to diagnose disease early by screening.



9. Experience and meaning:

How to empathize with our patients' situations, appreciate the meaning they find in the experience and understand how this meaning influences their healing.

10. Self-improvement:

How to keep up to date, improve my clinical and other skills and run a better, more efficient clinical practice.

Cognitive Resonance

If a clinical situation calls for knowledge that we already possess, we experience the reinforcing mental and emotional responses that have been called “cognitive resonance” and can make rapid decisions.

Cognitive Dissonance

But if our patient's illness calls for knowledge that we don't possess, we experience mental and emotional responses termed “cognitive dissonance”, and this can be a powerful motivator.

Cognitive Dissonance is fairly common

About 5 questions for every in-patient and
About 2 question for every 3 out-patients.

Maladaptive Reactions

Sometimes it motivates us to develop maladaptive reactions to cognitive dissonance:

- Trying to hide our knowledge deficit from ourselves,
- Overreacting emotionally with excessive anxiety, guilt or shame.

Adaptive Response

A more positive (“adaptive”) response is to recognize our information needs and use our cognitive dissonance to motivate our learning, by turning the “negative space” of knowledge gaps into the “positive space” of well-built questions and finding answers.

Complex Ignorance

There is an even darker side to not knowing that goes by several names, including ignorance, incompetence, obsolescence, and not knowing when we don't know.

Complex Ignorance

Since we don't feel any cognitive dissonance with this, the solution is different:

Regular review of “current best evidence” through processes and publications

Answerable Clinical Question (ACQ)

First step in applying results of clinical research to patient care

Well- formulated ACQ will save time:

- Search for evidence will be efficient

- Sensibly-honed process rather than chaotic

Case Report

The patient is a 77-year-old man admitted for dyspnea and fever. He fell ill 4 days ago with low-grade fever, chills, myalgias, rhinorrhoea and a non-productive cough. One day ago he developed dyspnea on exertion, purulent sputum, lateral chest wall pain with inspiration and a shaking chill. His general health is fairly good; he has had essential hypertension for 12 years, well controlled on diuretic therapy. He has not smoked.

Case Report

On examination, his respiratory rate is 28, his heart rate is 108 and his temperature is 39.2°C. He may have subtle cyanosis. His chest expands symmetrically, he has no prolongation of expiration and no wheezing. There is bronchophony and egophony in the left lower posterior lung field.

Initial blood tests show leukocytosis and hyponatremia.

Types of EBM Database

- Bibliographic databases: PubMed, Embase, Science direct, Cochrane library
- Citation databases: Scopus, Web of science, google scholar

EBM databases: UpToDate, DynaMed Plus, Cochrane Library - reviews, trials, Epistemonikos, ACP Journal Club

EvidenceAlerts, TRIP Database - Turning Research into Practice, Guidelines*
(through PubMed, TRIP....)

The physician suspects acute community-acquired pneumonia with hypoxemia, and plans chest radiographs, sputum studies, supplemental oxygen and antimicrobial therapy.

What questions you have about this case?

What important pieces of medical knowledge you'd like to have in order to provide better care for this patient?

A medical students' questions:

1. What microbial organisms can cause community-acquired pneumonia?
2. How does pneumonia cause egophony?
3. What is the incidence of community-acquired pneumonia?

Notice that the students' questions ask for general or “*background*” knowledge about pneumonia, the disorder that presumably explains much of this patient's acute illness.

Background Questions

Ask for general knowledge about a disorder

Have two essential components:

1. A question root (who, what, where, when, how, why) with a verb
2. A disorder, or an aspect of a disorder

A practitioners' questions:

In this patient are any clinical findings sufficiently powerful to confirm or exclude pneumonia?

In this patient is a chest radiograph necessary for the diagnosis?

In this patient is the probability of *Legionella* infection sufficiently high to warrant considering covering this organism with the initial antibiotic choice?

In this patient , do clinical features predict outcome well enough that as a “low risk” patient can be treated safely at home?



Notice that these questions ask for specific knowledge about how to diagnose, “prognose”, and treat the patients with pneumonia, which might be called “*foreground*” knowledge.

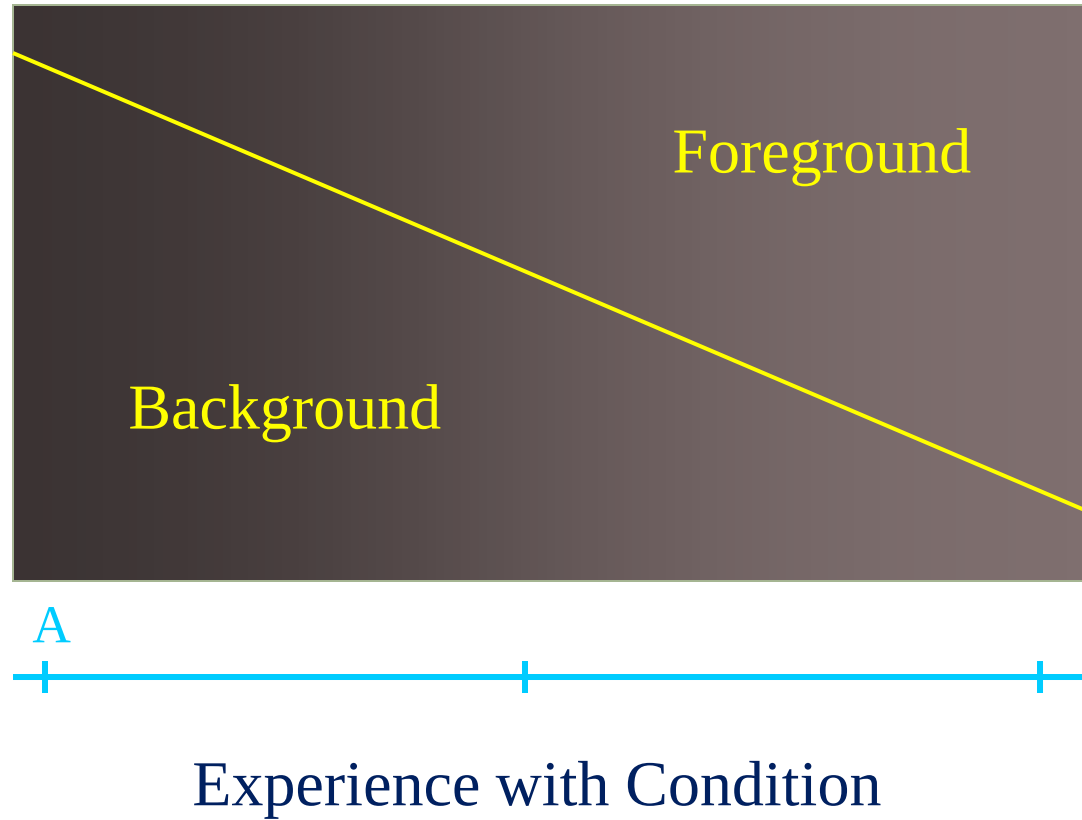
Ask for specific knowledge about managing patients with a disorder

Foreground” Questions

Have four (or three) essential components:

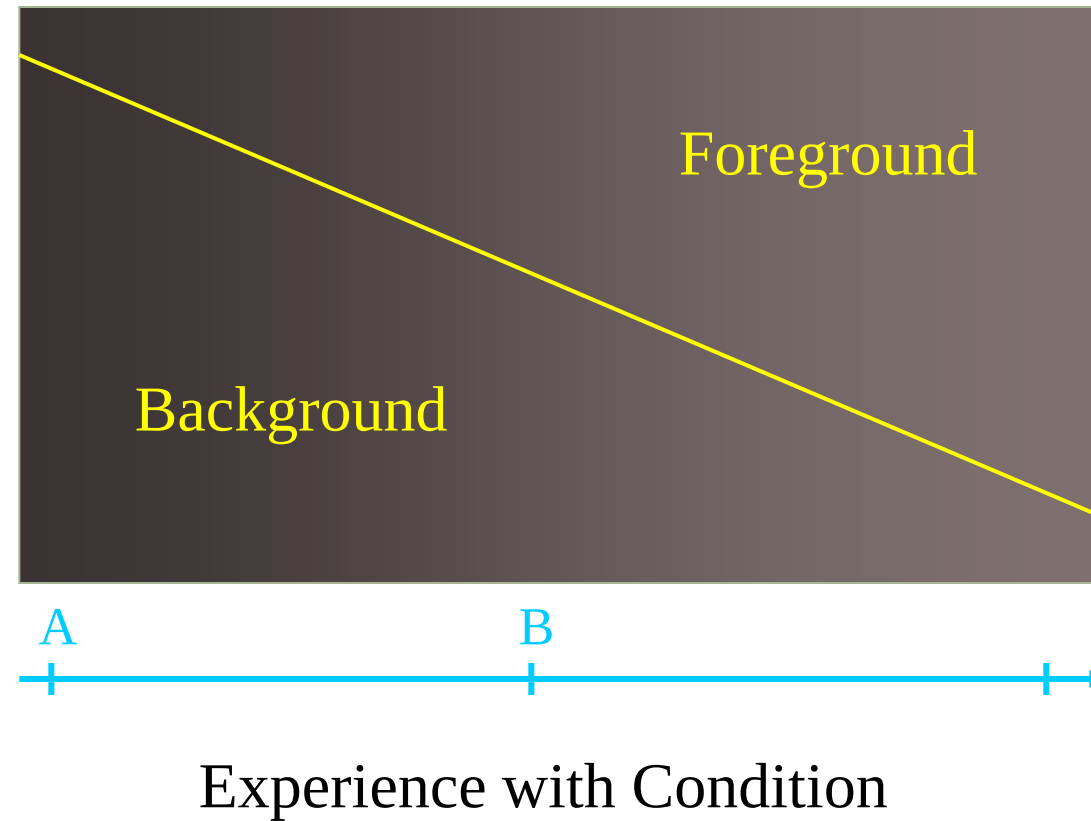
1. The patient and/or problem of interest
2. The main intervention (defined very broadly, including an exposure, a diagnostic test, a prognostic factor, a treatment, a patient perception, and so forth)
3. Comparison intervention(s), if relevant
4. The clinical outcome(s) of interest.

Background and foreground questions



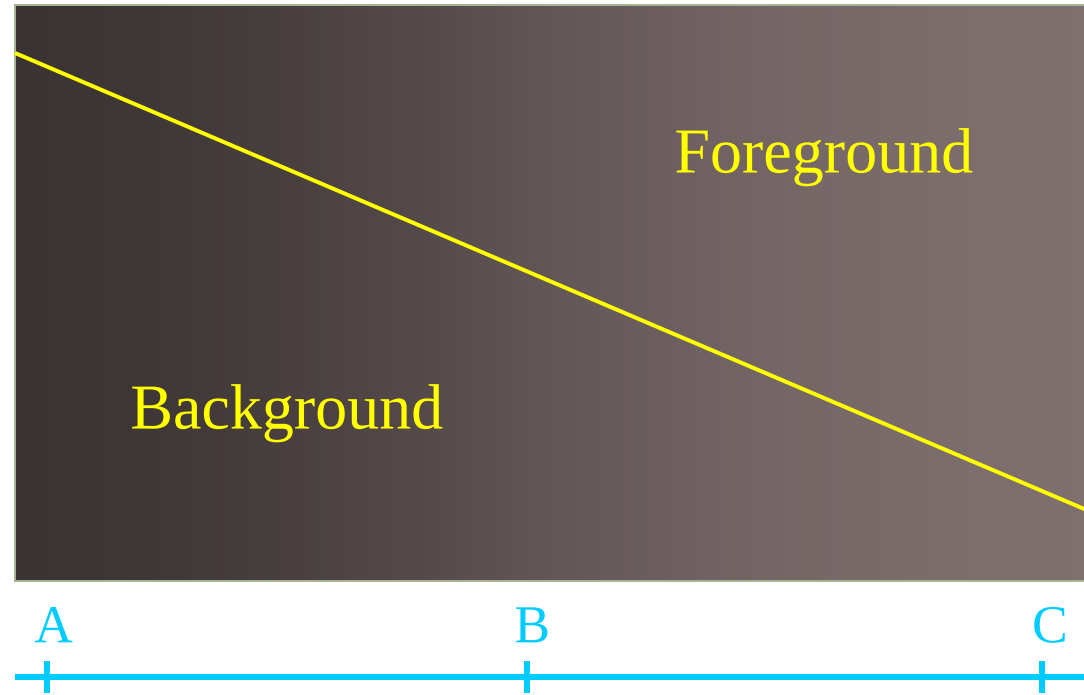
When our experience with the condition is limited, at point “A” (like a beginning student), the majority of our questions might be about “background” knowledge.

Background and foreground questions



As we grow in clinical experience and responsibility, such as at point “B” (like a house officer), we’ll have increasing proportions of questions about the “foreground” of managing patients.

Background and foreground questions



Experience with Condition

Further experience with the condition puts us at point “C”, where most of our questions will be “foreground”.

Clinical practice demands that we use large amounts of both “background” and “foreground” knowledge.

Background vs Foreground Questions

Background:

- What is...?

- Use Textbooks for these

Foreground:

- Specific Clinical Issues

- More Sophisticated Resources

4 Part Questions

Patient or problem

Intervention

Comparison intervention (if necessary)

Outcome(s)

4 Part **PICO** Questions

Patient or problem

Intervention

Comparison intervention (if necessary)

Outcome(s)

First component

Think about who / what you wish to apply this evidence to... e.g.

People with a particular disorder?

e.g. chronic recurrent cystitis

People in a particular care setting?

e.g. community

particular groups of people

e.g. sexually active young women?

the elderly?

children?

How would you describe your clients / setting?

Second component

The intervention / topic of interest (e.g. cause, change in practice etc.) e.g.

Use of cranberry juice (as a drink)

Might want to specify how much / how often

For complex interventions may need to give specific detail / consideration to the description...

What exactly am I considering...?

Third component

The comparison or alternative (not applicable to all questions) e.g.

Anti-biotic therapy?

Nothing?

Fluids alone?

What alternatives actions might I try?

Fourth component

The outcome... e.g.

Cure

Duration of disease
prevention

Death

Side effects

Pain (reduced)

Wellbeing

What am I hoping to accomplish (what outcomes might reasonably be affected...)?

The 4 part clinical question

1. “Population”
2. “Intervention”
3. “Comparison”
4. “Outcome”

“In adult females does cranberry juice reduce the duration of urinary tract infection when compared to no treatment”

4 Domains of EBM

Treatment

Diagnosis

Prognosis

Causation/Etiology

Treatment

P – In a child with frequent febrile seizures

I – would anticonvulsant therapy

C – compared to no treatment

O – result in seizure reduction?

Diagnosis

- P** – In an otherwise healthy 7-year-old boy with sore throat,
- I** - how does the clinical exam
- C** – compare to throat culture
- O** – in diagnosing Streptococcal infection?

Diagnosis

P – In a 15 month old child with FTT

I – is IgA antigliadin antibodies

C – comparable to biopsy

O – in diagnosing celiac disease?

Prognosis

P - In children with Down syndrome,

I - is IQ an important prognostic factor

C –

O – in predicting Alzheimer's later in life?

Prognosis

P – In a 14 year old teen with a low grade frontal oligodendroglioma, who is symptom free

I – receiving standard therapy,

C –

O – what is life expectancy?

Etiology/Harm

P – Controlling for confounding factors, do otherwise healthy children

I - exposed in utero to cocaine,

C – compared to children not exposed

O – have increased incidence of learning disabilities at age six years?

Etiology/Harm

P – Does a newborn

I – given vitamin K at birth

C – compared to no vitamin K

O – have an increase in cancer later in life?

Good ACQ?

Does Amoxicillin work better for otitis media than placebo in children who are in daycare?

Good ACQ?

Is Amoxicillin an effective treatment for children with otitis media?

Good ACQ?

Does the treatment with antibiotics result in more rapid improvement of otitis media than no treatment?

Good ACQ?

Among young children with otitis media, does treatment with Amoxicillin result in more rapid improvement than placebo?

Good ACQ?

Is there something more effective than albuterol in reducing length of hospital stay in children with asthma?

Good ACQ?

In children with acute asthma, does the addition of atrovent to standard therapy with albuterol decrease the rate of hospitalization?

Develop ACQ's for this case (treatment, diagnosis, prognosis, cause)

CC: 18 mo male with ear pain

HPI:

fussy, not eating or sleeping well for the past 2 days

One prior OM ~6mo ago

Attends daycare

Meds – none

PE:

T – 38

Left ear red, bulging, decreased mobility

Few small anterior lymph nodes

Rest of the exam is normal

Treatment

P - Among young children with otitis media,

I - does treatment with Amoxicillin

C – compared with placebo

O - result in more rapid improvement?

Diagnosis

P - Among young children with otitis media,

I - how does the clinical exam

C – compare to tympanocentesis

O – in diagnosing otitis media?

Prognosis

P - Among young children with otitis media,

I - is smoking an important prognostic factor

C –

O – in predicting frequency of disease?

Etiology/Harm

P – controlling for confounding factors, do otherwise healthy children

I – who attend daycare,

C – compared to children who do not

O – have increased incidence of otitis media in the first two years of life?

Example 1

You admit a 65 year old man with a stroke. On examination you find that he has mild weakness of the right arm and right leg and bilateral carotid bruits. You send the patient for carotid doppler ultrasonography and subsequently receive the report that he has moderate stenosis (50-69% by NASCET criteria) of the ipsilateral carotid artery. You've noticed in the pile of journals that is accumulating in your office that there has been some recent literature addressing surgical versus medical (ASA=acetylsalicylic acid=Aspirin) therapy for patients with symptomatic carotid stenosis but you are unsure what the results of these studies indicate.

A clinician could ask the following questions:

1. Can ASA (acetylsalicylic acid, Aspirin) decrease the risk of stroke?
2. Does a carotid bruit predict significant carotid stenosis?
3. How effective is a carotid endarterectomy in someone with moderate carotid stenosis?

How can we make well-built clinical questions from these clinical dilemmas?

Example 1. Prevention

Patient or Problem	65 year old man with a stroke and moderate carotid stenosis
Intervention	ASA
Comparison	placebo
Outcome	stroke
Question	In a 65 year old man with a stroke and moderate carotid stenosis, can ASA decrease the risk of another stroke compared with no treatment?

Example 1. Diagnosis

Patient or Problem	65 year old man with a stroke
Intervention	carotid bruit
Comparison	doppler ultrasonography
Outcome	carotid stenosis
Question	In a 65 year old man with a stroke, how precise and accurate is the presence of an ipsilateral carotid bruit for diagnosing significant carotid stenosis compared with doppler ultrasonography?

Example 1. Therapy

Patient or Problem	65 year old man with a stroke and moderate carotid stenosis
Intervention	carotid endarterectomy
Comparison	ASA
Outcome	stroke
Question	In a 65 year old man with stroke and moderate carotid stenosis, can carotid endarterectomy decrease the risk of stroke compared with medical therapy?

Example 2

You admit a 75 year old man with a stroke (left sided weakness) who is having trouble ambulating, feeding, bathing and dressing himself. He has hypertension but it is well controlled with a diuretic. He is otherwise well and now that he is medically stable you decide after discussion with him to transfer him to a stroke unit. His family asks to see you because they are concerned about this transfer. They live very close to the acute care hospital and wonder why he can't stay on the general medical ward where he currently is. You arrange to meet with him and his family to discuss their concerns. In the meantime, you decide to review the evidence for the use of stroke units.

What clinical questions could you ask?

Example 2

Patient or Problem	75 year old man with a stroke and residual weakness
Intervention	admission to a stroke unit
Comparison	general care
Outcome	functional status
Question	In an elderly man with a stroke, does admission to a stroke unit decrease the risk of death and dependency?

Example 3

You are a GP. Your middle-aged patient comes to see you because of painful, weak, and stiff left shoulder. A few days ago, while lifting some heavy furniture, he felt a pop in the shoulder. You suspect a rotator cuff tear and send him to an orthopedic specialist. Your patient returns after a couple of days, angry because the doctor at the hospital first ordered an MRI, but since the machine was not operational he used the ultrasound, ensuring your patient that “it’s all the same”. Your patient doesn’t believe this to be a valid diagnosis. Can you, by reviewing evidence of diagnostic procedures in such cases, persuade him to see the specialist again?

What clinical questions could you ask?

Example 3

Patient or Problem	middle-aged man with a rotator cuff tear
Intervention	ultrasound
Comparison	MRI
Outcome	diagnosis
Question	Is diagnostic ultrasound imaging as accurate as MRI in detecting partial thickness rotator cuff tear in middle age?

Example:

You admitted 4 year old boy with the diagnosis of bacterial meningitis. Blood tests revealed existence of IgM-class antibodies reactive to antigens from H. influenzae. You wondered how sure can you only by this test confirm the diagnosis, but despite that questions, soon after taking blood sample for hemoculture, you introduced therapy with antibiotics. You are familiar with the fact that 20% of cases of meningitis caused by H. influenzae result in complete or partial hearing loss. You also remember that you read somewhere that risk of this sequel may be lowered by application of dexamethasone.

Ask clinical question, search the literarture, and appraise the results?

Asking clinical question

P atient or P roblem	4 year old man with H. influenzae meningitis
I ntervention	antibiotics+dexamethasone
C omparison	antibiotics only
O utcome	hearing loss
Question	In a 4 year old boy with H. influenzae meningitis, does application of dexamethasone decrease the risk of partial or complete hearing loss?

Factors to consider when deciding which question to answer first include:

1. Which question is most important to the patient's well-being?
2. Which question is most relevant to our learners' needs?
3. Which question is most feasible to answer within the time we have available?
4. Which question is most interesting?
5. Which question is most likely to recur in our practice?

Questions our patients want answered

We need to pause a moment, consider our patient's perspective, and frame a four-part question that will help us assemble the evidence that will help them. This might be initiated by asking them:

“What do *you* think is the problem?”

“Have you any thoughts about what treatment you need/want?”

“What alternatives have you heard about/read about/considered?”

“What benefits do you want/need?”

The 60-second Answerable Question Checklist

- ☐ What decision am I trying to make?
- ☐ What type of question is it?
- ☐ What intervention, test, exposure or phenomenon matters?
- ☐ What outcome matters to the patient / decision?
- ☐ Is this a background or foreground question?
- ☐ Who / what is the population or problem?
- ☐ What is the realistic comparator, if relevant?
- ☐ Can I answer this with available evidence and time?

An introduction to GRADE

Certainty in the body of evidence

High

Further research is very unlikely to change the estimate

Moderate

Further research may change the estimate

Low

Confidence in the estimate is limited

Very low

Confidence in the estimate is very limited

Downgrade domains include risk of bias, inconsistency, indirectness, imprecision, and publication bias.

Five messages to remember

- 1 Start with uncertainty—not with a database.
- 2 A question should be answerable before it is searchable.
- 3 PICO is a scaffold, not a rule for every question.
- 4 Choose the framework that matches the question type.
- 5 Keep the patient-important outcome visible.

“Before you search, stop and ask: “What exactly am I trying to answer?””

Good questions make evidence easier to find, judge, and use.

AI can assist the workflow—but cannot replace appraisal

Useful applications

- Suggest synonyms
- Draft PICO elements
- Organise references
- Create a preliminary summary

Risks

- Fabricated citations
- Omitted negative results
- Misread methods
- False confidence

Verification rule

- Open the original source.
- Check every key claim.
- Read limitations.
- Preserve clinical judgement.

Educational Prescription

Date and place to be filled_____

Educational tasks to be completed before session

Learner:_____ Task:_____

Presentations will cover:

- How you found what you found

- What you found

- The validity and applicability of your find

- How it will alter your management

- How well you think you did

Advantages of the educational prescription

1. It specifies the clinical problem that generated the question.
2. It states the question, in all of its key elements.
3. It specifies who is responsible for answering it.
4. It reminds everyone of the deadline for answering it (taking into account the urgency of the clinical problem that generated it).
5. Finally, it reminds everyone of the steps of searching, critically appraising and relating the answer back to the patient.

EBM databases

- UpToDate
- DynaMed Plus
- Cochrane Library - reviews, trials
- Epistemonikos
- EvidenceAlerts
- ACP Journal Club
- TRIP Database - Turning Research into Practice
- Guidelines* (through PubMed, TRIP....)
- Guidelinecentral
- TheNNT
- Access
- LitCovid

- <https://www.accessss.org/>
- ACCESSSS is a service to help provide current best evidence for clinical decisions.
- It conducts searches simultaneously in several evidence-based information services (online evidence-based texts, evidence-based guidelines and pre-appraised journal publications).
- ACCESSSS also provides email alerts to newly published evidence in the user's chosen area(s) of training/interest.
- Searching ACCESSSS yields content that is hierarchically organized: Always look first at the content available at the highest level of the hierarchy, as it is most likely to be useful for clinical purposes.
- Evidence at all levels of the pyramid has been pre-appraised for scientific merit and clinical relevance. The levels of the pyramid reflect the extent to which the evidence has been integrated into the context of decisions for clinical care, with the most integration at the top



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- Lancet Diabetes Endocrinol. 2025 Dec;13(12):1003-1014. doi: 10.1016/S2213-8587(25)00222-0. Epub 2025 Oct 11. *(Original study)*
- ☐ **Type 2 Diabetes Remission: A Systematic Review and Meta-analysis of Nonsurgical Randomized Controlled Trials.**

★★★★★☆☆
- Diabetes Care. 2025 Dec 1;48(12):2181-2191. doi: 10.2337/dc25-0562. *(Systematic review)*

The NNT Concept (This concept helps understand the effectiveness of treatments in a straightforward manner and aids in clinical decision-making.)



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The NNT Rating system

- TheNNT (thennt.com) is an evidence-based medicine website that summarizes the benefits and harms of medical interventions using the concept of “Number Needed to Treat” (NNT) and related measures.
- Its goal is to help clinicians and patients quickly understand how many people must receive a treatment for one to benefit, and how often important harms occur, using clear, patient-oriented statistics.

- **Green – Clear benefit**

Used when high-quality evidence shows an important net benefit: good NNT (reasonable number treated for one to benefit), serious harms are rare or small, and results are consistent across studies.

- **Yellow – Unclear / more study needed**

Evidence exists but is limited, low quality, inconsistent, or the effect size is small; benefits may exist but are uncertain or borderline compared with possible harms or costs.

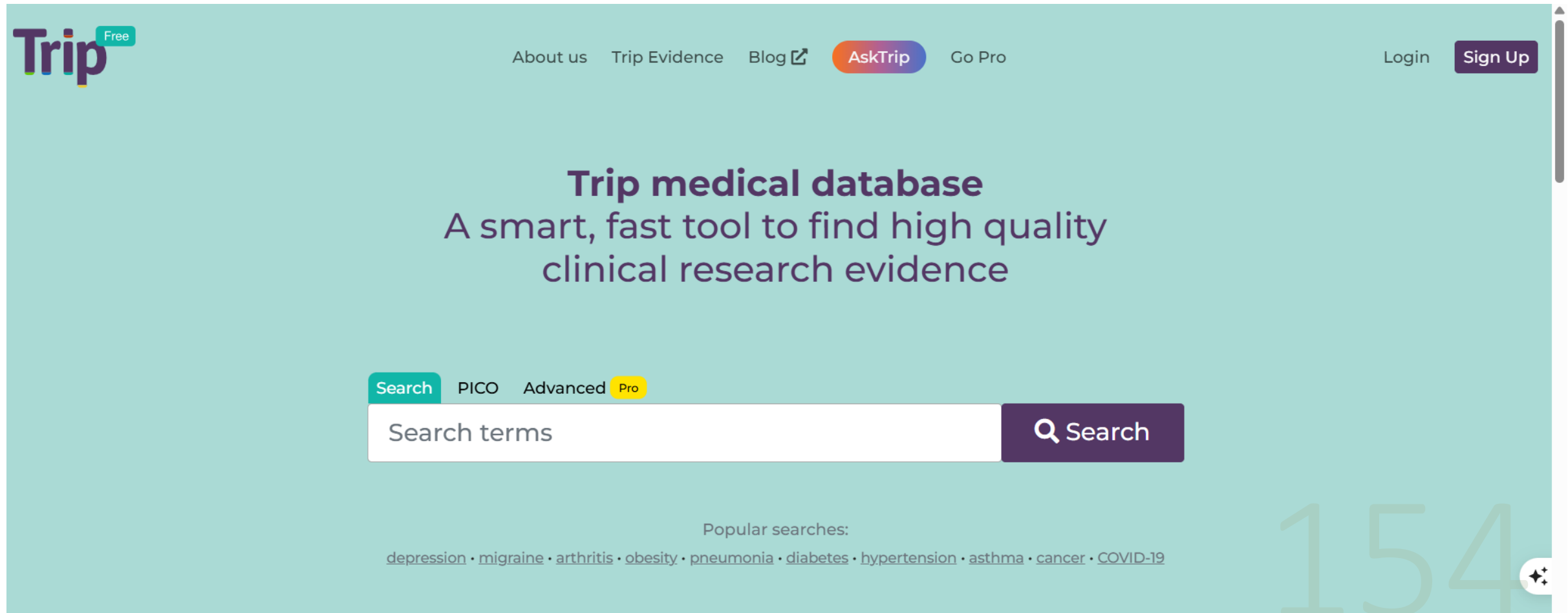
- **Red – No net benefit**

Trials show little or no meaningful benefit (NNT very large or effect ~ 0), or any small benefit is offset by burdens such as adverse effects, cost, or inconvenience, so routine use is not supported.

- **Black – Net harm**

Evidence indicates that important harms outweigh any benefits: NNH is low (harms occur relatively often), or there is clear excess mortality/serious morbidity; the intervention is generally not recommended

- Trip is a clinical search engine designed to allow users to quickly and easily find and use high-quality research evidence to support their practice and/or care.
- As well as research evidence we also allow clinicians to search across other content types including images, videos, patient information leaflets, educational courses and news.



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Selected methodological resources

- • Cochrane Handbook for Systematic Reviews of Interventions, current edition.
- • PRISMA 2020 Statement and Explanation & Elaboration.
- • GRADE Handbook and Summary of Findings guidance.
- • PubMed User Guide and Clinical Queries.
- • Risk-of-bias tools matched to the study design.

REFERENCES

- Centre for Evidence-Based Medicine (University of Oxford). Evidence-Based Medicine: What's in a name?
- Centre for Evidence-Based Medicine. Making a decision; Levels of Evidence.
- U.S. National Library of Medicine. Using PubMed in Evidence-Based Practice: Developing a Clinical Question.
- PubMed / NCBI. Clinical Queries and Clinical Study Categories.
- Cochrane. What are systematic reviews?
- Kloda et al. J Med Libr Assoc. 2020; PICO and alternative clinical question frameworks.
- Vella et al. 2026. A framework for developing PICO research questions with subgroups in clinical practice guidelines.
- Munn et al. 2026. PIECE for evidence implementation projects.

Questions and discussion

Every defensible clinical decision begins with a well-built question.

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Thank you