Identifying the Evidence and Making Your Case

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Research Nurse Scientist

IHQSE Certificate Program
Are you throwing spaghetti at the wall?
What does the evidence tell us?
Health Care is Expensive and Resources are Limited

- 2016—National health expenditures exceeded 3 trillion dollars
  - > 10,000 per person
- 2025—Healthcare costs will reach $5.7 Trillion = 47% of government’s budget

- Quality Improvement Resources:
  - Time
  - Energy
  - Money

- Healthcare does not want to invest resources into processes that are ineffective.
Healthcare must be evidence based

Evidence-Based Healthcare = \( \uparrow \) Quality and Safety + \( \uparrow \) Patient Outcomes + \( \downarrow \) Healthcare Costs
Evidence-Based Healthcare/Evidence-Based Practice (EBP)

Best Available Evidence

Patient Preferences

Clinical Expertise

EBP
Translation of Evidence

Knowledge
- Research

Practice
- Quality Improvement

Process
- Program Evaluation
Identifying Sources of Evidence

Goode, Fink, Krugman, Oman, Traditi, 2011
Identifying the Best Evidence to Make Your Case

PICOT

1. Ask clinical question in PICOT format
2. Search for the best evidence
3. Critically appraise the evidence
4. Synthesize the evidence
5. Make Practice Recommendation
Ask Clinical Question in PICOT Format

“The PICOT question is a consistent, systematic way to identify the components of a clinical question”

“A well-built PICOT question increases the likelihood that the best evidence to inform practice will be found.”

• **P**: Patient Population
• **I**: Intervention or Issue of Interest
• **C**: Comparison Intervention or Issue of Interest
• **O**: Outcome(s) of Interest
• **T**: Time it Takes for the Intervention to Achieve the Outcomes (optional)

Melnyk, Fineout-Overholt, Stilwell, Williamson, 2010
# Templates and Definitions of PICOT Questions

<table>
<thead>
<tr>
<th>Question type</th>
<th>Definition</th>
<th>Template</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention or therapy</td>
<td>To determine which treatment leads to the best outcome</td>
<td>In __________________ (P), how does _______ (I), compared with _______ (C), affect _______ (O) within _______ (T)?</td>
</tr>
<tr>
<td>Etiology</td>
<td>To determine the greatest risk factors or causes of a condition</td>
<td>Are __________________ (P) who have __________________ (I), compared with those without _______ (C), at ____ risk for _______ (O) over __________________ (T)?</td>
</tr>
<tr>
<td>Diagnosis or diagnostic test</td>
<td>To determine which test is more accurate and precise in diagnosing a condition</td>
<td>In __________________ (P), are/is __________________ (I), compared with __________________ (C), more accurate in diagnosing _______ (O)?</td>
</tr>
<tr>
<td>Prognosis or prediction</td>
<td>To determine the clinical course over time and likely complications of a condition</td>
<td>In __________________ (P), how does _______ (I), compared with _______ (C), influence _______ (O) over __________________ (T)?</td>
</tr>
<tr>
<td>Meaning</td>
<td>To understand the meaning of an experience for a particular individual, group, or community</td>
<td>How do ____________ (P) with _______ (I) perceive ____________ (O) during ____________ (T)?</td>
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</table>
PICOT Examples

In mechanically ventilated patients (P), how does a weaning protocol (I) compared with no weaning protocol (C) affect ventilator days (O) during ICU length of stay (T)?

In hospitalized adults (P), how does hourly rounding (I) compared with no rounding (C) affect fall rates (O)?

Other Examples?
Search for the Best Evidence (Valid and Current Research)

- Identify the type of PICOT question
- Determine the best levels of evidence for the PICOT question
- Select relevant databases to search
- Use elements from your PICOT question to identify searchable keywords
- Streamline your search
  - Use database vocabulary
  - Use Boolean connectors
  - Use database filters

Melnyk, Fineout-Overholt, Stilwell, Williamson, 2010
In mechanically ventilated patients (P), how does a weaning protocol (I) compared with no weaning protocol (C) affect ventilator days (O) during ICU length of stay (T)?

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Search for the Best Evidence
Determine the Best Level of Evidence

1. Meta Analyses & Systematic Reviews

2. Randomized Control Trails

3. Control Trials Without Randomization

4. Case Control or Cohort Studies

5. Systematic Review of Qualitative or Descriptive Studies

6. Qualitative or Descriptive Studies

7. Case Reports, Opinion Papers, Expert Opinion

Melnyk, Fineout-Overholt, Stilwell, Williamson, 2010
Search for the Best Evidence
Select Relevant Databases to Search

Cochrane Library
Collection of systematic reviews and meta-analyses

PubMed
Life sciences and biomedical topics

CINAHL
Top nursing and allied health literature

EMBASE
Biomedical database

PsychInfo
Behavioral Sciences and Mental Health
Search for the Best Evidence
Use PICOT Question to Identify Searchable Keywords

In mechanically ventilated patients (P), how does a weaning protocol (I) compared with no weaning protocol (C) affect ventilator days (O) during ICU length of stay (T)?

<table>
<thead>
<tr>
<th>Population</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Outcome</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical ventilation</td>
<td>Weaning</td>
<td>Protocol*</td>
<td>Non-protocol*</td>
<td>Ventilator Days</td>
</tr>
<tr>
<td>Mechanical ventilator</td>
<td>Protocol*</td>
<td></td>
<td></td>
<td>ICU length of stay</td>
</tr>
<tr>
<td>Artificial respiration</td>
<td></td>
<td></td>
<td></td>
<td>Intensive care unit length of stay</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ICU</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intensive care unit</td>
</tr>
</tbody>
</table>

* captures similarly spelled terms such as protocolized, protocols, etc.
In mechanically ventilated patients (P), how does a weaning protocol (I) compared with no weaning protocol (C) affect ventilator days (O) during ICU length of stay (T)?

Search for the Best Evidence
Use PICOT Question to Identify Searchable Keywords

(((mechanical ventilation OR mechanical ventilator OR artificial respiration)) AND weaning) AND non-protocol*) AND ventilator days) AND (ICU length of stay OR intensive care unit length of stay OR ICU OR intensive care unit)
Search for the Best Evidence
Streamline Your Search

• Too many search results?
  • Narrow search by adding more keywords

• Not enough search results?
  • Broaden search by removing keywords

• Streamline your search
  • Use database vocabulary (MESH, Thesaurus)
  • Use Boolean connectors (AND, OR, NOT)
  • Use database filters (English, humans, last 10 years)
Critically Appraise the Evidence

Step 1
• Determine the level of evidence for each study

• Categorize studies by level of evidence

1. Meta Analyses & Systematic Reviews
2. Randomized Control Trials
3. Control Trials Without Randomization
4. Case Control or Cohort Studies
5. Systematic Review of Qualitative or Descriptive Studies
6. Qualitative or Descriptive Studies
7. Case Reports, Opinion Papers, Expert Opinion
Step 2

- Use a critical appraisal guide to evaluate studies
- Identify major strengths and weaknesses

<table>
<thead>
<tr>
<th>Table 1. Research questions - guidelines for critiquing a quantitative research study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements influencing the believability of the research</td>
</tr>
<tr>
<td>Questions</td>
</tr>
<tr>
<td>Is the report well written – concise, grammatically correct, avoid the use of jargon? Is it well laid out and organized?</td>
</tr>
<tr>
<td>Do the researcher(s)'s qualifications/position indicate a degree of knowledge in this particular field?</td>
</tr>
<tr>
<td>Is the title clear, accurate and unambiguous?</td>
</tr>
<tr>
<td>Does the abstract offer a clear overview of the study including the research problem, sample, methodology, finding and recommendations?</td>
</tr>
<tr>
<td>Elements influencing the robustness of the research</td>
</tr>
<tr>
<td>Questions</td>
</tr>
<tr>
<td>Is the purpose of the study/research problem clearly identified?</td>
</tr>
<tr>
<td>Does the research report follow the steps of the research process in a logical manner? Do these steps naturally flow and are the links clear?</td>
</tr>
<tr>
<td>Is the review logically organized? Does it offer a balanced critical analysis of the literature? Is the majority of the literature of recent origin? Is it mainly from primary sources and of an empirical nature?</td>
</tr>
<tr>
<td>Has a conceptual or theoretical framework been identified? Is the framework adequately described? Is the framework appropriate?</td>
</tr>
<tr>
<td>Have aims and objectives, a research question or hypothesis been identified? If so are they clearly stated? Do they reflect the information presented in the literature review?</td>
</tr>
<tr>
<td>Has the target population been clearly identified? How were the sample selected? Was it a probability or non-probability sample? Is it of adequate size? Are the inclusion/exclusion criteria clearly identified?</td>
</tr>
<tr>
<td>Were the participants fully informed about the nature of the research? Was the autonomy/confidentiality of the participants guaranteed? Were the participants protected from harm? Was ethical permission granted for the study?</td>
</tr>
<tr>
<td>Are all the terms, theories and concepts mentioned in the study clearly defined?</td>
</tr>
<tr>
<td>Is the research design clearly identified? Has the data gathering instrument been described? Is the instrument appropriate? How was it developed? Were reliability and validity testing undertaken and the results discussed? Was a pilot study undertaken?</td>
</tr>
<tr>
<td>What type of data and statistical analysis was undertaken? Was it appropriate? How many of the sample participated? Significance of the findings?</td>
</tr>
<tr>
<td>Are the findings linked back to the literature review? If a hypothesis was identified was it supported? Were the strengths and limitations of the study including generalizability discussed? Was a recommendation for further research made?</td>
</tr>
<tr>
<td>Were all the books, journals and other media alluded to in the study accurately referenced?</td>
</tr>
</tbody>
</table>

Coughlan, Cronin, Ryan, 2007; Melnyk, Fineout-Overholt, Stilwell, Williamson, 2010
Step 3
• Create a study evaluation table and extract relevant information

### Evaluation Table Template

#### A. The column headings for the evaluation table. Copy and paste this header into a text document.

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Conceptual Framework</th>
<th>Design/Method</th>
<th>Sample/Setting</th>
<th>Major Variables Studied (and Their Definitions)</th>
<th>Measurement</th>
<th>Data Analysis</th>
<th>Findings</th>
<th>Appraisal: Worth to Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

#### B. A description of each column’s content. Put the data extracted from the studies in the correct column.

- **(Put citation here.)**
- **(Theoretical basis for study goes here.)**
- **(Describe design and how study was carried out.)**
- **(This column contains number and characteristics of patients; attrition rate and why.)**
- **(List and define independent and dependent variables.)**
- **(Here go scales used to measure outcome variables, including name and author of scale and data on validity and reliability.)**
- **(Put statistics used to answer clinical question here; but don’t need to include all.)**
- **(These are statistical or qualitative findings—there should be a finding for every statistical test in previous column.)**
- **(Describe strengths and limitations of study; risk or harm if study intervention or findings are implemented; feasibility of use in your practice. Remember: level of evidence + quality of evidence = strength of evidence and confidence to act.)**

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Melnik, Fineout-Overholt, Stilwell, Williamson, 2007
## Critically Appraise the Evidence

## Synthesize the Evidence

<table>
<thead>
<tr>
<th>Level</th>
<th>Article Type</th>
<th>Keeper Article #1</th>
<th>Keeper Article #2</th>
<th>Keeper Article #3</th>
<th>Keeper Article #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1: Meta Analysis &amp; Systematic Review</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 2: Randomized Control Trial</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Level 3: Controlled Trial Without Randomization</td>
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<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Level 4: Case-Control or Cohort Study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 5: Systematic Review of Qualitative or Descriptive Studies</td>
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<td></td>
</tr>
<tr>
<td>Level 6: Qualitative or Descriptive Studies</td>
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</tr>
<tr>
<td>Level 7: Case Reports, Opinion Papers, Expert Opinion</td>
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</tbody>
</table>

Melnyk, Fineout-Overholt, Stilwell, Williamson, 2007
## Critically Appraise the Evidence
### Synthesize the Evidence

<table>
<thead>
<tr>
<th>Definition of the Outcome</th>
<th>Keeper Article #1</th>
<th>Keeper Article #2</th>
<th>Keeper Article #3</th>
<th>Keeper Article #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome #1</td>
<td>↑ adults</td>
<td>↑ children</td>
<td>↑ adults</td>
<td>NE</td>
</tr>
<tr>
<td>Outcome #2</td>
<td>NR</td>
<td>↓</td>
<td>↓</td>
<td>NE</td>
</tr>
<tr>
<td>Outcome #3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome #4</td>
<td></td>
<td></td>
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</tbody>
</table>

Helpful Tip: Make note of the symbols and acronyms that you use in your synthesis table

*Note.* NE = Not Evaluated; NR = Not Reported
Critically Appraise the Evidence
Make Practice Recommendations

Combine all sources of evidence

AND

Make a convincing, evidence-based case for your quality improvement initiative
Questions

Evidence-Based Practice Bootcamp
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