Evidence Based Medicine/Practice is a process that involves finding the most current evidence-based literature (usually a Randomized Controlled Trial), using your clinical expertise, and combining it with the needs of your patient. You use the results of the current research to make treatment or diagnostic decisions.

EBM is the integration of:
- Best clinical research evidence
- Clinical expertise
- Patient values


EBM is usually a specific question about:
- **Diagnostic test(s)**
  - Find prospective, blind comparison to a gold standard
- **Therapy**
  - Find RCTs, meta-analysis, systematic reviews
- **Prognosis**
  - Find cohort studies, case control, or case series
- **Harm or Etiology**
  - Find RCTs, cohort studies, case control, or case series
- **Prevention**
  - Find RCTs, cohort studies, case control, meta-analysis, systematic reviews
- **Cost Analysis**
  - Find economic analysis
- **Qualitative**
  - Find qualitative studies

**The Steps in the EBP Process**

<table>
<thead>
<tr>
<th>ASSESS the patient</th>
<th>1. Start with the patient -- a clinical problem or question arises from the care of the patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASK the question</td>
<td>2. Construct a well built clinical question derived from the case</td>
</tr>
<tr>
<td>ACQUIRE the evidence</td>
<td>3. Select the appropriate resource(s) and conduct a search</td>
</tr>
<tr>
<td>APPRAISE the evidence</td>
<td>4. Appraise that evidence for its validity (closeness to the truth) and applicability (usefulness in clinical practice)</td>
</tr>
<tr>
<td>APPLY: talk with the patient</td>
<td>5. Return to the patient -- integrate that evidence with clinical expertise, patient preferences and apply it to practice</td>
</tr>
<tr>
<td>Self-evaluation</td>
<td>6. Evaluate your performance with this patient</td>
</tr>
</tbody>
</table>

(Taken from Duke University)
Step 1. **ASK the Question using PICO**

- **PICO(T)** is an acronym to help you formulate your specific patient question:
  - **P**=Patient or Problem or Population
  - **I**=Intervention (i.e. diagnostic study or drug interventions)
  - **C**=Comparison if needed (i.e. CT vs. MRI, or oral dose vs. IV)
  - **O**=Outcome (i.e. what do you want to accomplish, measure, improve or affect?)
  - **T**=Time element (if needed)

- **Why use PICO?**
  - Helps you form a focused question
  - Assists you in brainstorming for keywords for your search

- **When do you use PICO?**
  - When you are looking for evidence to support best practice
    - Patient centered outcome measures (i.e. pressure ulcers, falls, VAP)
    - Nurse Centered Intervention Measures
    - System Centered Measures (i.e. IHI developed “bundle concepts”)
  - When you have a question about patient care

**Scenario:**

- A disgruntled patient complained to you that her OB/GYN provider answered a phone call during her exam and did not change her gloves after using the cell phone. You also observe similar behavior in your practice and wonder if cellphones, like stethoscopes, can transmit infections to patients (or to others). If so, should clinicians be educated in proper infection control measures when using cellphones during patient care? Since cellphones are ubiquitous, should everyone visiting or working in a clinical area or hospital be made aware of these issues?

- **PICO(T) Format of the above patient:**

<table>
<thead>
<tr>
<th>PATIENT</th>
<th>Cellphone use in the clinical area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem/population</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERVENTION</th>
<th>Infection control measures (hand hygiene and device decontamination)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPARISON of Intervention(s) or Group comparisons</td>
<td>No infection control measures</td>
</tr>
<tr>
<td>OUTCOME</td>
<td>Decreased transmission of bacterial infections/hospital acquired infections</td>
</tr>
<tr>
<td>TIME</td>
<td>None</td>
</tr>
</tbody>
</table>

**The PICO QUESTION:**
- **Does following infection control guidelines before and after using cell phones among healthcare workers reduce hospital acquired infections?**
Step 2. Find the evidence - Think of KEYWORDS for your topic

- Databases are dumb—they only search for the words you type
- Use the asterisk * as a truncation, if needed.
- Combine synonyms for each concept with Boolean Operators “OR”

- **Cellphones**: mobile phone* OR smart phone* OR smartphone* OR cell phone* OR cellphone* OR cellular phone* OR hand-held* OR iPad* OR handheld devices OR droid* OR mobile device*

- **Clinicians**: healthcare worker* OR health personnel OR physician* OR clinician* OR medical staff OR house staff OR nursing student* OR nurse* OR surgeon* OR APRN

- **Infection**: infection* OR contamin* OR pathogen* OR nosocomial OR hospital acquired infections OR communicable diseases OR equipment contamination OR cross infection OR fomites

  [Note Fomites is a Medical Subject Heading, or MeSH term, meaning inanimate objects that carry pathogenic microorganisms and thus can serve as the source of infection. Microorganisms typically survive on fomites for minutes or hours. Common fomites include clothing, tissue paper, hairbrushes, and cooking and eating utensils.]

- **Infection control**: Disinfectants OR disinfection OR infection control OR hand washing OR handwashing OR hand hygiene OR alcohol swipes

Combine the “best” keywords for a search strategy in a database:

(contamination OR cross infection) AND (smartphone* OR cell phone* OR cellphone* OR cellular phone* OR iPad* OR droid*)

Check limits that may pertain to your search: ___Age ___Language ___Year of Publication ___Peer Reviewed

Type of study you require:

- Systematic review
- Clinical Trials
- Quantitative Studies
- Randomized Controlled Trials
- Qualitative Studies
- Clinical Practice Guidelines
- Multicenter study
- Meta-analysis

Tips:

- **OR**—Use OR between synonymous words

- **AND**—Use AND to link different concepts that must be included in the search

- **NOT**—Use NOT to exclude irrelevant terms

- **Capitalization**—AND, OR, NOT work best when capitalized

- **Quotation marks**—Use quotation marks to find exact phrases, use with caution.

- **Parentheses**—Use parentheses to group together your synonyms

Step 3. Search the databases

**CINAHL Plus with Full Text**

- Enter key terms in search box and click Search button
• Click **Show More** under **Refine Results** (left side) to limit results (year, English language, Peer Review, Research Article, etc.). **Do not limit to full text!**

• Find more **precise** terms—click the article title and view the **CINAHL Subject Terms** (these terms describe the concept(s) of the article).

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**Surveillance study of bacterial contamination of the parent’s cell phone in the NICU and the effectiveness of an anti-microbial gel in reducing transmission to the hands.**

Authors: Backstrom, A C; Cleman, P E; Cassis-Ghrayeb, F L; Kambitsis, M D

Affiliation: [1] Division of Neonatology, Swedish Medical Center, Seattle, WA, USA [2] The Menard Center for Research, Education and Quality, Sunrise, FL, USA

Division of Neonatology, Swedish Medical Center, Seattle, WA, USA
Department of Pediatrics, Division of Pediatric Infectious Disease, Swedish Medical Center, Seattle, WA, USA

Source: Journal of Perinatology (J PERINATOL), 2015 Dec; 35 (12): 946-9

Publication Type: journal article - research tables/charts

Language: English

Major Subjects: Wireless Communications, Bacterial Contamination, Intensive Care Unit, Neonatal Disease Transmission — Prevention and Control, Germs, Antimicrobials, Parents

Minor Subjects: Human, Funding Source, Cross Sectional Studies, Microbial Culture and Sensitivity Tests, Male, Female, Questionnaires

Abstract: Objective: To determine the bacterial contamination rate of the parent’s cell phone and the effectiveness of anti-microbial gel in reducing transmission of bacteria from cell phone to hands.

Methods: Cross-sectional study of cultures from the cell phones and hands before and after applying anti-microbial gel (N=30). Results: All cell phones demonstrated bacterial contamination. Ninety percent had the same bacteria on the cell phone and their cleansed hands. Twenty-two percent had growth on their hands after applying anti-microbial gel after they had the same bacteria on the cell phone and hands. Ninety-two percent of parents were aware that cell phones carried bacteria, but only 31% cleaned their cell phones at least weekly. Conclusions: Bacterial contamination of cell phones may serve as vectors for nosocomial infection in the neonatal intensive care unit. Bacteria transmitted from cell phone to hands may not be eliminated using antimicrobial gel.

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• To find a subject heading, enter a term in the search box and check **Suggest Subject Terms** box
  o Search one concept at a time; click Search

  ![Search Box](image)

  o Select (check box) **Wireless Communications** from the CINAHL Headings results page
  o A middle column for **Subheadings** appears which allows you to zero in on a specific aspect of wireless communication. We will **not select** a subheading.
- Scroll down to bottom of page and click **Browse Additional Terms**
- Type *Contamination*, click **BROWSE**, select the broadest term *Microbial Contamination* (clicking the Scope note gives you the definition and suggestions)
- Change the radio button from **OR** to **AND** before you click **Search Database** (both concepts must be in the article)
- Click **Search Database** which will run the search and return to the main page
- You will see this on the main page:
  - (MH "Wireless Communications") AND (MH "Microbial Contamination+")
- You can expand your search with other CINAHL Subject Headings to be broader:
  - (MH "Cellular Phone+" OR MH "Smartphone+" OR MH "Computers, Hand-Held+" OR MH "Wireless Communications") **AND** (MH "Microbial Contamination+" OR "Equipment Contamination")

**Search PubMed**

Simple method:
- Enter a term(s) or phrase(s) in search box, then click **Search** button (you can also copy & paste the search you used in CINAHL)
- This example will find the terms anywhere in the record:
  - (contamination OR cross infection) AND (smart phone* OR smartphones OR cell phones OR iPad*)

Reminders:
- Click **Advanced** under search box to review search history
- Keep track of the best search terms for your Methodology Section!
- Search for terms in the **title** – [title] or [ti]
  - “mobile phone”[ti] will find the phrase in the title
  - mobile[ti] phones[ti] is broader because it will find the words anywhere in the title
- Search for terms in either **title** or **abstract** – [title/abstract] or [tiab]
  - “mobile phone”[tiab] will find the phrase in the Title or Abstract AND find either contamination OR infection in the Title or Abstract

**Search Details** will display how PubMed searched (or translated) your terms
  - MeSH Terms are the Medical Subject Headings
- **All Fields** means that PubMed is finding your keywords everywhere in the record (journal, author, abstract, author institution, etc.), so you may get irrelevant hits.

**Search Details**

**Query Translation:**

(contamination[All Fields] OR ("cross infection"[MeSH Terms] OR ("cross"[All Fields] AND "infection"[All Fields]) OR "cross infection"[All Fields]))) AND ((smart phone[All Fields] OR smart phones[All Fields]) OR ("smartphone"[MeSH Terms] OR "smartphone"[All Fields] OR "smartphones"[All Fields]) OR ("cell phones"[MeSH Terms] OR ("cell"[All Fields] AND "phones"[All Fields]) OR "cell phones"[All Fields]) OR (ipad[All Fields] OR ipad's[All Fields] OR ipad12[All Fields] OR ipad2[All Fields] OR ipad20[All Fields] OR ipad2s[All Fields] OR ipad3g[All Fields] OR ipad4[All Fields]))

- To limit results, click **Show Additional Filters** on left side
  - Check the **Languages** box, click **SHOW**, and then select **English** to activate
  - Select Publication dates, if needed
  - Select **Customize** under **Article Type**; select your preferences, (i.e. Review, Randomized Controlled Trial, Systematic Reviews, Guidelines, Practice Guidelines, etc.) click **SHOW**. Then select your limits (again!)
  - **DO NOT LIMIT TO FULL TEXT OR FREE FULL TEXT!**

- Click **title of article** to find **UCONN Full Text** or the full text
When viewing your results check the citation box to select article; send to Clipboard under Send to dropdown; then select Add to Clipboard.

When done with search, select Clipboard icon to:
- Print your saved results
- Export saved results to RefWorks
- Email saved results
- Save in My Bibliography

See Learn to Search PubMed in the Health Subject Guide for more tips.

**Method 2**

**Clinical Queries Option** from PubMed homepage
- Quick method to find systematic reviews
- Easy to use – very simple search using the “best” terms
- It is not comprehensive!

### PubMed Clinical Queries

Results of searches on this page are limited to specific clinical research areas. For comprehensive searches, use PubMed directly.

![PubMed Clinical Queries Interface](image)

#### Clinical Study Categories

- **Category:** Etiology
- **Scope:** Narrow

#### Systematic Reviews

- **Results:** 2 of 2
  - Han N, Heppel-Lane C, Settle N.

  ![Systematic Review Result](image)

- The role of mobile communication devices in the spread of infections.
  - Mervi J, Stoskó R.

#### Medical Genetics

- **Topic:** All

- **Results:** 5 of 7
- Contamination of healthcare workers' mobile phones by epidemic viruses.

- Methicillin-resistant staphylococcal contamination of cellular phones of personnel in a veterinary teaching hospital.
  - Julian T, Singh A, Guest-Jones L, Weese J.

  - Sun W, Siets-Arnolds R, Field JA.

- What is on that keyboard? Detecting hidden environmental reservoirs of Clostridium difficile during an outbreak associated with North American pulsed-field gel electrophoresis type 1 strains.
  - Putnam DM 3rd, Narazick MJ, Richman BC, Donley CJ.

- Antibiotic multiresistance strictly associated with IS256 and its genes in Staphylococcus epidermidis strains from implant orthopedic infections.
  - Mervi J, Stoskó R.
Method 3

Search using MeSH Terms for precision (MeSH defines the content of the article)

- Many citations are indexed with Mesh Terms, click MeSH Terms link below abstract/PMID

- Get to the MeSH Database from the PubMed homepage:
  - Click MeSH Database under More Resources; OR
  - Use the drop-down box on web pages and select MeSH

- Simple search in the MeSH database:
  - Enter cell phones; click Search
  - Select MeSH term Cell phones; and click ADD to Search Builder - will populate PubMed Search Builder box
  - Clear screen and enter cross infection; click Search
  - Select MeSH term Cross Infection; click ADD to Search Builder
  - Click Search PubMed to return to PubMed; then limit your results of 37

- Click Customize under Article Types (located on left hand side) to limit results:
  - Meta-analysis
  - Clinical Trials
  - RCT’s
  - Systematic Review
  - English
  - Published within the last 10 years
Other sources for finding the Evidence:

- CURRENT Practice Guidelines in Primary Care 2018 via AccessMedicine database
- Funding support for the National Guideline Clearinghouse ended on July 16, 2018. Find Clinical Practice Guidelines or Guidelines by searching the following databases via our library:
  - PubMed - Search by keyword, then browse the Article Types option (located on the left side of the screen) for Practice Guideline. Selecting an Article Type is a 3-step process: 1) Click More under Article Types; 2) Check the box for Practice Guideline and click [Show]; Practice Guideline will now show on left column; 3) Click it once more to limit results to practice guidelines.
  - TRIP - Search by keyword, then click the link for Guidelines on the results page.
  - DynaMed Plus - Search by keyword, appending the word guidelines. E.g. mammography guidelines.
  - ECRI Institute will provide access (unknown if free or fee based at this time) to a new guideline resource in fall 2018. www.ecri.org/guidelines
- Use valid medical sites for general information (access via our Databases)
  - MedlinePlus
  - Micromedex
- Evidence Based Medicine (filtered) databases via our library unless noted otherwise:
  - Clinical eCompanion – http://ecompanion.pitt.edu/
  - Cochrane Database
  - DynaMed Plus
  - Essential Evidence Plus
  - Medscape Reference
  - PubMed Clinical Queries (select link from PubMed homepage)
  - TRIP (Turning Research Into Practice -- free access from UK) http://www.tripdatabase.com
  - SpeechBite (An Australian database of intervention studies in speech pathology) http://speechbite.com/
  - UpToDate is not available at UConn
- E-Journals (online) that focus on Evidence Based Practice:
  - The ACP Journal Club
  - Clinical Nursing Research
  - Evidence Based Nursing
  - Evidence-based medicine (EBM Online)
  - Evidence-based mental health
  - International journal of evidence-based healthcare
  - Journal of Family Practice
  - Worldviews on Evidence-Based Nursing
- EBM Tutorials for nurses (also listed in Health Subject Guide)
  - Evidence Based Practice - an inter-professional tutorial
    Created by the University of Minnesota.
• **Evidence Based Medicine Centers:**
  - Agency for Healthcare Research & Quality (AHRQ)
    [http://ahrq.gov](http://ahrq.gov)
  - Canadian Task Force on Preventive Health Care
    [http://www.canadiantaskforce.ca](http://www.canadiantaskforce.ca)
  - Centre for Reviews and Dissemination
    [http://www.crd.york.ac.uk/crdweb/](http://www.crd.york.ac.uk/crdweb/)
  - Centre for Evidence Based Medicine (Oxford)
    [http://cebm.net](http://cebm.net) (see EBM Tools)

**Keep Current - Set up Email Alerts or RSS feeds**

- Academy Health

- AHRQ
  [http://ahrq.gov](http://ahrq.gov)

- BMJ Evidence Centre (free monthly alerts)
  [http://clinicalevidence.bmj.com](http://clinicalevidence.bmj.com)

- Evidence Alerts (from McMaster Plus & DynaMed Plus)
  [https://plus.mcmaster.ca/EvidenceAlerts/](https://plus.mcmaster.ca/EvidenceAlerts/)

- Health Affairs Blog:
  [https://www.healthaffairs.org/blog](https://www.healthaffairs.org/blog)

- Health Business Blog:
  [https://www.healthaffairs.org/](https://www.healthaffairs.org/)

- Health Care Business News
  [https://www.healthleadersmedia.com/](https://www.healthleadersmedia.com/)

- Medical News Today
  [http://www.medicalnewstoday.com](http://www.medicalnewstoday.com)

- Medscape
- Not Running a Hospital Blog:
  [http://runningahospital.blogspot.com/]
  [http://hsl.lib.unc.edu/services/evidence-based-practice-resources]

- The Pennsylvania Patient Safety Authority:
  [http://patientsafetyauthority.org/Pages/Default.aspx]

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August 13, 2018