Technology to Support an Evidence-Based Practice

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With special thanks to:
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Disclosure

• Kimberly Trout, PhD, CNM, APRN – nothing to disclose

• Teri Thompson, PhD, RN, CPNP, FNP-BC – nothing to disclose to the disclosure slide
Objectives:

• Briefly review Evidence-based practice principals.

• Discuss the necessary technology to support an evidence-based practice

• Discuss methods to use technology to access evidence based practice

• Application of learning
Healthcare Today:

- Based on the IOM report on Health Professionals, we are supposed to possess five-core competencies:
  - Provide patient-centered care
  - Work in interdisciplinary teams
  - Employ evidence-based practice
  - Apply quality improvement
  - Use informatics

- IOM (2003). Health Professions Education: A Bridge to Quality
Why EBP?

- As a practitioner you are expected to keep up with the current changes in practice.

- You are expected to be a life long self-directed adult learner.

- In order to keep up with the journals relevant to your practice, we need to review 19 articles a day, 365 days of the year!
  - Brian Haynes, 1993

- Goal is to have ninety percent of healthcare decisions be evidence-based by 2020
  - IOM roundtable on EBP
Why EBP?

EBP improves patient outcomes

Heater, Becker, & Olsen, 1988
Why EBP?

- Explicit process to enhance efficiency
- Explicit criteria for appraising evidence as valid or invalid
- Explicit strategies for incorporating evidence into clinical practice
What tools do you need to do EBP?

• Curiosity – Curiosity – Curiosity
• Knowledge of EBP
• High Standards of Care
• Research Skills
• Informatics Skills
• Little or NO Financial Resources
Major Barriers to EBP

• Low comfort level with search techniques or with proposed guidelines.
• Perceived lack of time to search for the best evidence.
• Challenges with critically appraising research reports.
• Lack of organizational/administrative support.
• Negative attitudes toward research.
• Colleagues who are skeptical of or who do not believe in EBP.
• The difficulty in implementing new guidelines.
Evidence-based Practice

- Evidence-based practice (EBP) is a problem solving approach to clinical practice that integrates the conscientious use of best evidence in combination with a clinician’s expertise as well as patient preferences and values to make decisions about the type of care that is provided. **Resources** must be considered in the decision-making process as well.
The merging of Science and Art of EBP within a context of Caring Results in the Highest Quality of Patient Care

- Research Evidence & Evidence-based Theories
- Clinical Expertise and Evidence from assessment of the patient’s history and condition as well as healthcare resources
- Patient Preferences and Values
- Clinical Decision Making
- Quality Patient Outcomes

Melnyk, B., Fineout-Overholt, E. (2011). Evidence-based practice in Nursing and Health care. 2nd ed.: Lippincott Williams & Wilkins
Technology to Support an Evidence-based Practice

- There are seven steps to an Evidenced-based Practice (we will get to these shortly)
- At this point several questions arises:
  - 1. How do you access the evidence you need?
  - 2. What types of technology are available, how do you use them to your benefit, and what are some newer and unique ways of using this technology?
  - 3. How do you implement these new technologies into practice?
- These last two questions we will answer as we go through the seven steps.
The Seven Steps of EBP

0. Cultivate a spirit of inquiry
1. Ask the burning clinical question in the format that will yield the most relevant and best evidence (PICOT format)
2. **Search for and collect the most relevant and best evidence to answer the clinical question (e.g., searching for systematic reviews)**
3. **Critically appraise the evidence that has been collected**
4. Integrate the evidence with one’s clinical expertise and the patient’s preferences and values to implement a clinical decision
5. Evaluate the outcomes of the practice decision or change based on evidence
6. Disseminate the outcomes of the EBP decision or change
The Seven Steps of EBP

- Step 0: Cultivate a spirit of inquiry
The Seven Steps of EBP

Step 1: Ask the burning clinical question in PICOT format:

- **Patient population**
  - (age, gender, ethnicity, with certain disorder)
- **Intervention or range of interventions of interest**
  - (exposure to disease, prognostic factor A, risk behavior)
- **Comparison intervention or group**
  - (no disease, placebo or not intervention/therapy, absence of risk factor)
- **Outcome of interest**
- **Time frame**
The Question becomes (in PICOT):

- For health care providers who need to answer clinical questions (P), what is the best way to access evidence regarding treatments (I), to improve outcomes (O) compared with traditional knowledge methods (C)?
- Optional: (T) over what period of time?
What burning questions do you have in your clinical practice?

- In newborns (P), how does delayed cord clamping (I) compared to immediate cord clamping (C) affect neonatal iron stores (O) within first six months of life (T)?
The seven steps of EBP

Step 2: Collect the best evidence. Search first for systematic reviews and evidence-based clinical practice guidelines

The questions:
- How do you access the evidence you need?
- What types of technology are available, how do you use them to your benefit, and what are some newer and unique ways of using this technology?
Accessing Evidence?

• The type of evidence that you need depends on the type of question you are answering.
• Two paths:
  ▫ one path for quick clinical questions that you need answers (e.g., Dynamed, UptoDate)
  ▫ one for more in depth research type clinical questions
How do you access the evidence you need?

• Simple Answer
  ▫ Technology- Technology-Technology

• Not so simple to do
  ▫ Need some technological resources
  ▫ Need some simple applications to help access the evidence
• What types of technology are available, how do you use them to your benefit, and what are some newer and unique ways of using this technology?
Simple Resources

- Computer
- Smart Phone
- Tablet

- High-Speed Internet Access
- Appropriate Permissions
- Appropriate Applications/Programs/Databases
If you have access to academic databases, select the most likely source that can help answer the question:

- Electronic databases
  - MEDLINE
  - PsycInfo
  - CINAHL
- Database Software
  - OVID
- Web sites
- Cochrane Library
- Pre-appraised Literature
  - http://ebn.bmjjournals.com
- Hand searching through book collections
Applications/Programs

• Applications/Programs for your Smart Phone/Tablet/PC/Workstations
  ▫ [Link](http://www.essentialevidenceplus.com/)
  ▫ [Link](http://www.uptodate.com/home/wkhcs/index.html)
  ▫ [Link](http://www.pepid.com/)
  ▫ [Link](http://en.wikipedia.org/wiki/List_of_open-source_healthcare_software)
  ▫ [Link](http://www.imedicalapps.com/app-review/)
  ▫ [Link](http://www.imedicalapps.com/2011/06/evidence-based-medicinlevel-bmj/)
  ▫ [Link](http://www.lexi.com/individuals/iphone/)
  ▫ [Link](http://www.unboundmedicine.com/products/iphone)
  ▫ [Link](http://www.epocrates.com/)
  ▫ [Link](http://www.aafp.org/fpm/2003/0500/p73.html)
But I’m not academically based - other options:

- Clinical Guidelines
- Local Libraries, Community Colleges, and State based Health Science Libraries
- Your EHR
- Online Databases that are housed through memberships with specialty organizations
- Group Databases
- Research Participation
Register Now! And view the Program Guide!

2012 Conference Exhibitor Prospectus.
Click here to view and download the prospectus.

NPWH has developed a Heavy Menstrual Bleeding Toolkit for NPs to help both identify and treat HMB. This toolkit is available at no charge. Click here to request one today!

www.npwh.org
• [www.midwife.org](http://www.midwife.org)  
  ▫ Birth Toolkit  
  • For promoting physiologic birth
The seven steps of EBP

3. Critically appraise the evidence
   a. Are the results valid (as close to the truth as possible)?

   b. What were the results of the study?

   c. Are the findings clinically relevant to my patient(s)?
Rating System for Levels of Evidence (Melnyk & Finout-Overholt, 2011)

Level I: Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials or evidence-based clinical practice guidelines based on systematic reviews of RCTs.

Level II: Evidence obtained from at least one properly designed randomized controlled trial.

Level III: Evidence obtained from well-designed controlled trials without randomization.

Level IV: Evidence obtained from well-designed case control and cohort studies.

Level V: Evidence from systematic reviews of descriptive and qualitative studies.

Level VI: Evidence from a single descriptive or qualitative study.

Level VII: Evidence from opinion of authorities and/or reports of expert committees.
Sources of evidence

- **Reliable:**
  - Use well done evidence syntheses with confidence
  - Read the pre-appraised literature (Evidence-based Nursing, Journal, ACP Journal Club)
  - Use peer-reviewed journal articles

- **Less Reliable:**
  - Use textbooks with caution (great source of information for background questions)
Systematic Reviews

- Where do you find them
  - Cochrane collaboration
    - Cochrane Database of Systematic Reviews (CDSR)
    - Database of Abstracts of Reviews of Effectiveness (DARE)
    - Health Technology Assessment (HTA)
- National Library of Medicine
  - CINAHL
  - PubMed/MEDLINE
    - www.mcbi.nlm.nih.gov/entrez
- What is a systematic review
  - Comprehensive and unbiased summary of the research on a single topic (Evans, 2000)
  - Uses the scientific approach
  - Most rigorous approach to minimize bias
  - Usually conducted by an expert or expert panel
Systematic Reviews

- Critically Appraised the same as other research
  - Few different questions:
    - Are the studies in the review randomized
    - Is it unlikely that important, relevant studies were missed
    - Is there a description of how the validity of the individual studies were assessed
    - Were the results consistent across studies
    - Were individual patient data or aggregate data used in the analysis?

What were the results?
- How large were the treatment effects?
- How precise is the estimate of treatment
Evidence-based Guidelines:

- Systematically developed statements to assist practitioner with patient decisions about appropriate health care for specific clinical circumstances
  - Readily useable distillation of valid evidence, clinical expertise, and expert opinion
  - Include all issues that may affect decision making

- Two major components of guidelines
  - The evidence summary: validity, importance, up-to-date
  - Detailed instructions for applying it

- Guidelines: Asking Preliminary Questions
  - Does the guidelines make explicit recommendations (reflecting value judgments about outcomes)
  - Did you do you homework
  - Is the guideline based on ALL evidence – good and bad
  - Was a comprehensive, reproducible literature review carried out in the past 12 months?
  - Is each recommendation in the guideline tagged by the level of evidence upon which it is based and linked with a specific citation
  - Who funded the guideline development
  - Who were the developer
    - Representative of key stakeholders in this specialty?
  - Were all the options and outcomes considers
Evidence-based guidelines: preliminary questions, cont.

- Did its developers carry out a comprehensive, reproducible literature review within the past 12 months of its publication/revision?
  - Maybe shorter for rapidly changing issues, longer for more stable issues
  - Was an explicit and sensible process used to identify, select and combine evidence
    - Is each of its recommendations both tagged by the level of evidence upon which it is based and linked to a specific citation?
  - Is there a guide to the levels of evidence supporting each recommendation or statements?
  - Are the recommendations practical and clinically relevant?
  - Has the guideline been subjected to peer review and testing?
  - Will the recommendations help me in caring for my patients?
  - Is the guideline applicable to my patients (Killer B’s)?
    - Is the burden of illness too low to warrant implementation
    - Is the belief of patients about the value of the interventions incompatible with the guideline?
    - Would the cost of implementing the guideline be a bad bargain in the use of resources?
    - Are the barriers so big that it is not worth trying to overcome them?
Foundational Knowledge for the Critical Appraisal of Intervention Studies

• The independent variable (the treatment or intervention) must precede the dependent variable or outcome in time
• There must be a relationship between the IV & the DV
• This relationship can not be explained by the other extraneous factors
Explanations for differences between study groups in intervention studies

- Extraneous/confounding variables

- Differences between how the groups were treated during the clinical trial

- The treatment or intervention worked
Critical appraisal of a therapy or intervention trial

• Are the results valid?

• Five major questions
  ▫ Were subjects randomly assigned to the tx groups and was the random assignment concealed from the individuals enrolling subjects?
    • Were patients and providers kept blind to treatment?
  ▫ Was the follow-up sufficiently long to study the effects of the treatment and were all patients accounted for at the end of the study?
  ▫ Were patients analyzed in the group to which they were assigned?
    • Were the groups treated equally aside from the experimental treatment?
  ▫ Was the control group appropriate?
    • Were the groups equal at the beginning of the study?
  ▫ Were the instruments used to measure the outcome variables valid and reliable?
Critical appraisal of a therapy or intervention trial

• What are the results of the study and are they important?
  ▫ What was the magnitude of the treatment effect?
    • Relative Risk Reduction (RRR): proportion of risk for bad outcomes in the intervention group compared to the unexposed control group. This is a problem when we only look at the p value. It is dependent on sample size, need to look at effect size as well.

    • Absolute Risk Reduction (ARR): the absolute difference between the unexposed and exposed groups’ risks (ie. Occurrence in the unexposed/control group subtracted from the occurrence in the exposed intervention group)

    • Number needed to treat (NNT): the number of patient the need to be treated to achieve one additional favorable outcome.

    • Number needed to Harm (NNH): the number of patients that need to be treated to achieve one negative outcome.

    • Effect Sizes: an estimate of how large the treatment effect is, that is how well the intervention worked in the experimental group in comparison to the control group.
Critical appraisal of a therapy or intervention trial

• What are the results of the study and are they important?
  ▫ Statistical significance vs. clinical meaningfulness
    • Statistical significance: the results obtained in a study are unlikely to be caused by chance
      • Is largely dependent upon the power and number of subjects in a study
      • The larger the sample, the greater the power and probability of detecting significant differences between study groups even when effect sizes are small (fictitious example)
    • When evaluating intervention trials, the focus should be on the magnitude of effects instead of statistically significant differences
Critical appraisal of a therapy or intervention trial

- How precise were the treatment effect?
  - P value
    - The probability of an event given the assumption that there is no true difference between the intervention and control
    - Unlike CI’s, p values do not tell us anything about the precision of the measures or the size of the effect
  - Confidence Intervals
    - The range in which the real answer lies with a given degree of certainty (usually 95%)
    - Describe an interval around the estimated effect point (you can get results within this interval, if you replicate their intervention)
Statistics aside

- **Risk Ratio [relative risk – RR]**
  - Reported as measures of association between groups exposed and unexposed to the intervention and the outcome
  - Measures the strength of association
  - If the outcome is something we want or positive (ie. BF) RR > 1 means the treatment is better than control
  - If the outcome is something we do not want or negative (ie. death), RR > 1 means the treatment is worse than control

- **Odds Ratio (OR)**
  - The odds of a case patient (ie. Someone in the intervention group) being exposed divided by the odds of a control patient being exposed
  - Usually reported in retrospective studies such as case control studies where the number of sick and not sick patients is known but not the total number of people
  - If the outcome is something we want or positive (ie. BF), OR > 1 means the treatment is better than the control
  - If the outcome is something we don’t want or negative (ie. Death), OR > 1 means the treatment is worse than control
Websites to help with Step 3: Critical appraisal

- http://www.clahrclnr.nihr.ac.uk/evidence/appraising-evidence
- http://guides.lib.unc.edu/content.php?pid=182979&sid=1539843
- http://iskillzone.uwe.ac.uk/RenderPages/RenderConstellation.aspx?Context=10&Area=8&Room=46&Constellation=34
Applying Classification of Recommendations and Level of Evidence

<table>
<thead>
<tr>
<th>Class I</th>
<th>Class IIa</th>
<th>Class IIb</th>
<th>Class III</th>
</tr>
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<tbody>
<tr>
<td>Benefit &gt;&gt;&gt; Risk</td>
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<td>Benefit ≥ Risk</td>
<td>Risk ≥ Benefit</td>
</tr>
<tr>
<td>Procedure/ Treatment SHOULD be performed/administered</td>
<td>Additional studies with focused objectives needed</td>
<td>Additional studies with broad objectives needed; Additional registry data would be helpful</td>
<td>No additional studies needed</td>
</tr>
<tr>
<td>IT IS REASONABLE to perform procedure/administer treatment</td>
<td>Procedure/Treatment MAY BE CONSIDERED</td>
<td>Procedure/Treatment should NOT be performed/administered</td>
<td>SINCE IT IS NOT HELPFUL AND MAY BE HARMFUL</td>
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should is recommended is indicated is useful/effective/beneficial

is reasonable can be useful/effective/beneficial is probably recommended or indicated

may/might be considered may/might be reasonable usefulness/effectiveness is unknown /unclear/uncertain or not well established

is not recommended is not indicated should not is not useful/effective/beneficial may be harmful

http://content.onlinejacc.org/cgi/content/full/j.jacc.2007.10.001
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**Level A:** Recommendation based on evidence from multiple randomized trials or meta-analyses Multiple (3-5) population risk strata evaluated; General consistency of direction and magnitude of effect

**Level B:** Recommendation based on evidence from a single randomized trial or non-randomized studies Limited (2-3) population risk strata evaluated

**Level C:** Recommendation based on expert opinion, case studies, or standard-of-care Very limited (1-2) population risk strata evaluated

http://content.onlinejacc.org/cgi/content/full/j.jacc.2007.10.001
The seven steps of EBP

4. Integrate evidence, clinical expertise, and patient factors preferences to implement a decision

5. Evaluate the outcome
   1. Will the results from this study help me in caring for my patients?
      1. Are the results applicable to my patients?
      2. Were all clinical important outcomes considered?
      3. What are the risks and benefits of the treatment?
      4. Is the treatment feasible in my clinical setting?
      5. What are my patient’s values and expectations for both the outcome that is trying to be prevented and the treatment itself?
Why Measure EBP Outcomes?

- Outcomes reflect IMPACT!
- EBP’s effect on patients:
  - Physiologic (complication reduction, health improvement)
  - Psychosocial (quality of life; depressive and anxiety symptoms; patient perception of care)
  - Functional improvement
- EBP’s effect on the health System:
  - Decreased cost, length of stay;
  - Nursing retention / job satisfaction
  - Interdisciplinary collaboration
Implementation

• How do you implement an evidence-based practice?
• How do you help colleagues implement an evidence-based practice?
• Why is this important?
• How do you overcome barriers to EBP?
• Can you give an example of an evidence-based practice change in your clinical practice?
Centers for Evidence-based Practice

- http://www.ahrq.gov/clinic/epc/
- http://www.centerforebp.case.edu/
- http://www.cebm.net/
- https://www.ecri.org/about/pages/evidencebasededpracticecenter.aspx
Step 6: Disseminate the outcomes of the EBP decision or change

• Remember the story of Semmelweis and his quest to encourage handwashing to prevent puerperal fever!
Develop a PICOT question:

- **Intervention**
  - In _____(P), how does _____(I) compared to ___(C) affect ___(O) within ____(T)?

- **Prognosis/Prediction**
  - In ____ (P), how does ____ (I) compared to ___(C) influence/predict ___(O) over ___(T)?

- **Diagnosis or Diagnostic Test**
  - In ___(P), are/is ____ (I) compared with ___(C) more accurate in diagnosing ___(O)?

- **Etiology**
  - Are ___(P), who have ____ (I) compared with those without ____ (I) at risk for/of ___(O) over ___(T)?

- **Meaning**
  - How do ____ (P) with ____ (I) perceive ___ (O) during ___(T)?
Let’s Practice

• Develop a PICOT question
• Find Some Evidence
• Appraise your Evidence
• Decide whether you should change a practice
• Implement the change
Questions?