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What is Evidence Based Medicine?

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Increasing disease rates, limited funding, and the ever-growing scientific basis for intervention demand the use of proven strategies to improve population health. Public health practitioners must be ready to implement an evidence-based approach in their work to meet health goals and sustain necessary resources.

Learning Objectives

- ❑ **Conceiving** the concept of «Evidence» in Medicine & Public Health.
- ❑ *How to **create** scientific, valid, actual qualitative & quantitative Evidences?*
- ❑ **Utilising** required evidence at an optimal scale for problem solving & decision making
- ❑ **Constructing** *Scientific, Legal, Ethical and Professional responsibilities in the Clinical & Public Health Decision Procedures.*
- ❑ **Developing** Reasoning Skills in evaluating Evidences for both clinical care & Public Health Services.
- ❑ *Through **understanding** the nature of relationships among variables.*
- ❑ **Diffrentiating** ordinary / common relationship and **Causality** ties among variables.
- ❑ *No way for making clinical diagnosis, treatment and follow up patients, public health policies – interventions without **laying** on suitable evidences.*

What is EBM?

- ✓ Dave Sackett *et al* state **evidence based medicine** is
- ✓ “The conscientious, explicit and judicious use of current **best evidence** in making decisions about the care of the individual patient.
- ✓ *It means integrating individual clinical expertise with the best available external clinical evidence from systematic research.”*



What is EBM?

Why ??

- Clinicians play an *integral role* in the student's discovery of **Evidence-Based Practice**.
- The clinician's expertise in *clinical decision making* coupled with understanding of patient values helps guide students to utilize **best research** to make *optimal treatment decisions*.

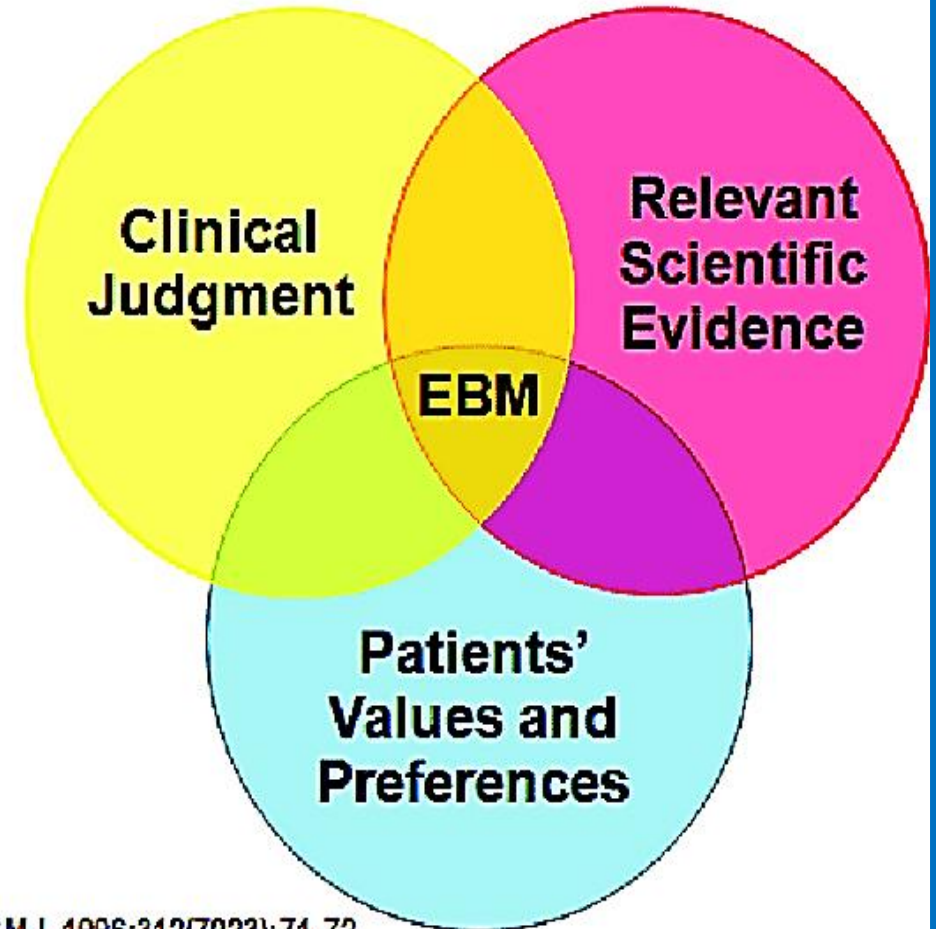
How ??

- ✓ Guide for efficient *literature searching*
- Application of appraising evidence

Library Guide to Evidence-Based Medicine:

https://libguides.slu.edu/clinical_faculty

What Is Evidence-Based Medicine?



Sackett DL, et al. BMJ. 1996;312(7023):71-72.

JNC 8 Guidelines for the Management of Hypertension in Adults

FIGURE. BLOOD PRESSURE GUIDELINES FROM THE AMERICAN HEART ASSOCIATION

Blood Pressure	Systolic mm HG	Diastolic mm HG
Normal	<120	<80
Elevated	120-129	<80
High blood pressure-stage 1	130-139	80-89
High blood pressure-stage 2	≥140	≥90
Hypertensive crisis	<180	<120

The Canadian guidelines, which are more advanced and clear, are³:

- First choice: automatic oscillometric automated office blood pressure (AOBP); high, >135/85 mm Hg
- Non-AOBP: high, >140/90 mm Hg
- Ambulatory BP: high awake, >135/80 mm; Hg; mean 24-hour, >130/80 mm Hg
- Home BP: high, >135/85 mm Hg

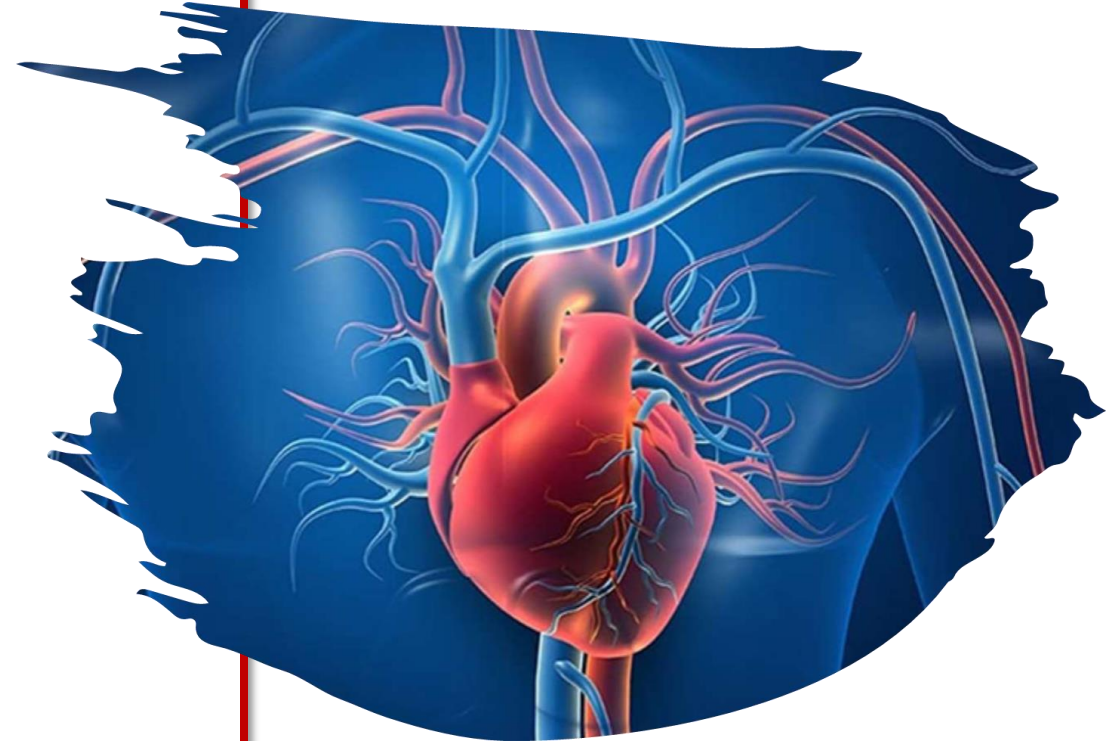
EBM Guidelines for Hypertension Management

Key Points

- **Current Guidelines:** The latest comprehensive recommendations come from the ACC/AHA 2017 Hypertension Guidelines.
- **Blood Pressure Targets:**
 - **Normal:** Less than 120/80 mmHg
 - **Elevated:** 120-129/<80 mmHg
 - **Hypertension Stage 1:** 130-139/80-89 mmHg
 - **Hypertension Stage 2:** \geq 140/90 mmHg
- **Treatment Approaches:**
 - **Lifestyle Modifications:**
 - Weight loss, exercise, low-sodium diet, and limited alcohol intake.
 - **Pharmacologic Therapy:**
 - ACE inhibitors, ARBs, calcium channel blockers, and thiazide diuretics.
 - **For High-Risk Populations:**
 - Special attention to African American adults and those with comorbidities like diabetes and chronic kidney disease (CKD).

EBM Highlights:

- **Clinical Trials:** Evidence from clinical trials supports the use of lower BP targets (e.g., SPRINT trial).
- **Individualized Care:** Patient preferences, risk factors, and response to therapy guide treatment choices.



3 Main Components of EBM

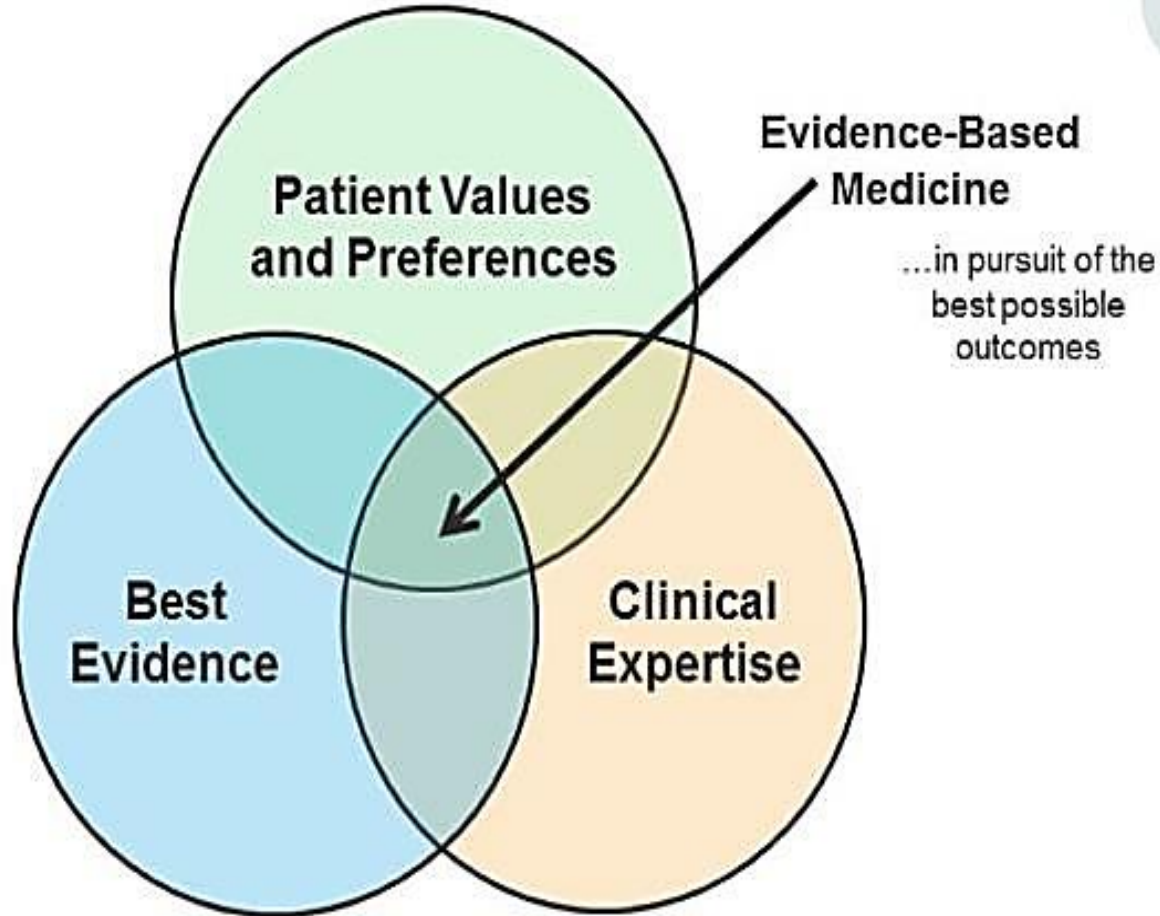
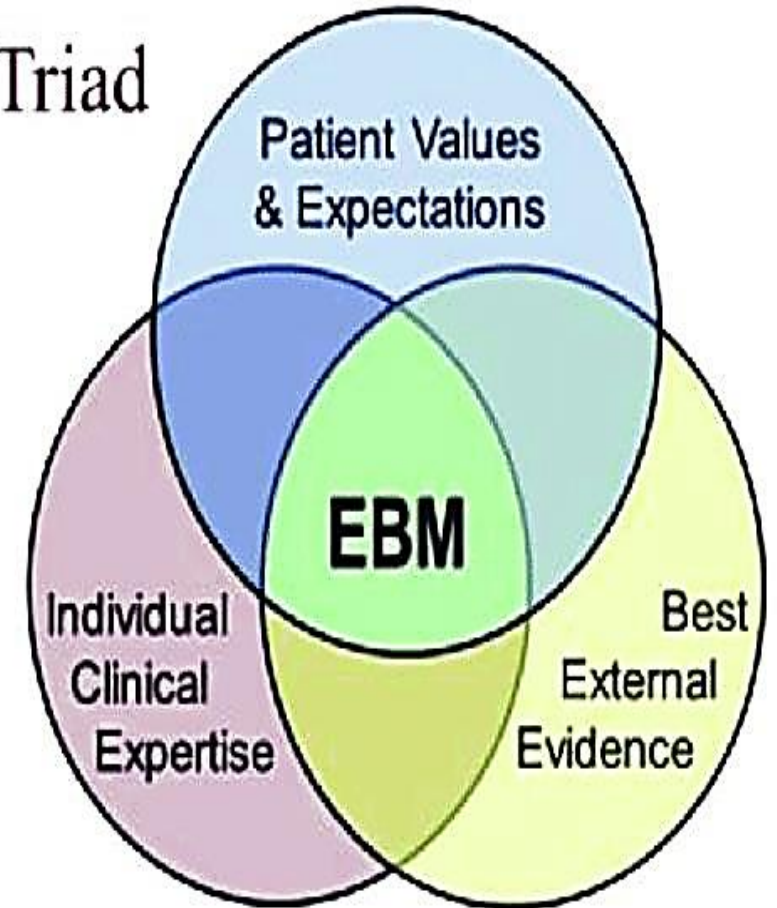


Figure 1: The three components of evidence-based medicine.

The EBM Triad



Armstrong, E.C. (2003) Harnessing new technologies while preserving basic values. *Fam Sys & Health*, (21)4: 351-355

What is Evidence-based Medicine?

- ❑ Evidence-based medicine, as it follows, is the **conscientious, explicit, and judicious** use of current best evidence in making decisions about individual patients.
- ❑ Therefore, EBM's praxis encompasses 2 components:
A combination of **medical expertise** with the best available external **clinical evidence** from systematic research.



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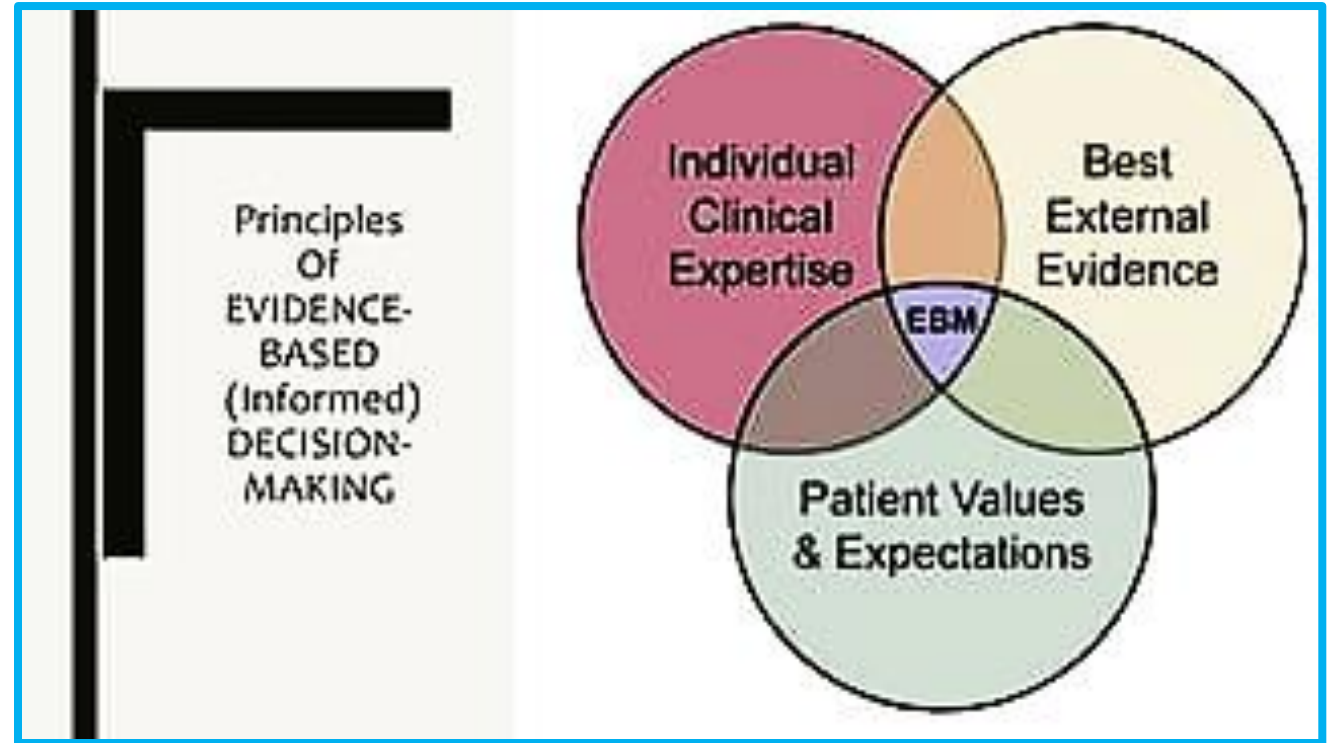
*A combination of **medical expertise** with the best available external **clinical evidence** from systematic research.*

❑ Consequently, according to EBM's concept, medical treatment decisions must be based on the **best available evidence**.

From a philosophical point of view, the EBM's paradigm can be considered as a modern dialogue between **Aristotle and Hippocrates**.

What is Evidence-based Medicine?

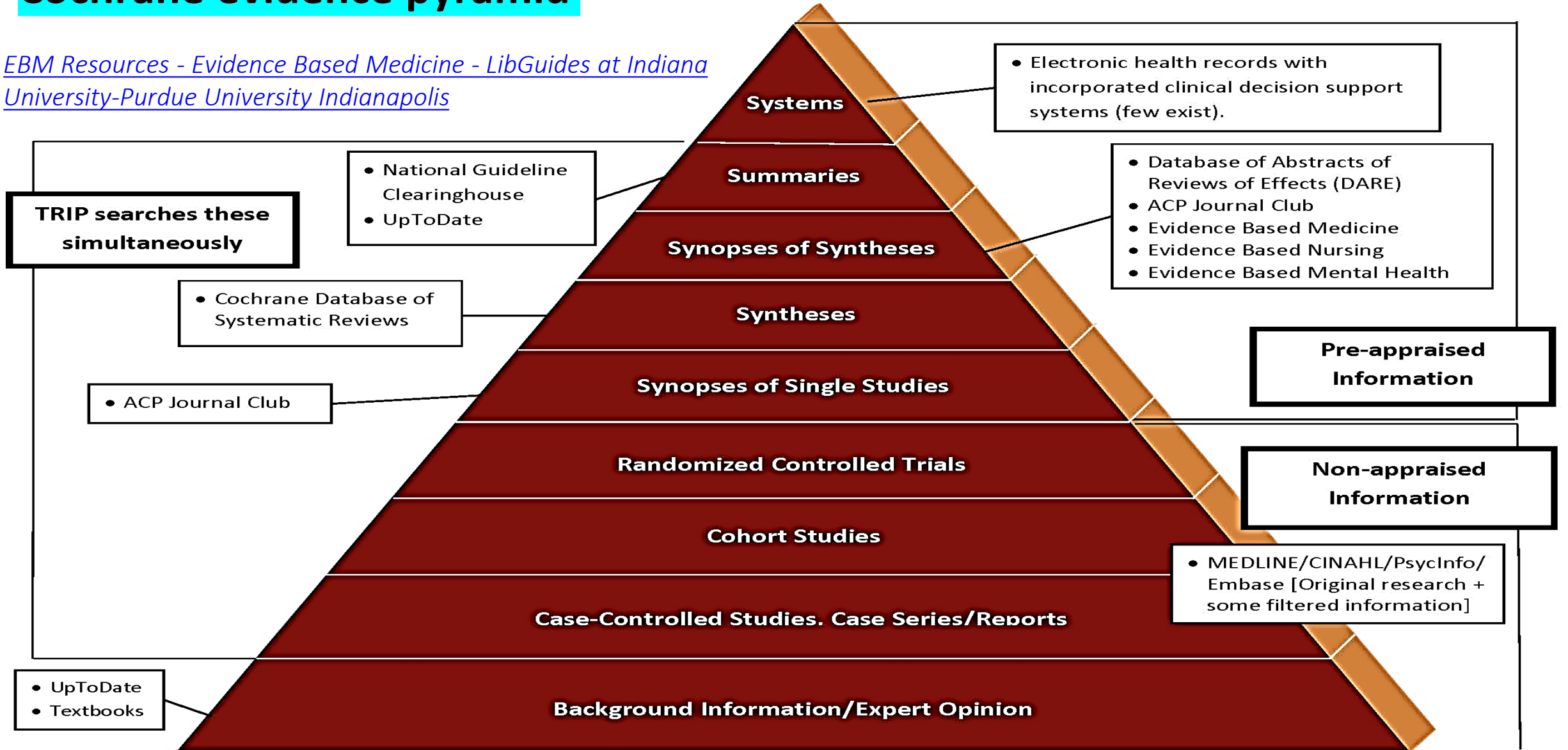
- ❑ Doubtless, EBM is also strongly related to **R. Descartes'** expression to his mentor, **Piere Marin Mersenne**, in 1630, «**Medicine based on infallible demonstrations.**»
- ❑ Between Descartes' and Sackett's expressions, 391 years have passed, however, the foundation of EBM is nothing but the advent of **Clinical Epidemiology.**



Cochrane evidence pyramid

Levels of Evidence Pyramid

[EBM Resources - Evidence Based Medicine - LibGuides at Indiana University-Purdue University Indianapolis](#)



Adapted from Supporting Clinical Care: An Institute in Evidence-Based Practice for Medical Librarians. (2010). Evidence Pyramid. <http://www.dartmouth.edu/~biomed/institute2010/> and The 6S Pyramid <http://hsl.mcmaster.libguides.com/ebm>

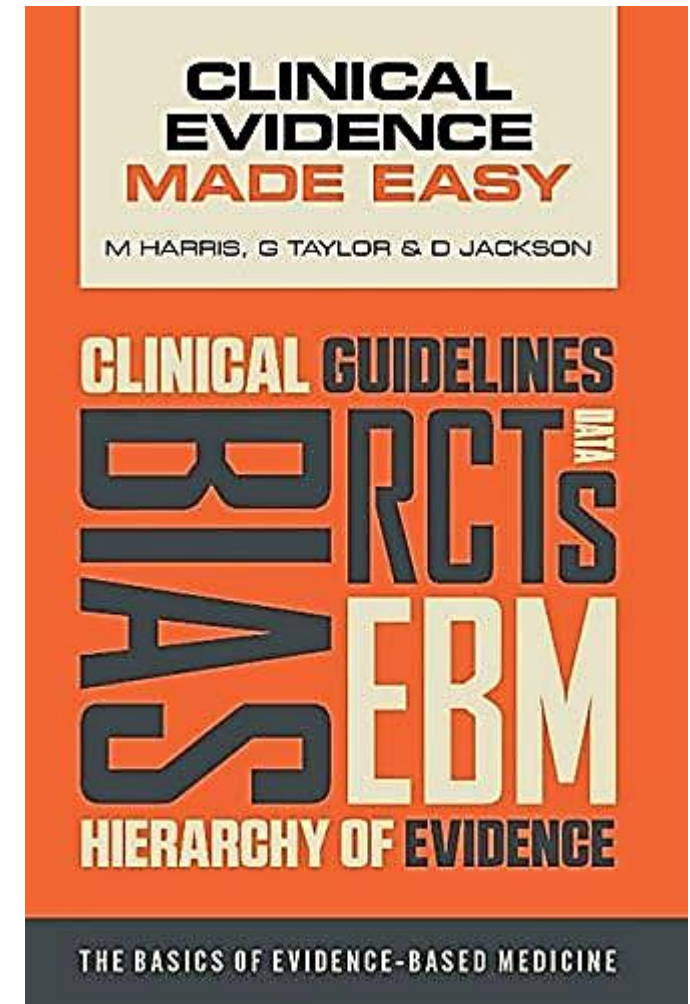
Putting Evidence to Work

- An increasing volume of scientific evidence is now at the fingertips of public health practitioners and other medical staff.
- *Putting this evidence to work can help practitioners meet demands for a systematic approach to **public health** / **medical problems solving that yields measurable outcomes.***
- Practitioners need skills, knowledge, support, and time to implement **evidence- based policies and programs.**



Putting Evidence to Work

- *Many tools exist to help efficiently incorporate the best available evidence and strategies into their work.*
- Improvements in **population health** are most likely when these tools are applied in light of local context, evaluated rigorously, and shared with researchers, practitioners, and other stakeholders.

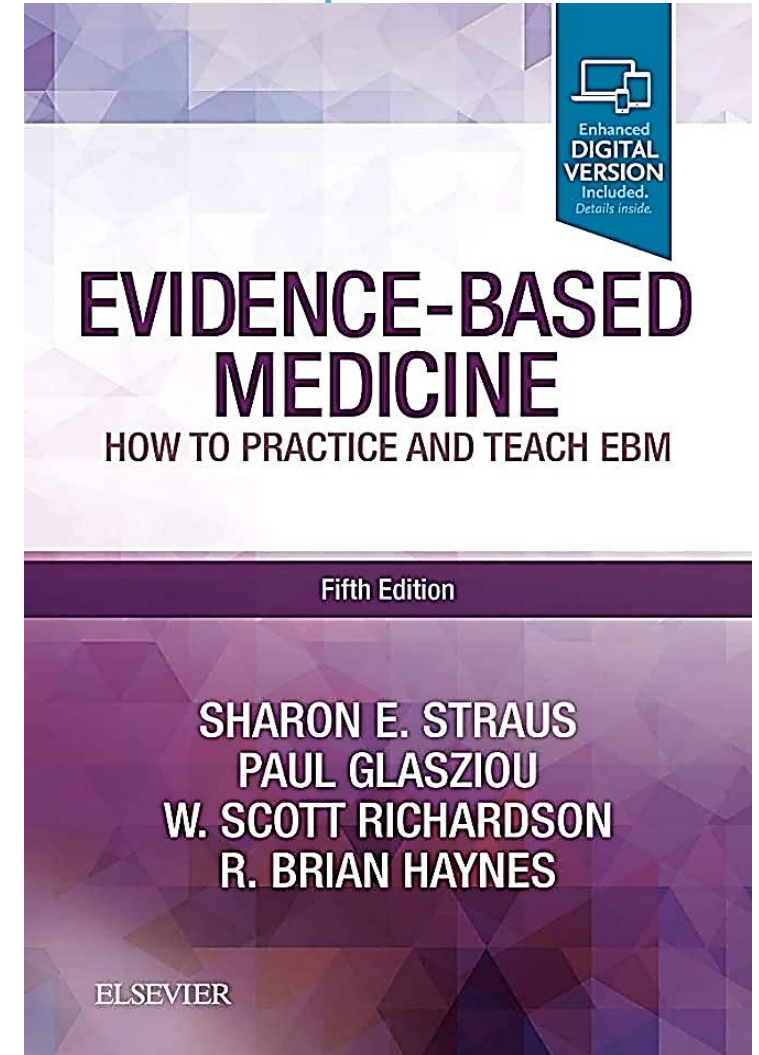


Main Components of Quantitative Decision Making Procedure



Public health decision making

- Public health decision making is a complicated process because of complex inputs and *group decision making*.
- *Public health evidence often derives from cross-sectional studies and quasi-experimental studies, rather than the so-called “gold standard” of randomized controlled trials (RCTs) often used in clinical medicine.*



https://www.cdc.gov/pcd/issues/2012/11_0324.htm

Public health decision making

- Study designs in public health sometimes lack a *comparison group*, and the interpretation of study results may have to account for multiple caveats (*warnings*).
- *Public health interventions are seldom a single intervention and often involve large-scale environmental or policy changes that address the needs and balance the preferences of large, often diverse, groups of people.*

Public health surveillance

- ❖ Public health surveillance is a critical tool for understanding a community's health issues.
- ❖ *Often conducted through national or statewide initiatives, surveillance involves ongoing systematic collection, analysis, and interpretation of quantitative health data.*
- ❖ Various health issues and indicators may be tracked, including deaths, acute illnesses and injuries, chronic illnesses and impairments, birth defects, pregnancy outcomes, risk factors for disease, use of health services, and **vaccination coverage**.

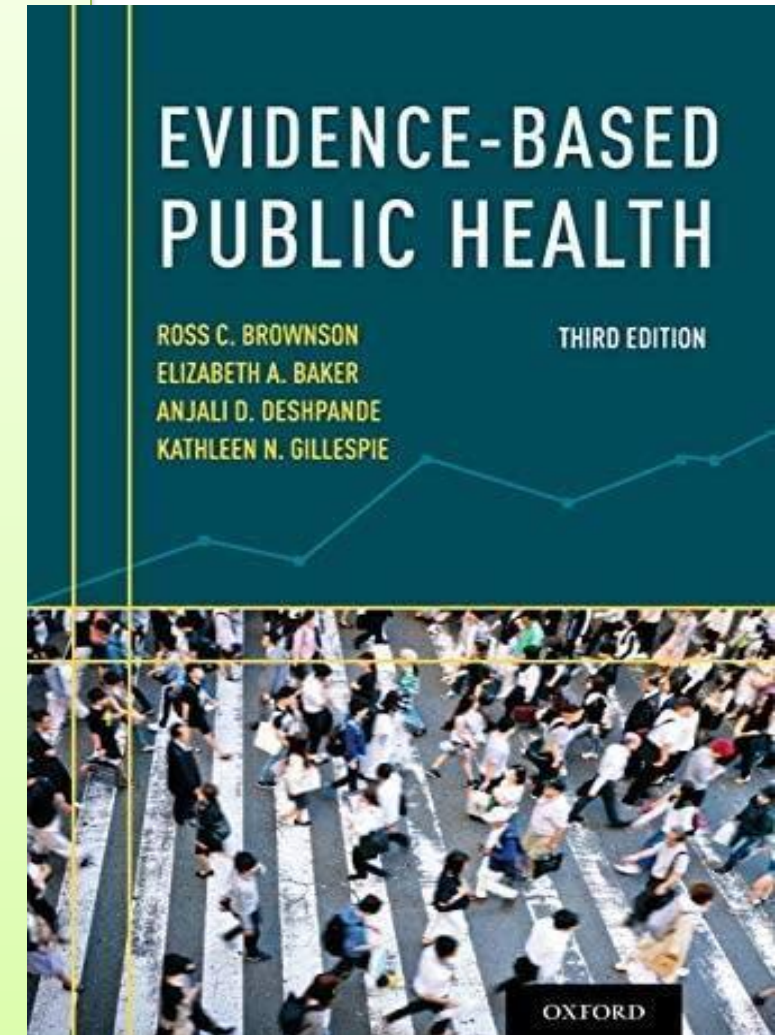
EVIDENCE BASED PUBLIC HEALTH

❖ **Evidence based public health** can be defined as a public health endeavour in which there is an informed, explicit, and judicious use of evidence that has been derived from any of a variety of science and social science research and evaluation methods.

❖ The definition highlights 2 aspects of evidence based public health:

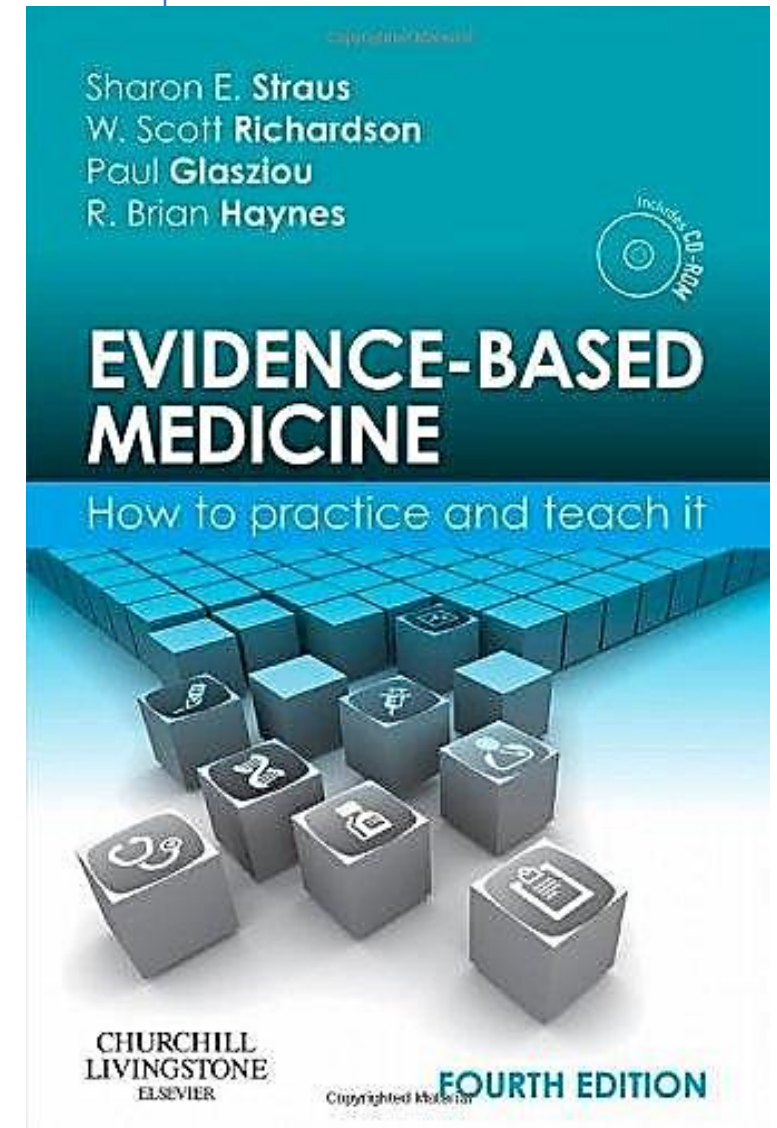
❖ (1) *the use of a particular type of evidence to inform public health decisions; and*

❖ (2) *an emphasis on clear reasoning in the process of appraising and interpreting that evidence.*



Selecting evidence

- ❖ Once health needs are identified through a **community assessment**, the scientific literature can identify programs and policies that have been effective in addressing those needs.
- ❖ *The amount of available evidence can be overwhelming; practitioners can identify the **best available evidence** by using tools that synthesize, interpret, and evaluate the literature.*



Three Buckets of Prevention

**Traditional Clinical
Prevention**



**Innovative Clinical
Prevention**



**Total Population or
Community-Wide Prevention**



Health Care

Public Health





***“Education is love, setting a good example;
nothing else.”***

**Swiss Johann Heinrich Pestalozzi,
one of the pioneers of modern education:**



With bucket 3, the focus shifts..

- It includes interventions that are no longer oriented to a single patient or all of the patients within a practice or even all patients covered by a certain insurer.
- *Rather, the target is an entire population or subpopulation usually identified by a geographic area.*
- Interventions are based not in the doctor's office but in such settings as a neighborhood, city, county or state.
- *3 This bucket is the one that is most unfamiliar to the clinical sector but quite comfortable to the public health sector.*

Study Types for producing evidence

- ❑ **Descriptive**: To identify the qualities and distributions of variables;
- ❑ **Taxonomic**: *To compare and classify variables into related groups or categories;*
- ❑ **Analytic**: To examine associations between variables, these may be hypothesised ***causal*** or ***therapeutic*** relations;
- ❑ **Interpretive**: *To identify and explain meanings, usually from a particular perspective;*
- ❑ **Explanatory**: To make observations intelligible and understandable; and
- ❑ **Evaluative**: *To determine quality and worth, often assessing the relevance, effectiveness, and consequences of activities.*

3 Types of Reasoning

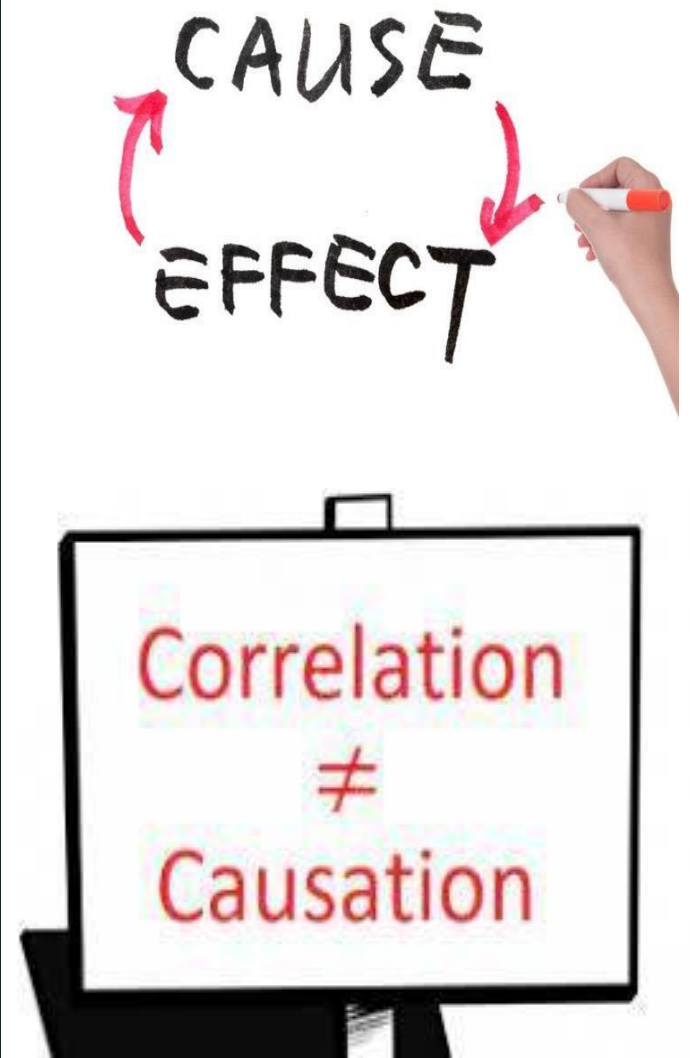
❖ **Reasoning** refers to the process of drawing inferences or conclusions from premises, facts, or other evidence.

It is valuable to distinguish between 3 types of reasoning :

1. **Induction** *refers to reasoning that proceeds from the particular to the general. Thus induction is applied to infer general conclusions or general theory from empirical data, such as particular observations or cases.*
2. **Deduction** *refers to reasoning that proceeds from the general to the particular. Thus deduction relies on general theory to infer particular conclusions.*
3. **Abduction** *refers to reasoning that makes an inference to the best available explanation; that is, selecting from a number of possibilities the hypothesis that provides the best explanation of the available evidence.*

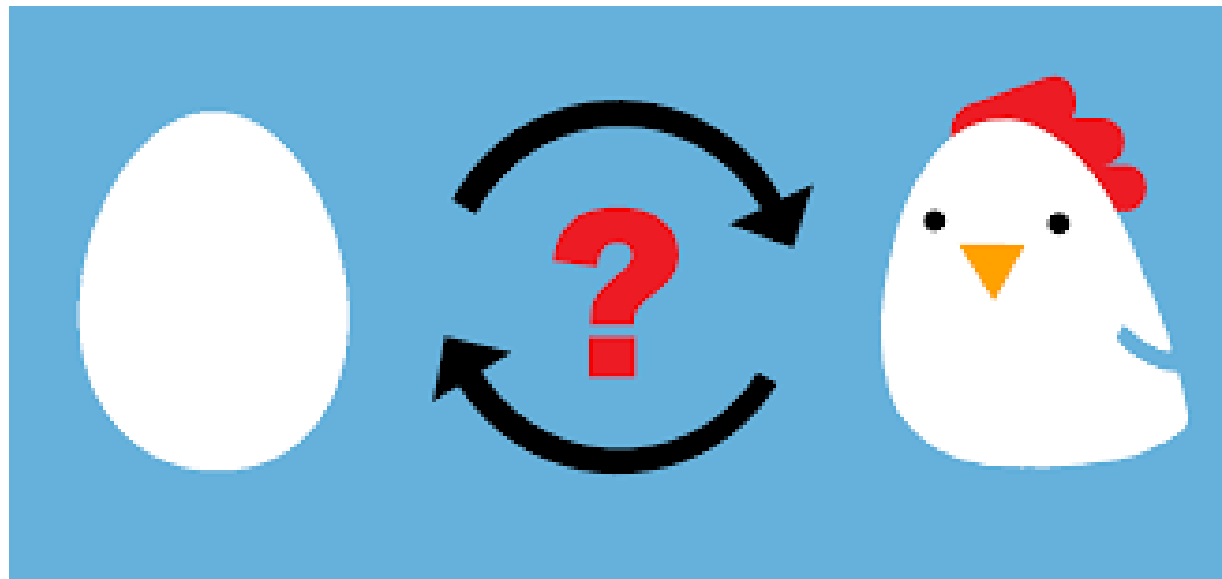
CAUSALITY...

- ❑ **Causality** is “the relating of causes to the effects they produce”.
- ❑ Broadly, causality is about production in the sense that a cause is something that produces or creates an effect.
- ❑ **Causality** is fundamental to two aspects of *evidence based public health*:
 - (1) demonstrating and understanding the causes of public health problems;
 - (2) establishing the probability and nature of causal relations between an intervention and its effects



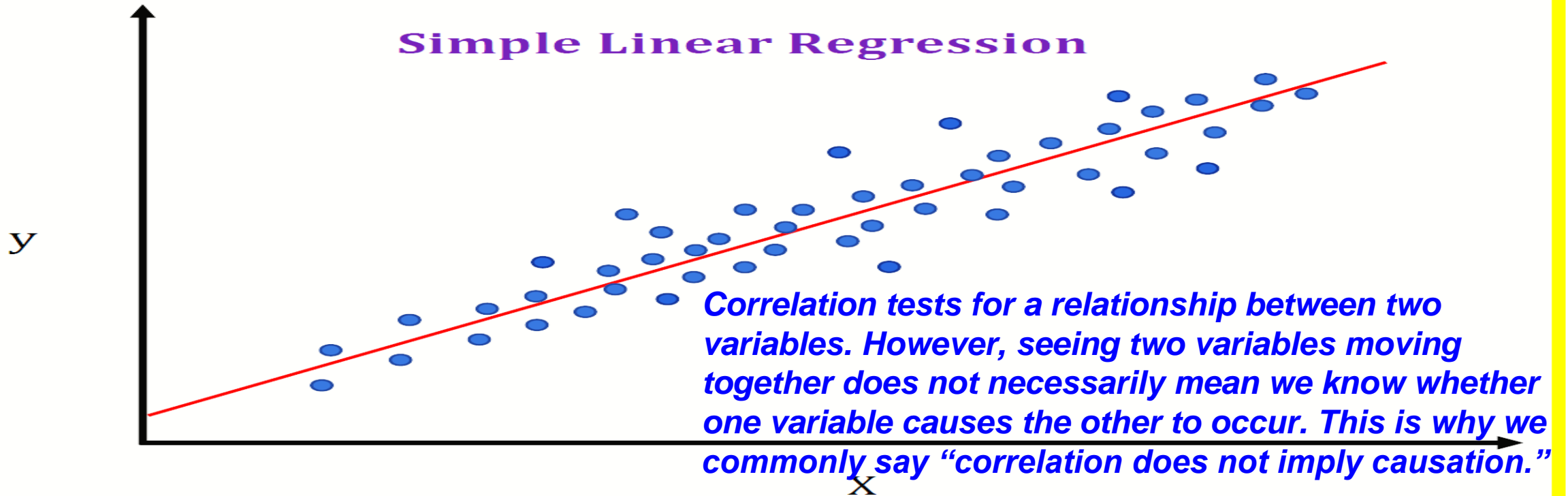
CAUSALITY...

- ❑ Traditional public health research has focused on the former (*the magnitude and aetiology of disease*), but the literature on ***evidence based practice*** has emphasised methods and processes for generating, appraising, and applying intervention research.



Strong correlation; is it causal / causative??

Simple Linear Regression



- A strong correlation *might* indicate **causality**, but there could easily be other explanations:
- *It may be the result of random chance, where the variables appear to be related, but there is no true underlying relationship.*
 - There may be a third, lurking variable that that makes the relationship appear stronger (or weaker) than it actually is.

F R E Q U E N C Y & R A T E

- ❖ The magnitude and severity of public health problems are often expressed as **measures of frequency** or **proportions and rates**.
- ❑ **Prevalence** is the proportion of people in a population who have some attribute or condition at a given point in time or during a specified time period.
- ❑ **Incidence (incidence rate)** is the number of new events (for example, new cases of a disease) in a defined population, occurring within a specified period of time.
- ❑ **Incidence proportion (cumulative incidence)** is the proportion of people who develop a condition within a fixed time period. An incidence proportion is synonymous with **risk**. For ex. the proportion of people who develop a condition during their lifespan represents the lifetime **risk of disease**.

Incidence Proportion (*Cumulative Incidence*)

Definition of Incidence Proportion (Cumulative Incidence):

It is the proportion of an initially disease-free population that develops a specific condition over a defined period. This is calculated as:

Incidence Proportion = (Number of new cases / Total population at risk) × 100

It provides an idea of **risk** over a specified time period.

Concrete Example / Scenario :

A town has 1,000 residents who are all free from hypertension at the beginning of a 5-year study. During these 5 years, 50 residents develop hypertension.

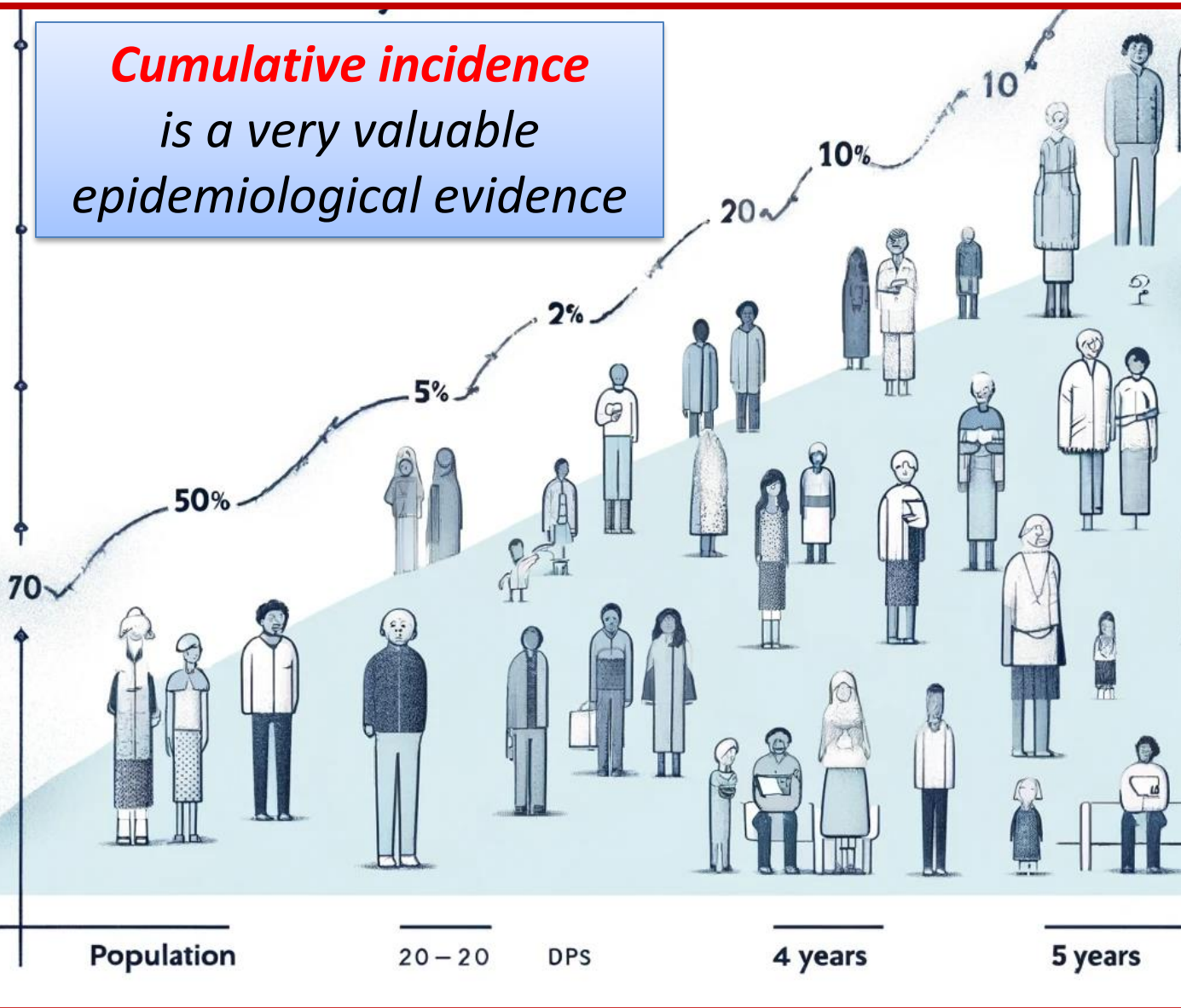
Cumulative Incidence Calculation:

Incidence Proportion = $(50/1000) \times 100 = 5\%$

So, 5% of the population developed hypertension during the study period.

Incidence Proportion (*Cumulative Incidence*)

Cumulative incidence
is a very valuable
epidemiological evidence



Here is a schematic illustration representing **Cumulative Incidence** over a 5-year period for a population of 1,000 people, where 50 individuals develop a disease (*like hypertension*).

The image visually depicts how the disease progresses, moving a portion of the population from the healthy group to the affected group over time, highlighting the **5% incidence proportion**.

Underlying Medical Conditions and Severe Covid-19

- ❑ While age is the strongest risk factor for **severe COVID-19** outcomes, studies have shown that COVID-19 does not affect all population groups equally.
- ❑ *The risk of severe COVID-19 (e.g., hospitalization, admission to the intensive care unit (ICU), intubation or mechanical ventilation, death) increases with the number of underlying medical conditions.*



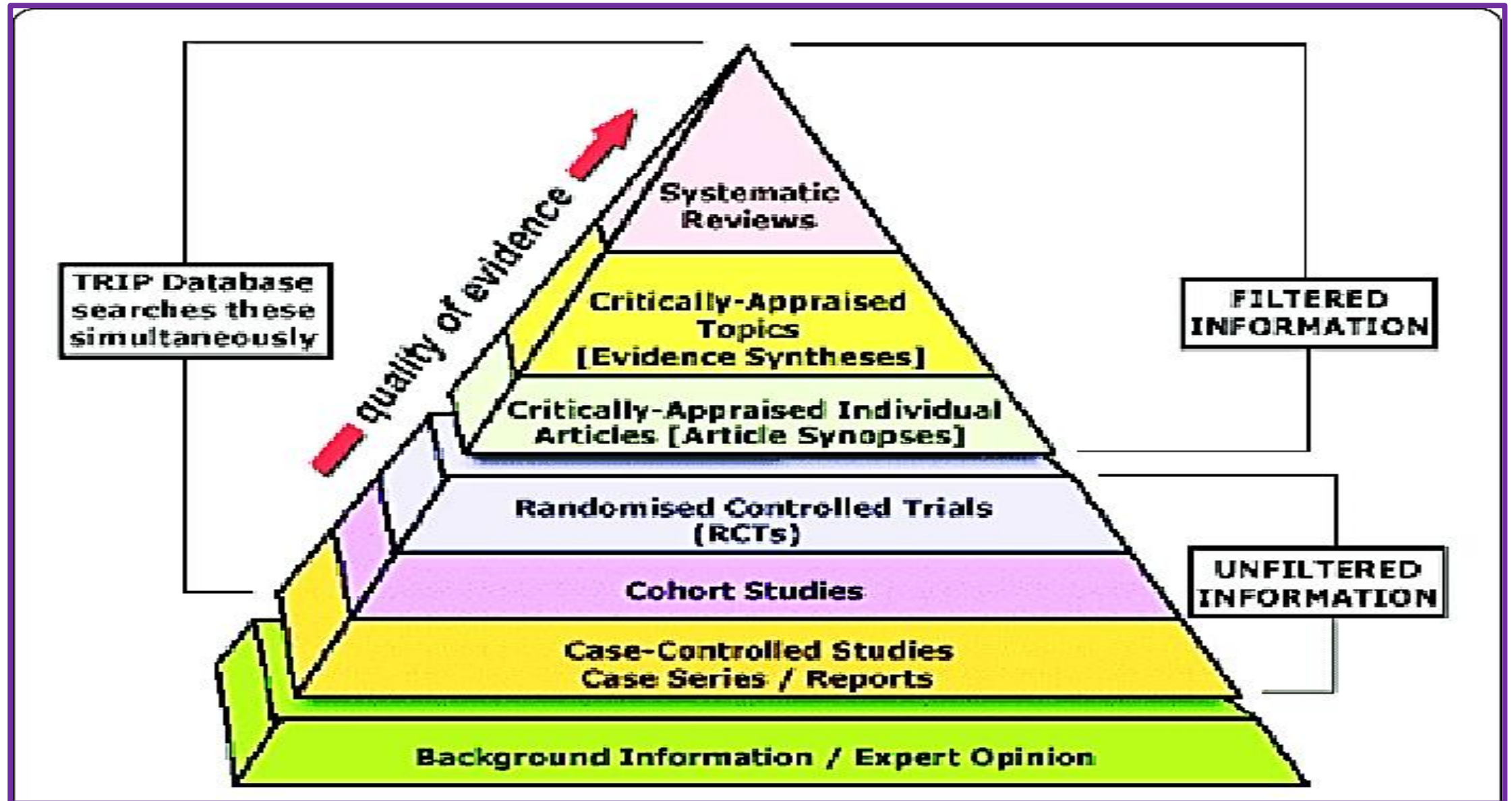
Evidence-Based Public Health



Decisions for Public Health Practice

- Interventions
- Programs
- Policies

Pyramide of Proof

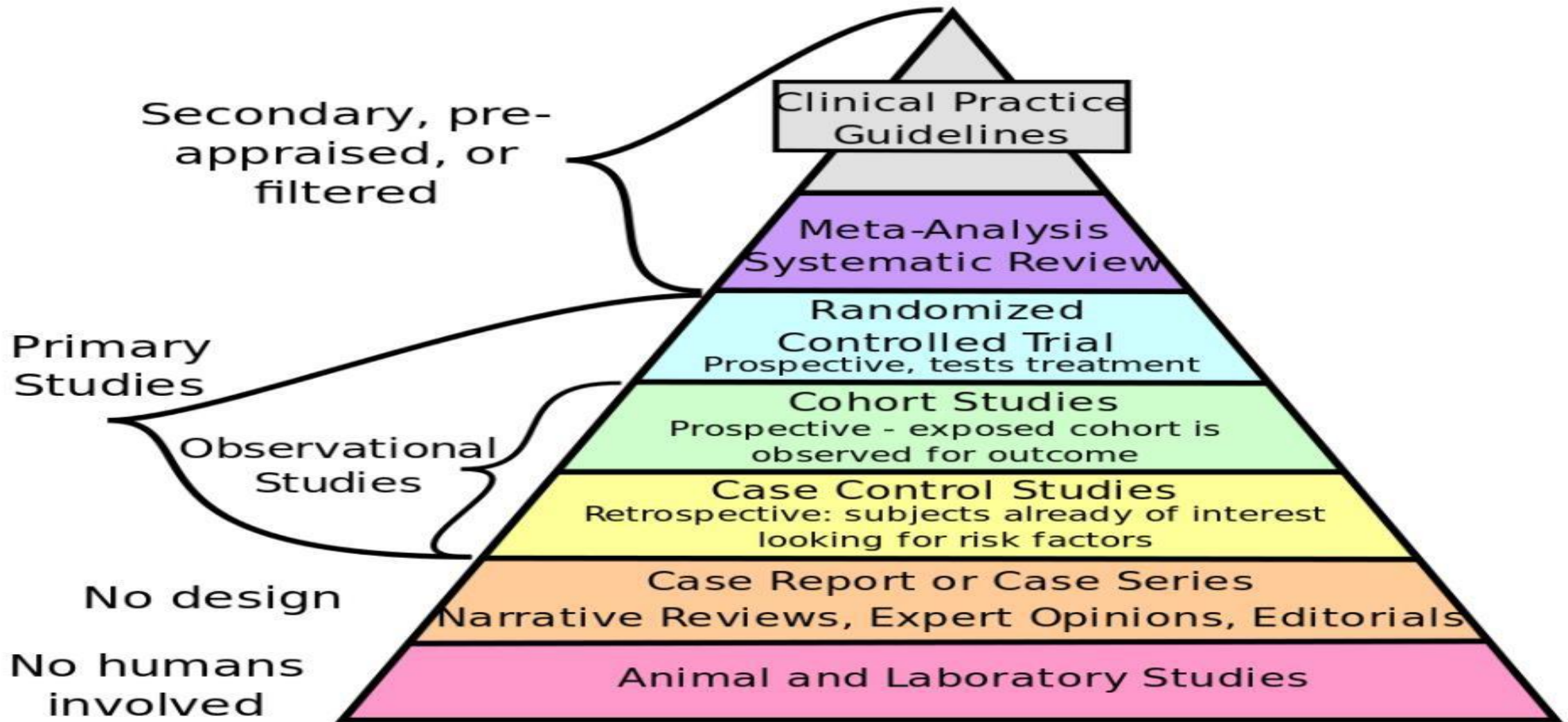


ERA of “EVIDENCE- BASED MEDICINE

Anish Koka recently wrote a great piece entitled “*In Defense of Small Data*” that was published on The Health Care Blog.

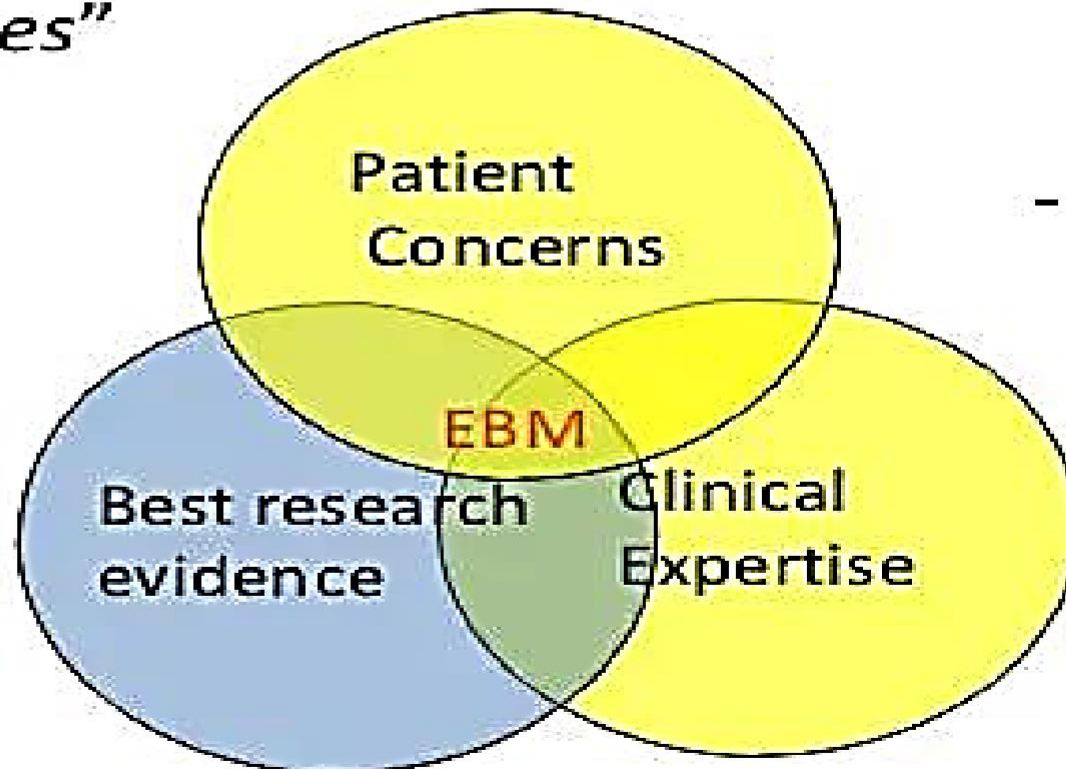
- ❑ *We live in the era of “evidence- based medicine,” or EBM, which began about 50 years ago.*
- ❑ Reflecting on the scientific standards that the medical field has progressively imposed on itself over the last few decades,
- ❑ *I can make out that demands for better scientific methodology have ratcheted up 4 levels:*
- ❑ Beginning in the late 1960s, and then throughout the 1970s, some began to call attention to the need for better statistical science in research publications.

The devolution of evidence-based medicine



Why is EBM important?

“Evidence-based medicine is the integration of best *research evidence* with *clinical expertise* and *patient values*”



- *Dave Sackett*

Slide courtesy Prof Paul Glasziou, CE BM

Conclusion...

- The terms '**evidence-based medicine**' and '**evidence-based health-care**' were developed to encourage practitioners and patients to pay due respect –*no more, no less*– to current evidence in making decisions.
- **Evidence** should enhance health-care decision making, not rigidly dictate it.
- Public health practitioners need to consider their population's health- and social-care needs and what effective interventions are available to meet them.
- **Finally, the practitioner must consider society's and individuals' preferences.**
- **The art of EBHC** lies in bringing all these considerations together.

Evidence-based health-care Padmanabhan Badrinath and Stephen Gillam, PDF, in Essential Public Health Theory and Practice, 2nd ed 2012

Quick reminders-1...

1. EBM is the use of the current best evidence for patient care, integrating clinical experience, patient values and preferences, and research findings.
2. The key steps in EBM are: Asking a focused clinical question, acquiring the best available evidence, appraising the evidence for its validity and relevance, applying the evidence to the patient's situation, and assessing the effectiveness and efficiency of the process.
3. The most common types of clinical questions are about diagnosis, therapy, prognosis, harm, and prevention. A useful framework for formulating these questions is PICO: Population, Intervention (or Exposure), Comparison, and Outcome.
4. *The best available evidence is usually found in systematic reviews and meta-analyses, which synthesize the results of multiple primary studies on a specific topic. Other sources of evidence include randomized controlled trials-RCTs, cohort studies, case-control studies, case reports, and expert opinions.*

Quick reminders-2...

5. To appraise the evidence for its **validity and relevance**, you need to consider the study design, the risk of **bias**, the statistical methods, the results, and the applicability to your patient. You can use tools such as checklists and critical appraisal worksheets to help you with this step.

6. To apply the evidence to your patient's situation, you need to consider the benefits and harms of the intervention (or exposure), the patient's preferences and values, the feasibility and availability of the intervention (or exposure), and the **ethical and legal** implications of your decision.

7. To assess the **effectiveness and efficiency** of the EBM process, you need to reflect on your performance, identify areas for improvement, seek feedback from peers and mentors, and monitor the outcomes of your actions.

Quick reminders-3...

8. EBM is a *lifelong learning* skill that requires constant updating and practice.

You can use online resources such as databases, journals, websites, blogs, podcasts, and social media to keep up with the latest evidence and learn from experts in the field.

9. *EBM is not a rigid or dogmatic approach to medicine. It is a flexible and dynamic way of thinking that allows you to adapt to new situations and challenges.*

It also encourages you to be curious, critical, and creative in your clinical practice.

10. EBM is not only beneficial for patients but also for yourself as a medical student and future doctor. It can help you improve your knowledge, skills, confidence, communication, collaboration, professionalism, and satisfaction in your career.

Evidence-based medicine (EBM) for undergraduate medical students in Sudan: sources of information, knowledge about terms, skills related to EBM and attitude toward EBM in Sudan | BMC Medical Education | Full Text (biomedcentral.com)

**Any QUESTIONS?
or COMMENTS??**

f o r



*Thank you
for joining..*



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