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**Харківський національний медичний університет**  
**Кафедра Внутрішньої медицини №3**  
**Факультет VI по підготовці іноземних студентів**

**ЗАТВЕРДЖЕНО**

**на засіданні кафедри внутрішньої медицини №3**

**«29» серпня 2016 р. протокол № 13**

**Зав. кафедри \_\_\_\_\_ д.мед.н., професор Л.В. Журавльова**

**МЕТОДИЧНІ ВКАЗІВКИ**

**для самостійної роботи студентів**

**з дисципліни «Внутрішня медицина (в тому числі з ендокринологією)**  
**студенти 4 курсу I, II, III медичних факультетів, V та VI факультетів по**  
**підготовці іноземних студентів**

**Principles of evidence based medicine.**

**Харків 2016**

**Topic 1. Principles of evidence based medicine. Definition of evidence based medicine. Role of evidence based medicine in clinical practice. Parts of evidence based medicine. The main concept of clinical investigations. Medical and ethic aspects of evidence based medicine.**

**Definition of evidence based medicine.** Evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research. (From BMJ 1996; 312:71-72)

Evidence-based medicine asks questions, finds and appraises the relevant data, and harnesses that information for everyday clinical practice.

**Role of evidence based medicine in clinical practice.**

***Why do we need EBM? Lifelong Learning.***

- Old method: read a few journal articles per week
- Reality:
  - Primary care docs would need over 17 hrs/day just to review reasonable and pertinent material
    - Even in one narrow specialty would need 6+hrs/wk
    - Practicing docs (all specialties) average 1-1.5 hrs/wk
- Reading the articles that happen to cross the desk **does not** help **MY PATIENTS TODAY**
- Finding evidence based optimal care for my patients today helps them AND helps me to stay current in my field and be an efficient and effective lifelong learner
- “The practice of evidence-based medicine is a process of lifelong, self-directed, problem-based learning in which caring for one's own patients creates the need for clinically important information about diagnosis, prognosis, therapy and other clinical and health care issues.”

***The Process of practical use of EBM***

- **ASK:** Formulate an answerable clinical question
- **ACCESS:** Track down the best Evidence
- **APPRAISE:** Appraise the evidence for its validity and usefulness
- **APPLY:** Integrate the results with your clinical expertise and your patient values/local conditions
- **ASSESS:** Evaluate the effectiveness of the process

Step 1: **ASK** an answerable clinical question

<b>P</b>	patient, population, problem	Who?	"How would I describe a group of patients similar to this particular patient?"
<b>I</b>	<b>intervention</b>	What?	"Which treatment, test or other intervention?"
<b>C</b>	<b>comparison</b>	Alternative Intervention?	"Compared to what other treatment, test, or perhaps compared to doing nothing"
<b>O</b>	<b>outcome</b>	Outcomes	What is the patient oriented outcome – better prognosis? Higher rate of cure? Etc.?"

Examples

P	I	C	O
Kids with acute otitis media -2-4 y/o	Antibiotics	No treatment except acetaminophen for pain/fever	No pain after two days?
Adult with microhematuria	IVP	CT scan	Diagnostic accuracy (Predictive value or likelihood ratio)
Adult patients <70	TIA	No TIA	Rates of CVA within 90 days
Healthy adolescents	Routine scoliosis screen	No screening – evaluate only if problems	Pain, disability, need for intervention

**Why should I use PICO?**

- To help define problem in clarify it in your own mind
- To prepare for searching
- To ask patient centered questions. Treatment of Pneumococcal Pneumonia SHOULD be different for
  - Terminal Cancer Patient
  - Elderly, Severely Demented Patient

- Young, mother of 2 children
- Developing the question requires:
  - Some background knowledge of the condition
  - Understanding of the patient and what are the outcomes and beliefs that matter to this patient
    - Death? Disability? Quality of life? Cost? Improvement of symptoms?
- To help define problem in clarify it in your own mind
- To prepare for searching
- To ask patient centered questions. Treatment of Pneumococcal Pneumonia SHOULD be different for
  - Terminal Cancer Patient
  - Elderly, Severely Demented Patient
  - Young, mother of 2 children
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  - Understanding of the patient and what are the outcomes and beliefs that matter to this patient
    - Death? Disability? Quality of life? Cost? Improvement of symptoms?

***Example: Intervention Questions***

- Identify background questions, create a PICO and a focused clinical question for this case:

54 year old male patient was diagnosed with intermediate grade prostate cancer and wants to know whether to get a radical prostatectomy or radiation treatment. He is concerned about death from prostate cancer and also risks of impotence and incontinence.

***Example: Formulate the Clinical Question***

- **PICO**
  - **P** – 54 year old male with intermediate grade prostate cancer
  - **I** – radical prostatectomy
  - **C** – radiation treatment
  - **O** – reduce risk of mortality, impotence, and incontinence

- Focused clinical question  
In 54 year old male patients with intermediate grade prostate cancer is radical prostatectomy more effective compared to radiation treatment in reducing the risk of mortality, impotence, and incontinence?

Step 1a: Classify the type of the question

- What is the treatment?  
Question of INTERVENTION/PREVENTION/THERAPY
- What causes the problem?  
Question of ETIOLOGY, RISK, HARM
- Does this person have the problem?  
Question of DIAGNOSIS
- Who (and how likely) will get the problem?  
Question of PROGNOSIS

**Etiology and Risk Questions**

- What causes a disease or health condition?
- The reverse of intervention questions-they deal with harmful outcomes of an activity or exposure (public health issues)
- **Develop a clinical question for the case:**

S.Patient is a smoker and just found out that she is 3 months pregnant. She quit smoking immediately. But she is worried if her developing baby was harmed and if the baby is at risk for having developmental problems. She is asking you if smoking during the first trimester can harm her baby?

*Etiology or Risk Questions*

- **P** – babies of mothers who smoke
- **I** – smoking in first trimester
- **C** – nothing
- **O** – increase risk of developmental problems
- Question:  
Are babies of mothers who smoke during their first trimester at an increased risk of developmental disabilities?

**Diagnosis Questions**

- These questions are concerned with how accurate a diagnostic test is in various groups and in comparison to other tests or usually to a “gold standard test”.

As part of your clinic assessment of elderly patients, there is a hearing check. You think that a simple whispered voice test is very accurate compared to other methods. You want to do a literature search. What is your question? (1)

#### **Example**

- **P** – elderly people
- **I** – whispered voice test
- **C** – no test (or other tests)
- **O** – accurate diagnosis of hearing problems
- Question: In elderly people, does the whispered voice compared to other tests give an accurate diagnosis of hearing problems?

#### **Templates for EBP Questions**

- **For a therapy:** In \_\_\_\_\_ (P), what is the effect of \_\_\_\_\_ (I) on \_\_\_\_\_ (O) compared with \_\_\_\_\_ (C)?
- **For etiology:** Are \_\_\_\_\_ (P) who have \_\_\_\_\_ (I) at \_\_\_\_\_ (Increased/decreased) risk for/of \_\_\_\_\_ (O) compared with \_\_\_\_\_ (P) with/without \_\_\_\_\_ (C)?
- **Diagnosis or diagnostic test:** Are (is) \_\_\_\_\_ (I) more accurate in diagnosing \_\_\_\_\_ (P) compared with \_\_\_\_\_ (C) for \_\_\_\_\_ (O)?
- **Prevention:** For \_\_\_\_\_ (P) does the use of \_\_\_\_\_ (I) reduce the future risk of \_\_\_\_\_ (O) compared with \_\_\_\_\_ (C)?
- **Prognosis:** Does \_\_\_\_\_ (I) influence \_\_\_\_\_ (O) in patients who have \_\_\_\_\_ (P)?

#### **Step1b: Choose the best type of study for question**

#### **A hierarchy of evidence for each type of question**

<b>Therapy/Prevention</b> What should I do about this problem?	RCT -> cohort -> case control -> case series
<b>Diagnosis</b> Does this person have the problem?	cross-sectional study with blind comparison to a gold standard
<b>Etiology/Harm</b> What causes the problem?	RCT -> cohort -> case control -> case series

<b>Prognosis/Prediction</b> <b>Who will get the problem?</b>	RCT -> cohort study -> case control -> case series
<b>Frequency and Rate</b> <b>How common is the problem?</b>	cohort study -> cross-sectional study

**NOTE:** A well designed systematic review of RCTS (randomized controlled trials) is **best** as it is least biased therefore more valid

### **Hierarchy of Study Designs for Intervention**

Least Bias	Randomized Controlled Trial	Experimental
	Cohort Studies	Observational
	Case-Controlled Studies	Observational
Most Bias	Case reports/Clinical Observations	Observational

### **To recognize the type of study ask the questions:**

1. Is intervention randomly assigned? Yes-RCT; No-Observational study
2. When were the outcomes determined?
  - After the exposure-cohort study (prospective study)
  - During the exposure-cross-sectional study
  - Before the exposure-case-control study (retrospective study based on recall)

### **Step 2: ACCESS: Track Down the Best Evidence**

- Start “hunting” from the best resource: Match your question to the best medical information resource for this question.

### **Hierarchy of Evidence – Access evidence at the level that will give you the best evidence**

Most clinically relevant (at the top) Least clinically relevant (at the bottom)

Cochrane Systematic Reviews	Filtered and critically appraised
Other SR and Meta-Analyses	Filtered and critically appraised
Evidence guidelines	Filtered and critically appraised
Evidence Summaries	Filtered and critically appraised
RCTs, Case Cohort Control Studies	Expert opinion and not filtered
Clinical Research Critiques	Expert opinion and not filtered
Other Reviews of Literature	Expert opinion and not filtered
Case Reports, Case Series, Practice Guidelines	Expert opinion and not filtered
Clinical Reference texts	Background Info

### **Assessing Validity**

- Definitions
  - Level of Evidence (LOE): usually *one study*
  - Strength of Recommendation (SOR): recommendation based on *multiple studies*
- A value of the confidence in the recommendation based on the quality of research
- Assigned by experts using specific criteria

### **Levels of Evidence (LOE)**

- Level 1: Systematic Review (with meta-analysis) of Randomized Clinical Trials
- Level 2: Cohort Studies
- Level 3: Case-Control Studies
- Level 4: Case-series
- Level 5: Expert Opinion

### **Strength of Recommendation (SOR) Taxonomy**

A: There is good research-based evidence to support the recommendation.

B: There is fair research-based evidence to support the recommendation.

C: The recommendation is based on expert opinion and panel consensus.

X: There is evidence of harm from this intervention.

### **Filtered and Critically Appraised Evidence-Based Resources**

- *The Cochrane Library* by The Cochrane Collaboration via Wiley
  - Independent non-for-profit international collaboration
  - Reviews are among the studies of highest scientific evidence
  - Minimum Bias: Evidence is included/excluded on the basis of explicit quality criteria
  - Reviews involve exhaustive searches for all RCT, both published and unpublished, on a particular topic
  - Abstracts searchable for free on the Internet; complete database is available via HINARI for most countries

### **Benefits for using not-evaluated databases for EBM research (PubMed, Cinahl)**

- Create comprehensive search strategies
- Conduct systematic reviews of the literature
- Conduct synonym searching utilizing thesauri



- Set up and distribute alerts relating to evidence-based medicine
- Limit to specific populations & publication types
- Utilize EBM [built-in filters](#) (search strategies)

**Step 3: Appraise: Determine if the results are valid and useful**

- Appraisal principles (primary and secondary research)
  - What is the PICO of the study? Does it match my question?
  - How well was the study done? Is it biased?
  - What do the results mean? Are they real and relevant?
- More: University of Oxford's Center of EBM: <http://www.cebm.net/index.aspx?o=1157>
- Tools for evaluating studies can be found in the Evaluating the Evidence section in the EBM tutorial at:

<http://www.hsl.unc.edu/Services/Tutorials/ebm/welcome.htm>

**Step 4: APPLY: Integrate the results with your clinical expertise and your patient values**

- Question to ask:
  - Is the intervention feasible in my settings?
  - What alternatives are available?
  - Is my patient so different then those in the study that the results cannot apply?
  - Will the potential benefits outweigh the potential harms of treatment ?
  - What does my patient think? What are his cultural beliefs?
  - Individual decision making/group decision making/choice
  - Explaining risks and benefits to patients:
    - [https://docs.google.com/View?id=d7k3gkg\\_679hnvn54c8](https://docs.google.com/View?id=d7k3gkg_679hnvn54c8)
    - Visual Rx: <http://www.nntonline.net/visualrx/>

**Step 5: ASSESS: Evaluate the effectiveness of the process. How am I doing?**

- Am I asking questions?
- Am I writing down my information needs?
- What is my success rate in the EBM steps?
- How is my searching going? Am I becoming more efficient?
- Am I periodically syncing (checking) my skills and knowledge with new developments?

- Teach others EBP skills
- Keep a record of your questions

### **Limitations of EBP**

- Limited scope of evidence – it will never be complete
- The quality of research available
- Keeping it patient centered, cost effective
- Evidence from Randomized Controlled Trials for real life patients
- Communicating uncertainties
- Decision making

### **Types of Questions Best Answered by EBM Resource**

- ***Therapy Question***
  - In patients with migraine headaches without auras, is Depakote more effective than Inderal for prophylaxis of headaches?
- ***Prognosis Question***
  - In diabetic patients with foot ulcers, is the diagnosis of osteomyelitis with MRI as predictive of healing as an audible pulse on Doppler examination?
- ***Diagnosis Question***
  - In geriatric patients with suspected carotid stenosis, is duplex ultrasound as good as magnetic resonance angiography in detecting significant carotid stenosis?
- ***Harm Question***
  - For pregnant patients, does the consumption of large amounts of coffee, (compared to non-coffee drinkers) increase the rate of spontaneous abortion?

### **The main concept of clinical investigations.**

#### **Randomized Controlled Trials.**

- RCT or randomized clinical trials are experimental studies where the effect of an intervention is assessed by collecting data before and after an intervention.
- Used to compare an intervention with one or more other intervention or with no intervention.
- Interventions are often clinical treatments but may also be educational interventions (e.g. health promotion leaflets).
- ***Two main features of the RCT***
  - They are comparative

They are designed to minimize bias

### ***Comparative***

- In RCT, an intervention is investigated by comparing one group of people who receive the intervention with a control group or control arm who do not.

Control group receives **usual** or **no treatment** and their outcome measure (or the change in measure from the baseline) is compared with that of the intervention group.

### ***Minimizing bias in RCT***

- Allocation bias
- Performance bias
- Assessment bias
- Attrition bias
- Allocation concealment

### ***Allocation bias***

- Occurs when the measured treatment effect differs from the true treatment effect because of **how participants were selected** into the intervention or control group.
- In RCT, participants will be **randomized** to either an intervention or control group at study entry.
- Randomization ensures that characteristics that might affect the relationship between intervention and outcome measures will be roughly equal across all arms of the study
  - minimizing potential bias

### ***Performance bias***

- Occurs when participants' response to the treatment is affected by knowledge of the group to which they are assigned.
  - **They know which group they belongs** to either intervention or control.
- Performance bias might also occur when health professionals **administer treatment differently between treatment arms**.

### ***Assessment bias***

- Health professionals assessing the outcome of treatment relative to alternative or placebo interventions may record outcome measures **biased by the knowledge of the group assignments**.
- **Overestimation or underestimation of the effects** on an intervention is known as assessment bias.

- There might be a **systematic difference** in measuring the outcomes between the two groups because of the method of recording used
  - E.g. control group is assigned to one practitioner and the intervention group to another, or groups are assessed at different times of the day.
- **How to minimize the assessment bias?**
  - Use a **standardized method** of evaluation across both groups.
  - **Avoid using subjective measures** to assess the effectiveness of a treatment which are more prone to bias.

#### ***Attrition bias***

- Also called as loss-to-follow-up bias.
- Occurs when **patients drop out** of the study from their respective study group.
- If halfway through a study the treatment has been successful, participants may drop out and information about the success of the treatment is then lost.
- Participants in the control group might be unhappy with their lack of progress and may drop out of the study in order to seek alternative help.

#### ***Allocation concealment***

- Bias will be minimized where the allocation schedule is concealed of whom is assigned to which group.
- Blinding (or masking) helps prevent systematic differences between comparison groups in prognosis or responsiveness to treatments (allocation bias).
- Blinding of both participants and practitioners prevents performance and assessment bias by ensuring everybody (participants, treatment admin, those measuring outcomes) do not know which treatment was given.
- It is recommended RCT participants are blind to the treatment they receive.
  - Control group receives placebo

#### ***Trial design***

- There are two commonly used trial design to allocate treatment and control regimens in RCT;
  - Parallel design
  - Crossover design
- Parallel design:

#### ***Trial design***

- Crossover trials are another way of overcoming differences in groups by keeping the patients as matched as possible.

- Instead of having different patients in each treatment group, patients receive first one treatment and then the other, in random order, with a wash out period in between.
- Within-patient differences are then compared in crossover design.
- Each patient effectively becomes their own 'test' and 'control'.

### ***Outcome Measurement***

- It is critically important that investigators think through and specify in advance the outcomes they plan to measure to test whether their treatment works.
- ***Primary endpoint:***
  - Event – death, hospitalization, or the onset or remission of a condition, like major depression
- ***Intermediate endpoint (surrogate marker):***
  - Biomarkers (like blood pressure, lipids, or obesity) or health risk behaviors (like smoking, eating a high fat diet, or being physically inactive) can be considered intermediate markers because they relate to disease.

### ***Advantages of RCT***

- Ability to make causal inferences mean that RCT provide the strongest empirical evidence of a treatment's efficacy.
- Randomization of participants to the test and control arms and concealment of their allocation ensures that allocation bias and confounding or unknown variables are minimized.
- The study can be tailored to answer a specific question
- Ability to make causal inferences mean that RCT provide the strongest empirical evidence of a treatment's efficacy.
- Randomization of participants to the test and control arms and concealment of their allocation ensures that allocation bias and confounding or unknown variables are minimized.
- The study can be tailored to answer a specific question

### ***Disadvantages of RCT***

- High dropout when the intervention has undesirable side-effects or there is little incentive to stay in the control arm.
- Ethical consideration may mean that a research question cannot be investigated using RCT design
- For a descriptive overview it may be cheaper and easier to use an observational design.
- Prior knowledge is required for sample size calculation;
  - the level of improvement that is clinically meaningful

- expected variation of improvement in the sample

### ***Systematic reviews and Meta-analysis***

#### ***What is a Systematic Review?***

- “A review that is conducted according to clearly stated, scientific research methods, and is designed to minimize biases and errors inherent to traditional, narrative reviews.”

#### ***Key Characteristics of Systematic Reviews***

- Clearly stated title and objectives
- Comprehensive strategy to search for relevant studies (unpublished and published)
- Explicit and justified criteria for the inclusion or exclusion of any study
- Clear presentation of characteristics of each study included and an analysis of methodological quality
- Comprehensive list of all studies excluded and justification for exclusion

#### ***Characteristics of Systematic Review***

- Clear analysis of the results of the eligible studies
  - statistical synthesis of data (meta-analysis) if appropriate and possible;
  - or qualitative synthesis
- Structured report of the review clearly stating the aims, describing the methods and materials and reporting the results

#### ***Meta-Analysis***

- “Meta-analysis is a statistical technique for combining the results of independent, but similar, studies to obtain an overall estimate of treatment effect.”
- “While all meta-analyses are based on systematic review of literature, not all systematic reviews necessarily include meta-analysis.”

#### ***Steps of Meta-analysis***

- Define the Research Question
- Perform the literature search
- Select the studies
- Extract the data
- Analyze the data
- Report the results

#### ***Analyzing the Data***

***There are 2 statistical models used in a meta-analysis.***

1. Fixed effects

- “The fixed-effects model assumes that the true effect of treatment is the same for every study.”
- Kevin C. Chung, MD, Patricia B. Burns, MPH, H. Myra Kim, ScD. “Clinical Perspective: A Practical Guide to Meta-Analysis.” The Journal of Hand Surgery. Vol.31A No.10 December 2006. p. 1675
- Random effects
- “The random effects model assumes that the true effect estimate for each study vary.”

***The Results Section***

- The results section should
  - Include a flow chart of studies included
  - A figure displaying the results from each individual study (forest plot), results of heterogeneity testing, overall summary statistic, and results of a sensitivity analysis and meta-regression, if performed.

**EBM Databases**

Meta-Analyses	Cochrane Database of Systematic Reviews, DARE, TRIP Database, PubMed , CINAHL	Appraised/filtered
Systematic Reviews	Cochrane Database of Systematic Reviews, DARE, TRIP Database, PubMed , CINAHL	Appraised/filtered
Critically Appraised Sources	UpToDate, Dynamed, Clinical Evidence, ACP Journal Club, Essential Evidence, Evidence Updates	Appraised/filtered
Randomized controlled trials	PubMed , CINAHL, PsycInfo, CENTRAL, TRIP, Web of Science	Unfiltered
Cohort studies	PubMed , CINAHL, PsycInfo, CENTRAL, TRIP, Web of Science	Unfiltered
Case Control Studies	PubMed , CINAHL, PsycInfo, CENTRAL, TRIP, Web of Science	Unfiltered
Case Reports/ Case Series	PubMed , CINAHL, PsycInfo, CENTRAL, TRIP, Web of Science	Unfiltered
Background information/expert opinion	ClinicalKey, Access Medicine, Other Clinical Textbooks.	Unfiltered

**Major EBM Databases**

- Cochrane
- Clinical Evidence

- DARE
- ACP Journal Club
- InfoPOEMS

### **Cochrane Library**

- The current resource with the highest methodological rigor
- For each clinical question, all of the English literature meticulously searched for randomized trials
- Large systematic reviews with valid methods + collaborative effort by Review Groups
- Conclusions are based on all the evidence from valid randomized trials (**treatment and harm questions**)
- Full text at Cochrane Library at Wiley
- Abstracts in InfoRetriever
- Limitations
  - limited to English
  - only addresses questions amenable to randomized trials
  - most of medicine has not been studied enough to allow for conclusions
  - \$235/year or abstracts only free
- <http://www.cochrane.org/>
- <http://www.cochranelibrary.com/>

### **ACP Journal Club**

- About 140 internal medicine journals systematically surveyed
- Highest-validity articles abstracted
- Structured abstracts to guide critical appraisal
- Clinical commentary
- Web site: **<http://acpjc.org/>**
- Also published in Annals of IM
- Alerts available
- Limitations
  - Limited pediatrics



- individual article summaries may not account for the “big picture”
- may have to read multiple items
- No “control” over what is covered
- \$78/year ?

- **Question:**

In young children with persistent otitis media with effusion (OME), does prompt insertion of tympanostomy tubes protect against or minimize subsequent developmental impairment at 3 years more than delayed insertion?

### **InfoPOEMS**

- **Patient Oriented Evidence that Matters**
- Journal of Family Practice and other specialty journals
- Systematic surveillance of 100 journals
- Reviews of recent research articles
- Effect patient concerns – morbidity, mortality, quality of life
- Included in **Essential Evidence Plus** (formerly InfoRetriever)
- Daily e-mail updates available

### **EBM Hunting Tools**

*A high-quality Hunting tool employs a transparent process that*

- Searches multiple EBM databases (several foraging tools)
- Organizes results to make them easy to find
- Provides levels of evidence

### **Major EBM Hunting Tools**

<b>Tools</b>	<b>Cochrane</b>	<b>ACP Journal Club</b>	<b>Guide-lines</b>	<b>US-PSTF</b>	<b>LOE</b>
Essential Evidence +	+		+	+	+
Dynamed	+	+	+	+	+
Clinical Evidence	summaries	summaries	summaries	summaries	+
ACP Pier (Web only)	summaries	summaries	summaries	summaries	+

PEPID	summaries	summaries	summaries	summaries	+

### **Clinical Evidence**

- Includes >250 conditions
- Summaries of evidence
- Specific clinical questions: treatment and prevention
- Makes specific recommendations
- States when there is a lack of evidence
- Book Free from United Health Foundation
- Web and PDA versions available

### **Essential Evidence Plus (EE+)**

- POEMS -- JFP
  - >104 journals surveyed
  - Over 3500 article synopses
  - Link out to PubMed
- Cochrane abstracts
- Selected evidence-based guidelines
- Basic drug info
- Clinical calculators/prediction rules

### **New Content**

- Essential Evidence summaries
  - Organized like disease quick reference
  - Bottom Line at top
  - Links to InfoPOEMs, Cochranes
  - Links to calculators and algorithms, images
  - Uses SORT for level of evidence

### **EE+ Features**

- Essential Evidence (replaces 5MCC)

- EBM Guidelines
- Pearls –PDA; Favorites on Desktop
- Levels of Evidence explained
- ICD-9 and E/M coding tools
- Immunization Guide
- USPSTF Guidelines
- Derm Expert

### **Essential Evidence Plus**

- Comes in web, desktop and PDA versions
- Daily POEMS are available in mp3 podcast version
- Limitations
  - individual article summaries may not account for the “big picture”
  - may have to read multiple items
  - \$85/year

### **DynaMed**

- Designed as entry point to information
- Textbooks and Medline not efficient
- Intuitive clinical organization
- Brief summarized information presented
- Links out to articles and reviews if more details needed
- ICD-9 codes and links to patient information handouts

### **DynaMed Sources**

- Systematic surveillance of 18 primary journals – e.g. BMJ, JAMA, Lancet, NEJM, Pediatrics
- 12 major EBM resources – e.g. ACP Journal Club, Cochrane Library, InfoPOEMs, Alternative Therapies,
- 4 drug info sources – e.g. The Medical Letter, FDA MedWatch

### **DynaMed Organization of Results**

- **Description (including ICD-9 Codes)**

- Description, Also called, ICD-9 Codes, Types, Organs Involved, Who Is Most Affected, Incidence/Prevalence
- **Causes and Risk Factors**
  - Causes, Pathogenesis, Likely risk factors, Possible risk factors
- **Complications and Associated Conditions**
- **History**
  - CC, HPI, Meds, PMH, FH, SH, ROS
- **Physical**
  - Skin, HEENT, Neck, Extremities, Neuro, Pelvic
- **Diagnosis**
  - Making the diagnosis, Rule out, Tests to order, Blood tests, Urine studies, Imaging studies, Pathology tests, Other diagnostic testing
- **Prognosis**
- **Treatment**
  - Treatment Overview, Diet, Activity, Counseling, Medications, Surgery, Consultation and referral, Other management, Follow-up
- **Prevention and Screening**
- **References (including Reviews and Guidelines)**
- **Patient Information**
- **Limitations**
  - variable quality if not Cochrane or review
  - areas with a lot of research can get hard to navigate. Lot of information-slower to wade through
  - Hard to navigate on PDA
  - \$200/year or effort

### **PubMed**

- Created and driven by U.S. National Library of Medicine:  
<http://www.nlm.nih.gov/>
- Website: <http://www.ncbi.nlm.nih.gov/pubmed>

### **Review/Summary**

- Evidence-based practice depends on knowing the most recent, valid scientific knowledge.

- This involves finding the 'best' studies.
- Sometimes others have evaluated the quality of the studies, including methodology; many new evidence-based tools mentioned in this tutorial provide evaluation.
- When there is no evaluation available, it is essential to evaluate the validity of the study.
- Tools for evaluating studies can be found in the Evaluating the Evidence section in the EBM tutorial mentioned earlier and found at:

<http://www.hsl.unc.edu/Services/Tutorials/ebm/welcome.htm>

- It is always important to consider studies in terms of applicability to and values of the local patient/situation.
- Evidence-based practice is a developing field and new, useful resources are continuously being developed.

#### **Test questions for control:**

##### **1. What is step 1 of the key steps for the practice of EBM?**

A. Critically appraising the evidence for its validity and applicability

##### **B. Converting clinical scenarios into a structured answerable question**

C. Searching the literature to identify the best available evidence to answer the question

D. Applying the results of the appraisal to clinical practice

E. Evaluation/assessment of the EBM process

##### **2. What is step 3 of the key steps for the practice of EBM?**

A. Applying the results of the appraisal to clinical practice

##### **B. Critically appraising the evidence for its validity and applicability**

C. Evaluation/assessment of the EBM process

D. Converting clinical scenarios into a structured answerable question

E. Searching the literature to identify the best available evidence to answer the question

##### **3. What is step 2 of the key steps for the practice of EBM?**

##### **A. Searching the literature to identify the best available evidence to answer the question**

B. Converting clinical scenarios into a structured answerable question

C. Evaluation/assessment of the EBM process

- D. Critically appraising the evidence for its validity and applicability
- E. Applying the results of the appraisal to clinical practice

**4. What is step 4 of the key steps for the practice of EBM?**

- A. Converting clinical scenarios into a structured answerable question
- B. Evaluation/assessment of the EBM process
- C. Critically appraising the evidence for its validity and applicability
- D. Applying the results of the appraisal to clinical practice**
- E. Searching the literature to identify the best available evidence to answer the question

**5. What is step 5 of the key steps for the practice of EBM?**

- A. Searching the literature to identify the best available evidence to answer the question
- B. Applying the results of the appraisal to clinical practice
- C. Critically appraising the evidence for its validity and applicability
- D. Evaluation/assessment of the EBM process**
- E. Converting clinical scenarios into a structured answerable question

**6. Which of the following study methods uses subjects who have already been exposed and will be followed over time to observe the differences in outcome between the exposed and non-exposed. (longitudinal study)**

- A. Case studies/reviews
- B. Cohort study**
- C. Cross-sectional study
- D. Case-control study
- E. Randomized controlled trials

**7. Which of the following study methods uses one or more active test treatments and at least one concurrent control basically, subjects are divided into two groups, one treatment group and one control group, they are both followed through time and then the outcomes are compared.**

- A. Cohort studies

- B. Case studies/reviews
- C. Cross-sectional study
- D. Case-control study
- E. **Randomized controlled trials**

**8. Cohort studies are typically:**

- A. Retrospective
- B. **Prospective**
- C. Snapshot studies
- D. Considered to be a gold standard

**9. Which of the following study methods collects data from patients who already have a certain condition in which the design of the study is retrospective?**

- A. Cohort study
- B. Cross-sectional study
- C. **Case-control study**
- D. Case report/series
- E. Randomized controlled trails

**10. Case series and case reports do not have statistical validity because:**

- A. **They are not randomly selected**
- B. They are voluntary
- C. They are involuntary
- D. They use no control groups against which to compare outcomes

**11. What is the gold standard for common study designs?**

- A. Cohort studies
- B. Case studies
- C. Cross-sectional studies

D. Case-control studies

E. **Randomized control studies**

**12. Case Series/Studies/Reports are generally reports on:**

A. An entire population

B. **An entire hospital facility/doctor's office**

C. A single patient

D. An entire sample

**13. How do we make certain that the sample fairly represents the population?**

A. By choosing a specific sample

B. By choosing a specific population

C. **By choosing a random selection of subjects**

D. By paying more money for studies to targets low income populations

**14. Choosing a random selection of subjects ensures that:**

A. There will be greater internal validity for the study

B. **The results of the study can be maximally generalized**

C. That the independent variable will be manipulated much less than the dependent variable

D. The results of the study will not have a high applicability to real life.

**15. Which of the following terms is the generalizability of a study to the real world population. In simpler terms, "can the results of this study be used in life with real people?"**

A. Internal validity

B. **External validity**

C. Efficacy

D. Independent and dependent variables

**Correct answers for tests: 1-B, 2-B, 3-A, 4-D, 5-D, 6-B, 7-E, 8-B, 9-C, 10-A, 11-E, 12-B, 13-C, 14-B, 15-B.**



**Control questions:**

- 1) Definition of evidence based medicine
- 2) Background for development of evidence based medicine
- 3) "Golden standard" of clinical trial
- 4) Hierarchy of evidence
- 5) How to form a clinical question
- 6) Best databases of evidence based medicine
- 7) Advantages of evidence based medicine
- 8) Features of randomized controlled trial
- 9) Definition of primary and secondary endpoints, their advantages and disadvantages
- 10) Systematic review, advantages and disadvantages
- 11) Meta analysis, advantages and disadvantages

**References:**

1. Evidence-Based Medicine Working Group. Evidence-based medicine. A new approach to teaching the practice of medicine. JAMA. 1992; 268 (17):2420-2425.
2. Rennie D, Chalmers I. Assessing authority. JAMA. 2009; 301(17):1819-1821.
3. Sackett DA. 1955 clinical trial report that changed my career. James Lind Library website.<http://www.jameslindlibrary.org/illustrating/articles/a-1955-clinical-trial-report-that-changed-my-career>. Accessed October 27, 2013.
4. Doi, S.A.R. (2012). Understanding evidence in health care: Using clinical epidemiology. South Yarra, VIC, Australia: Palgrave Macmillan.
5. "The Cochrane Collaboration". Retrieved August 21, 2014.
6. "Agency for Health Care Policy and Research". Retrieved August 21, 2014.
7. "National Guideline Clearinghouse". Retrieved August 21, 2014.
8. "National Institute for Health and Care Excellence". Retrieved August 21, 2014.
9. "UpToDate". Retrieved August 21, 2014.
10. "Clinical Evidence". Retrieved August 21, 2014
11. Doi, S.A.R. (2012). Understanding evidence in health care: Using clinical epidemiology. South Yarra, VIC, Australia: Palgrave Macmillan.

12. Ezzo J, Bausell B, Moerman DE, Berman B, Hadhazy V (2001). "Reviewing the reviews. How strong is the evidence? How clear are the conclusions?" *Int J Technol Assess Health Care* 17 (4): 457–466. PMID 11758290
13. Kunz R, Wegscheider K, Fritsche L, Schünemann HJ, Moyer V, Miller D et al. (2010). "Determinants of knowledge gain in evidence-based medicine short courses: an international assessment." *Open Med* 4 (1): e3–e10. PMC 3116678. PMID 21686291
14. West CP, Jaeger TM, McDonald FS (2011). "Extended evaluation of a longitudinal medical school evidencebased medicine curriculum." *J Gen Intern Med* 26 (6): 611–5. doi:10.1007/s11606-011-1642-8. PMC 3101983. PMID 21286836.
15. "Considerations about the efficacy of psychopharmacological drugs". 2011. PMID 22002839.
16. "Putting the efficacy of psychiatric and general medicine medication into perspective: review of metaanalyses". 2012. doi:10.1192/bjp.bp.111.096594. PMID 22297588.