Evidence-Based

An Independent Study Short Course for Medical-Surgical Nurses
This module was developed by the Clinical Practice Committee of the Academy of Medical-Surgical Nurses, in accordance with the 2006-2010 strategic plan.
One Approach to Evidence-Based Practice

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Iowa/Titler Model
Iowa EBP Model

• Theoretical-process model to:
  – Sequence and organize thinking about clinical activities and ways to improve them.
  – Help determine next steps.

• Has been shown to be successful in several settings for guiding EBP.

• Process has five steps.
EBP Process

The EBP Process Steps are:

1. Assess practice
2. Decide
3. Plan
4. Intervene
5. Evaluate
EBP Process

Step 1
Assess practice.....develop a question

*What isn’t working?*

*What do you want to know about?*
EBP Process

Step 2

Decide........

What resources are available and are they any good?

What has worked in other places?

How can you change your practice?
EBP Process

Step 3

Plan…………

• Make a plan to change care based on relevant, applicable information

• Collect data

• Let others help.
EBP Process

Step 4

Intervene

Implement revised caregiving protocol in clinical unit.
EBP Process

Step 5

Evaluate

How well is the process/plan working for you?
So, EBP either validates or poses a question as to why we do what we do and can we do it better.....
Problem Focused Triggers
1. Risk management data
2. Process improvement data
3. Internal/external benchmarking data
4. Financial data
5. Identification of clinical problem

Knowledge Focused Triggers
1. New research or other literature
2. National agencies or organization standards & guidelines
3. Philosophies of care
4. Questions from institutional standards committee

Is the topic a priority for the organization?
Yes

Form a team

Assemble relevant research and related literature

Critique and synthesize research for use in practice

Is there a sufficient research base?
Yes

Base practice on other types of evidence
1. Case reports
2. Expert opinion
3. Scientific principles
4. Theory

Conduct research

No

Pilot the change in practice
1. Select outcomes to be achieved
2. Collect baseline data
3. Design evidence-based practice (EBP) guideline(s)
4. Implement EBP on pilot units
5. Evaluate process and outcomes
6. Modify the practice guideline

Continue to evaluate quality of care and new knowledge

No

Is change appropriate for adoption in practice?
Yes

Institute the change in practice

Monitor and analyze structure, process, and outcome data
- Environment
- Staff
- Cost
- Patient and Family

No

Disseminate results

Consider other triggers

Iowa Model of Evidence-Based Practice to Promote Quality Care

Assess

Decide

Plan

Implement

Evaluate

Titler, Kleiber, Steelman, et al., 2001
So, let’s look at the five steps in detail……
1. Assess Your Practice

The assessment of practice drives the formulation of a clinical question that can be answered from research, clinical judgment, and patient preferences.
1. Assess Your Practice

- Start with looking for something in practice that could be done better.
- What is the clinical concern or uncertainty? Need to document that something isn’t working as expected or as well as it could
  - Doing this well helps to sell others on the need to change later.
  - Those closest to patients know best what is and isn’t working.
Triggers to Create the Clinical Question

- The catalyst for nurses to think critically about practice efficiencies and effectiveness may come from one or more sources.

- Triggers for practice improvement may be “problem-focused” or “knowledge-focused.”
Triggers to Create the Clinical Question

• **Problem-focused triggers** are used to generate questions about existing organizational or patient care issues for which some information is already known.

• **Knowledge-focused triggers** are used to generate questions initiated by review of information external to the organization about which more knowledge is desired.
Examples of Triggers

Problem-Focused Triggers

- Risk management
- Process improvement
- Internal and external benchmarks
- Financial data
- Identification of clinical problems
Examples of Triggers

Knowledge-Focused Triggers

• New information in the literature
• National agencies and standards of care (JCAHO, Magnet, NDNQI, IHI, AMSN)
• Philosophies of care
• Questions from institutional committees
Problem-Focused Triggers May Be Used to Ask Questions about Data

Which population has the highest infection rate/fall rate at this hospital?
Which populations have higher infection rate/fall rate than the benchmark comparator?
Which populations are a priority? What interventions need to be tried to reduce falls and infections?
Asking the Question

Next, formulate the clinical question.

• The question needs to be searchable and answerable, with the focus being on generating generalizable knowledge that will guide practice (Finehout-Overholt, Melnyk, & Schultz, 2005).
Asking the Question

Writing the question following the PICO format will drive an efficient search for the best answer to the question. (Finehout-Overholt et al., 2005).

- **P** = Patient population
- **I** = Intervention or area of interest
- **C** = Comparison intervention or group
- **O** = Outcome
PICO Question

PICO Question Example:

In adults, is music therapy or guided imagery more effective in reducing nausea during the first 48 hours following laparoscopic bowel resection?

- **P** = Adults
- **I** = Music
- **C** = Guided imagery
- **O** = Nausea
PICO Question

Now, practice writing a question from your area of practice.

– **P** (*population*) What is the population that is of concern?

– **I** (*intervention*) What do you want to do to get to a better outcome for this population?

– **C** (*comparison*) What are the alternatives or other options for intervention?

– **O** (*outcome*) What do you want to change?
2. Decide

Now that you have formulated a question, the next step is to decide:

• What makes this a priority?
• Is this a strategic goal of the organization? The National Patient Safety Goals for 2006 are widely embraced by hospitals and provide a framework for establishing priorities. If your question matches up with the patient safety goals, chances are it may already be one of your institutional priorities.
2. Decide

- Is this a high-risk or high-volume problem?
- Has there been a change in outcomes over time or is your interest triggered by a critical event?
- Do you have or will you be able to gain interdisciplinary support?
- Are others interested in/excited about the topic?
Sell the Clinical Issue

Gather as much information as you are able to on the cost of the problem that exists and the cost of not changing practice.

- What data do you have?
- What are the cost implications?

You will need hard data to sell any clinical issue with any costs attached.
Sell the Clinical Issue

When thinking about costs, be sure to include the cost of time for you and others to:

– Gather the information about the current situation.
– Search for the best evidence to support the practice improvement.
– Educate all of the players involved with the change.
– Then evaluate the change for effectiveness or need of modification.
– Other costs include any needed technology, equipment, supplies.
Sell the Clinical Issue

- Data needs to be presented to the right people in an understandable format.
- Consider tables and graphs to translate numbers into easily understood charts that display the relationships among the data elements.
Assemble a Team

Use of evidence to guide practice decisions is one of the five core competencies recommended by the IOM Summit on Education for Health Professionals.
Team Member Competencies

The competencies are interrelated and address:

1) providing patient-centered care
2) working in interdisciplinary teams
3) employing evidence-based practice
4) applying quality improvement methods
5) utilizing informatics.

When desiring to change practice to reach better patient outcomes, all five of these competencies are important.
The Team

• Assemble a team of interdisciplinary providers to look at various sources of information across disciplines. Team members and disciplines are determined by the topic. The breadth of knowledge will lead to discovery and possible application of research findings that a single discipline alone may be unfamiliar with or unable to implement due to practice scope.

• When comprising the team, consider the question, “Who should be involved with monitoring quality patient care?”

• Use existing structures (committees, task forces) when possible or build new structures.
Determine Your Resources

Identify who your internal and external resources are for guiding clinical practice improvements.

- Clinical nurse specialists, quality specialists, and other advanced practice nurses are skilled in process improvements and can be excellent consultation resources.
- Some hospitals have developed mentorship programs for supporting staff in asking and answering clinical questions.
- Some institutions have specially designated research librarians, specifically assigned to help staff of all disciplines with literature searches and writing the researchable question. Find out what your facility’s library offers.
- Some schools of nursing have developed collaborative relationships with hospitals and provide consultations on practice issues as part of this relationship.
Determine Your Resources

Know the databases that are available to you to collect the best evidence to answer the PICO question.

The PICO question will determine which databases you will need to search.
Databases

• **MEDLINE**
  World’s most comprehensive source of life science and biomedical bibliographic information. It contains nearly 11 million records from over 7,300 publications dating from 1965 to present. The listing is updated weekly.

• **PubMed**
  A service of the U.S. National Library of Medicine that includes over 16 million citations from MEDLINE and other life science journals for biomedical articles back to the 1950s. PubMed includes links to full text articles and other related resources.

• **CINAHL**
  Covers nursing and allied health literature from 1982 to the present.

• **National Guidelines Clearinghouse**
  A public resource for evidence-based clinical practice guidelines, sponsored by the Agency for Healthcare Research and Quality (formerly the Agency for Health Care Policy and Research in partnership with the American Medical Association and the American Association of Health Plans).
Databases

• **Cochrane Library**
  
The Cochrane Library consists of a regularly updated collection of evidence-based medicine databases, including The Cochrane Database of Systematic Reviews.

Reviews are based on the best available information about health care interventions. They explore the evidence for and against the effectiveness and appropriateness of treatments (medications, surgery, education) in specific circumstances.

Reviews are published in The Cochrane Library, which is available by subscription, either on CD-ROM or via the Internet. You should be able to browse the Cochrane Library at your nearest medical library.

The Cochrane Library is published four times a year. Each issue contains all existing reviews plus an increasingly wider range of new and updated reviews.
Databases

Cochrane Reviews – Example:
- There is no evidence that any wound dressing is better than a simple dressing for leg ulcer healing.
- There are many kinds of dressings used for the treatment of venous ulcers, usually beneath compression bandages. There was no evidence of additional benefit associated with wound dressings other than simple dressings when used beneath compression. There was no evidence of difference in healing rates between other dressings, but most studies are too small to allow us to rule out important differences. Inexpensive, simple, non-adherent dressings should be used beneath compression therapy unless other factors, such as patient preference, take precedence.

*The Cochrane Database of Systematic Reviews* 2006 Issue 3; Copyright © 2006 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.
Assemble Research Literature

• Search the databases.
• Locate relevant clinical protocols and clinical practice guidelines.
  – Such literature is developed based on a systematic review, appraisal, and synthesis of research evidence.
  – They are general recommended courses of intervention, supported by research, requiring judgment and reasoning in application based on unique needs of individual patients and variations in clinical settings and resources (Ledbetter & Stevens, 2000).
Assemble Research Literature

• Review articles in *Evidence-Based Nursing* and *Evidence-Based Medicine* journals.
• Locate relevant clinical research.
• Use library, online sources, and experts in searching topics.
• Use your professional networks and web resources for AMSN members.
Critique and Synthesize Literature

• Is there a body of literature to support answering your question?
• How good are the individual research articles?
• Identify key elements
Critique and Synthesize Literature

• Key elements:
  – Sample
  – Process under study; intervention:
    • Timing
    • Consistency in carrying out the intervention
  – Outcomes:
    • How were they measured?
    • What were the early outcomes and later outcomes?
    • Were the outcomes effective? How was effectiveness judged?
Create a **Collective Evidence Table** to summarize findings of the literature review.
## Sample Collective Evidence Table

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Sample</th>
<th>Process Under Study/Interventions</th>
<th>Outcomes Effectiveness</th>
<th>Applicability Feasibility</th>
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Next, critique and determine what evidence supports the issue............
Critiquing the Research Literature

• Internal validity
• External validity
• Study design
  – Sampling Plan
  – Measurement
    • Reliability
    • Validity
• Results
  – Statistical significance
  – Clinical significance
Internal Validity

Internal validity describes the degree to which the results can be attributed to the independent or predictor variables.

- Did you study what you intended or was it something else?
- Can the outcome be attributed to the predictors (or intervention), or did other factors influence the outcome?
- Was there a third variable that could/should have been considered?
Internal Validity

Examples of internal validity concerns:
- Making a positive relationship between crime rates and ice cream sales.
- Patients who report higher trust in health care professionals have shorter hospital lengths of stay.
- Patients in a massage study report massage intervention highly effective.
Threats to Internal Validity

• History and Natural Circumstances
  – *Unrelated event occurs.*

• Maturation
  – *As the study matures, one may become older, wiser, stronger, or fatigued.*

• Testing
  – *Subjects may remember previous questions or be influenced by their previous answers.*

• Instrumentation
  – *Measurement instruments may change over time.*
Threats to Internal Validity

• Statistical Regression
  – More subjects clustered around the middle with few floor and ceiling scores.

• Selection
  – Subjects participate because of positive expectations.

• Mortality
  – Dropout of the study for any of a number of reasons.

• Diffusion of Treatment
  – Intervention provided to both the control and experimental groups.
External Validity

External validity determines whether the results of the study can be generalized to people and settings beyond those included in the original study.

- *Can the study can be considered valid outside the original setting?*

This answer is crucial because it determines your ability to apply the findings. You must be able to apply the findings to answer your research question for your practice setting which determines if you can use the results.
Threats to External Validity

• Hawthorne effect: Subjects’ knowledge that they are participating in a study influences their behavior responses.

• Experimenter effect: Researcher's behavior and/or characteristics (facial expressions, clothing, age, gender, body build) influence subject behavior.
Study Design

• **Good Design = Control**

• Researchers need to control several variables that might affect the outcome of the study:
  - Environment
  - Subject selection
  - Treatment
  - Measurement
Study Design

Special types of control:

• **Blind**: *Unaware of assigned treatment.*

• **Double blind**: *Provider also unaware of assigned treatment.*

• **Placebo**: A *look-alike treatment with no efficacy.*
Sampling Plan

The **sampling plan** is the process of determining how subjects will be selected for the study.

The goal of the sampling plan is to minimize bias by obtaining a group of subjects that overall is representative of the general population to which the research question applies.
Sampling Plan

• Samples are controlled through:
  – Control group (those who do not get the intervention).
  – Homogeneity (characteristics of the control and experimental groups need to be similar).
  – Matching (characteristics of subjects in one group are matched with subjects in other group).
  – Statistical control.
  – Randomization (a systematic predefined process for assigning research subjects to either the control or experimental groups based on chance). Process is believed to control for extraneous variables.
Sampling Plan

Sample size:
- Determined by the question being asked.
- Larger samples are preferred but still may not be representative.
Measurement: Reliability

• The question regarding reliability is, “How are the concepts under study measured?”
• Does the instrument used for the measurement perform the way you expect it to across items, over time, between persons, and different settings?
Types of Reliability

- Internal consistency
  
  *Do all the items measure the same thing?*

- Stability
  
  *How does the test hold up when re-tested?*

- Inter-rater reliability
  
  *Does the test perform the same way for each tester that uses it?*
Validity is the extent to which the instrument actually reflects the concept being measured.
Types of Validity

• **Content validity:**
  
  *Is the range of questions comprehensive?*

• **Construct validity:**
  
  *Are the questions or items in the instrument theoretically connected?*

• **Convergent/divergent validity:**
  
  – *Is there a high correlation between scores on this instrument and other instruments measuring similar concepts?*
  
  – *Is there low correlation between scores on this instrument and other instruments measuring divergent or dissimilar concepts?*
Statistical Significance

• How strong are the statistical findings?
  – What is the strength of the associations/differences between 2 or more groups?
  – What is the proportion of the variance that is accounted for?

• Statistical significance is determined by the researcher. Typically, 0.05 is accepted in nursing or 0.01 in pharmacologic.
Clinical Significance

• What do the findings mean to your patients?

• Based on YOUR clinical judgment of the situation:
  – Is it clinically significant if knowledge of medications improves by 10%?
  – Is it clinically significant if readmission rates decline by 2%?
  – Is it clinically significant if the length of stay of complex head and neck surgery patients decreases by 3 days?
Clinical Significance

Typically, clinical significance is accepted when the difference between the results of two groups meets or exceeds one half of the standard deviation for the groups.
Clinical Significance

Example:

• Results of a subset of 1,000 subjects were compared with results of the larger cohort of 75,000.

• Because of the large size of the groups, very small differences of 1 to 2 points in scores were statistically significant.

• Focusing on areas where there was a clinical significance between the scores of the two groups (5 points or more since the standard deviation was 10), resources could be effectively used to target areas where change was needed and results could be easily quantified.
Synthesize Across Studies

- Use the collective evidence table to summarize major findings.

- Look for consistency across several studies.

- Ask the question, “How strong is any individual finding?”

- How applicable would any individual study be for this environment?

- Is there sufficient research to guide practice?
Evaluating the Research

Research is evaluated for **three** things:

1. The research information it provides.
2. The task to which the research refers.
3. The fit of the task within nursing context.
Evaluating the Research

1. The research information it provides.
   - How relevant is the information?
   - What is the quality of the research itself?
Evaluating the Research

2. The task to which the research refers.
   - How much effort will need to be expended to implement the change?
   - Is the intervention difficult to implement?
   - What are the consequences for the ones who will be carrying this out?
   - How much efficiency do you anticipate this will add?
   - What is the practicality?
   - How effective has the intervention been judged to be?
   - What are the risks and benefits?
Evaluating the Research

3. How does this fit within nursing practice?
   - What is the likelihood of others taking up and endorsing this practice?
   - How well will this new practice fit within the other existing practices?
Summary Statement

Write a simple statement regarding the basic findings.

– The summary statement needs to be written into a formal protocol as a prescription for practice.

  • Example: In 10 research trials, ventilator-associated pneumonia rates did not increase with an interval of 7 days between circuit changes.
3. Plan

Whether evidence is sufficient or not, the steps to follow for planning, implementing, and evaluating practice change are the same.
3. Plan

— If there is not sufficient research evidence on which to base your practice improvement:
  • Base your change on other types of evidence (case reports, theory, scientific principles, expert consultation)

    OR

  • Conduct a research study

— If there is sufficient evidence to change practice, the change instituted may be major or minor.
3. Plan

- Write the practice protocol detailing how the practice change will be carried out. Use relevant existing EBP guidelines from your literature critique.
- Select outcomes to be achieved.
- Aggregate the baseline data that has already been collected; collect additional data to further document the current situation (cost, quality, risk, benchmarks, outcomes).
3. Plan

• Recruit needed resources (people, time, supplies).
• Select pilot units for trial of intervention and implementation process.
• Create the timeline (communication/marketing plan, training plan, materials production, sequencing of practice change, and other events).
3. Plan

- Determine evaluation steps, timeline, and methods:
  - What data will be collected?
  - How will it be collected?
  - Who will do the work?
  - Negotiate resources well in advance of implementation.

- Assign team member responsibilities in implementation and evaluation.
4. Implement the Practice Change

Implement EBP protocol on pilot units:

1. Initiate staff training.
2. Deploy team members as educators, communicators, practice reviewers, and reinforcers.
3. Start the actual practice change.
4. Monitor practice change and provide feedback (assure that the intended practice is actually changing).
5. Evaluate Successes

1. Take stock
2. Focus on the right solution
3. Take collective action
4. Monitor & adjust
5. Maintain momentum
Evaluate and Modify if Needed

• Structure
  – Were the materials, people, and resources available for the change to occur? If needed, were staff schedules adjusted to accommodate the change?
  – Were competing or contradictory agendas controlled or timed to occur at a different time?
5. Evaluate Successes, Modify

• Process
  – *Did the change in practice occur according to the protocol?*

During the implementation phase, it is critical to observe and provide feedback on the practice change. People need to know that what they are doing is difficult, takes time, that they are doing it right, and that they are vital to this process.
5. Evaluate Successes, Modify

• Outcome
  – What were the costs associated with the change?
  – What has been the impact on staff – time, efficiency, perceptions of effectiveness?
  – How have patient and/or family outcomes changes?
  – Were the outcomes for the project achieved?
  – Were there other unanticipated outcomes?
5. Evaluate Successes, Modify

- Analyze findings from the review of the structure, process, and outcomes evaluation.
- What were the strengths and limitations
  - of the plan?
  - of the clinical protocol?
- Re-write the plan and protocol, incorporating modifications that address strengths and limitations.
- Report results to the involved staff; report externally as appropriate.
- Implement modifications and if appropriate, expand to more units.
5. Evaluate Successes, Modify

Acknowledge the process of EBP is one of continually learning and improving practice.
References


Stevens, K. R. (2004). *ACE Star Model of EBP: Knowledge Transformation*. Academic Center for Evidence-based Practice. The University of Texas Health Science Center at San Antonio. [www.acestar.uthscsa.edu](http://www.acestar.uthscsa.edu)
Additional Readings


