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Strategies for Evidence-based Nursing

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President Kasil OH, my colleagues in nursing, special guests and friends, it is my great pleasure to be here and to bring you greetings from your nursing colleagues at the University of Illinois at Chicago (UIC) College of Nursing. There I have the honor of working with Dr. Mi Ja Kim, who is Dean Emeritus and Director of the UIC College of Nursing Academy of International Leadership Development. As the first WHO Collaborating Center for Nursing and Midwifery in the United States, at UIC, we are committed to advancing nursing leadership in our country and across the globe. I appreciate the close connections that we have to Korean nurse leaders and especially extend warm greetings to our UIC Korean alumni. As President of the American Academy of Nursing, I also bring you greetings on behalf of the 1700 fellows. It is my honor to be here to address the Korean Academy of Nursing and I thank you for the invitation.

As leaders within Korean nursing, it is noteworthy that you are focusing on evidence-based nursing and you are to be commended for choosing the theme of this conference. In this paper I will comment briefly on why evidence-based healthcare practice is important, a nursing practice perspective to guide our evidence base and outline some skills that nursing clinicians need to practice from an evidence base.

Importance of Evidence-based Practice

Traditional western healthcare practice, and perhaps here in Korea, is largely based on the biomedical paradigm. Within this paradigm, the tradition is that clinical decisions are mostly based on unsystematic observations. Once healthcare professionals have mastered a critical mass of knowledge through healthcare education, they build on this knowledge as they practice and by watching or consulting with experts. Clinicians generally use their 'common sense' and recalled knowledge to make clinical decisions.

Knowledge guiding clinical practice in medicine has come from understandings of the basic derangements of function, i.e., pathophysiologic mechanisms of disease. Treatments (interventions) are designed to compensate for functional deficiencies. Treatments often have not undergone rigorous testing but come from ideas about what is intuitively logical and validated through 'trial and error' applications of therapies. Many interventions have been tested in the form of uncontrolled trials. Even though physicians emphasize the physical function of bodily systems

in their practice, we in nursing, mainly have adopted the same paradigm although our emphasis encompasses behavioral (i.e., psychological, social, spiritual, etc.) as well as physical function.

This approach to healthcare practice has led to wide variations in practice behaviors and quality of outcomes. In the U.S., attention to overall patient safety, the enormous investment in health-related research with unclear improvement in health care, and the rapidly escalating healthcare are driving the search for which practices generate the best outcomes.

Randomized clinical trials (RCTs) have emerged as a 'gold standard' design for research into the effectiveness of medical interventions. To be noted is that in the practice of medicine, the mainstay therapies are drugs or surgical interventions, although RCT design also is relevant to assessing diagnostic tests or predicting prognoses. In nursing, since we do not prescribe drugs or do surgeries, clinical trials are more likely than in medicine to involve behavioral, care model or health system interventions testing. For example, at our College, Drs. Lorna Finnegan and Lucy Marion are completing a trial for low-income women, which is a test of a nurse practitioner intervention to reduce sexually transmitted disease re-infection.

Over time, the proliferation of uncontrolled and controlled clinical trials has promoted the necessity to analyze across multiple studies or to meta-analyze in order to summarize the results for similar health problems. When consistent results are available, they can form the basis for summary in clinical practice guidelines or protocols.

Nursing Practice Perspective – a Guide for the Evidence Base

Let us think about nursing practice for a moment. I will be mentioning some ideas that were part of a paper that Dr. Mi Ja Kim delivered for me in 2001. I was to be Korea but the 9/11 events in the U.S. prevented me from flying to be here. In that paper, I noted that the predominance of the biomedical paradigm in influencing the U.S. health care system has meant that *care of the sick* is the most dominant form of nursing practice. However, we increasingly are embracing practice responsibilities related to primary care with *disease prevention* and *health promotion*. I favor a health ecology framework whereby health is seen as a function of the interaction of individuals with their environments. Ecology is study of the fit between persons and environments that occurs through behavioral interactions. Therefore, we need nursing evidence about the personal and environmental factors that are contributing to health/disease so that we can develop and test interventions that promote self-care. This is the nursing knowledge that will complement the medical knowledge derived for the diagnosis and cure of disease. While nursing research is predominantly focused on 'personal' health, there is need to understand the health of

populations and groups, i.e., 'public' health' and the role of healthcare systems or the factors in healthcare delivery that affect health. The scientific foundations for personal health nursing practice are focused on the *individual as the unit of analysis* but when data are aggregated across groups, the data also are relevant to informing public health nursing practice.

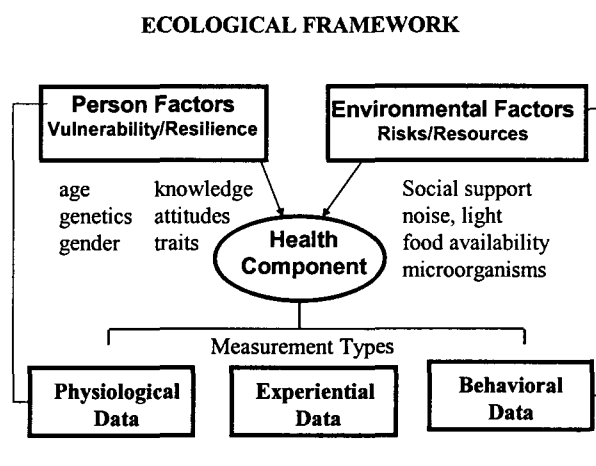
Behaviors (human) represent the observable interactions between persons and environments. Behaviors are a function of self-derived motivation or represent adjustments to environmental cues and are enacted to promote *best-fit*, i.e., healthy adaptations of individuals to environments.

If we think about nursing practice, much of it involves monitoring and screening for health status and particularly known actual or potential disease/illness conditions; and treating, referring and caring for people. Treating involves helping people engage in behaviors that help them manage their symptoms (perhaps helping them die). It means supporting activities (behaviors) of daily living for people when they cannot perform them on their own, often because they have debilitating disease or must recover from invasive medical interventions. It means helping them maintain or resume the behaviors of active living through self-care. Further, nursing practice means motivating behaviors known to enhance health/wellness and prevent disease/illness. As one can see, nursing practice is the practice of influencing the behaviors of human beings. In sum, most nursing practice activities fall into the following categories:

- monitoring functional status (both physical, psychological, sociocultural, spiritual);
- screening for disease/illness, (e.g., HIV/AIDS, heart disease, high blood pressure),
- treating symptoms, (e.g., pain, fatigue, anorexia, dyspnea, agitation, depression),
- supporting activities of daily living and improving functional status (e.g., feed, mobilize),
- protecting tissues or promoting healing of injured tissues, (e.g., wounds, osteoporosis);
- coaching, guiding, and educating about self-behaviors (including supportive others or the public) to self-treat, prevent injury/disabilities, manage medical therapies, reduce risks or vulnerabilities, promote health/wellness in usual living setting;
- manipulating environments to reduce health/wellness risks, e.g., noise, light/dark, microbes, violence or work injury.

We can use this framework to guide our research agenda for creating evidence and for our evidence-based nursing practice.

In order to think about the types of evidence relevant to nursing practice, we might consider an ecological framework (diagram) as developed through a collaborative effort when I was on faculty at the University of Washington. The center concept, labelled health component might be an actual or potential health problem (e.g., diabetes), or a functional disorder (e.g., insomnia) or a nursing diagnosis (e.g., difficulty



breathing) related to a particular context or population. We, as nurses, measure indicators and collect data in relation to the component. We do this to determine (diagnose) a status or monitor change in a component of health function. Furthermore we gather data about factors contributing to the status or component change. Knowledge of the contributing factors becomes the basis for determining treatments and care that can be tested.

In this framework, measurable indicators are seen as three broad types, which are shown in the bottom boxes. The one category labeled *physiological* refers to indicators that are physically detected and represent some aspect of bodily physicochemical functioning, e.g., serum cortisol. The second category of health status indicators is labeled *experiential*. They are measured by what people perceive and report such as thoughts, moods, symptoms, drives or sensations, e.g., pain, fatigue. The third category involves those indicators that are *behavioral*; that is, they are reported by patients/subjects or observed as actions that individuals perform or are states of being within their environments (e.g., sleep, exercise).

Within this ecological framework, factors contributing to health status are categorized in either of two categories - *person* or *environment* factors (top two boxes). Person factors refer to those factors that are internal to individuals and are labeled negatively as vulnerability or positively as resilience factors. These can be defined as elements that are *non-modifiable* such as genetic composition, age, and gender or *modifiable* such as knowledge, attitude, and information processing style. The other component refers to those elements that we would classify as external to the individual, that are part of the environment and constitute *risks* or, more positively, *resources*.

Examples are social support, microorganisms, noise, and food availability. These factors also can be measured or assessed by indicators that are physiological, experiential or behavioral.

This ecological framework can be used for specification of various phenomena relevant to nursing practice. It can be used to plan research or summarize features related to diseases such as diabetes mellitus or cancer, health lifestyle behavior phenomena such as obesity or smoking, or functional disorders such as insomnia or major depression. It is the knowledge of contributing factors that can inform what therapies or interventions to test. Using this schema to consider interventions or therapies, interventions (therapies) might be designed to alter various person factors (e.g., health knowledge) or environmental factors (social support system) or both.

In summary, evidence-based nursing practice should be based on research matched to a framework of how we see our practice. As already mentioned, there is increasing pressure for practice to be based on systematic critical knowledge appraisal. Clinical intuition and reasoning are still needed but must be blended with skills in utilizing evolving evidence.

Skills for Evidence-based Nursing Practice:

Although expert consultants and textbooks can be sources of evidence, most of the evidence on which to base practice resides in a broad range of literature. It must be accessed and judged for applicability to practice. An instructive resource for my remarks and for learning more is the Center for Health Evidence at <http://www.cche.net/cche/home.asp>. Major skills needed to master critical appraisal of the evidence upon which to base clinical nursing practice include: 1) precisely defining clinical problems and information needed, 2) accessing relevant sources of evidence, and 3) appraising the evidence.

1) Defining clinical problems

One way to think about formulating clinical practice questions is in terms of the relationships among a) the patient with a health problem or who is vulnerable, b) "exposure" (to a treatment, symptoms, high risk context), and c) one or more specific clinical outcomes of interest. Using these concepts, in nursing, one might ask the following practice questions:

- Would weekly sessions of reminiscing about the past as a therapy (exposure) reduce the severity of confusion (clinical outcome) in a woman residing in a long-term care facility (patient with problem)?
Evidence would create practice knowledge to guide behavioral therapy as a nursing intervention.

- Does the febrile seizure (exposure) that a 6-month-old infant (patient with a health problem) just had increase the likelihood that it will re-occur (clinical outcome)? Evidence would provide practice knowledge to guide teaching the family about how much and how to monitor body temperature.
- Do excessive noise levels in Pediatric Intensive Care Unit (exposure) for the baby born at 37 weeks gestational age (patient who is vulnerable) affect sleep/wake patterns (clinical outcome)? Evidence would provide practice knowledge to guide monitoring and modulating the environment as a nursing intervention.
- Are the symptoms of dementia (exposure) that I observe in this 85 year old man (patient with a health problem) likely to progress Alzheimer's Disease (outcome). Evidence would provide knowledge about prognosis for providing family support as a nursing intervention.

2) Accessing relevant evidence:

Evidence relevant to clinical nursing practice is available from people likely to know (experts), clinical journals with research summaries, evidence-based textbooks, on-line databases, the Cochrane Collaboration, National Guideline Clearinghouse, best practice web sites, professional organizations, and computerized clinical decision support systems. However, increasingly it is apparent that evidence from the library though electronic 'just in time' searching of primary or integrative studies is mandatory. Therefore, a basic skill for practicing from an evidence base is proficiency at conducting electronic searches. In North America, resources to do searches increasingly are available at the 'point of care', e.g., access to Medline from computers on hospital units.

Because of the importance of systematic reviews in summarizing the evidence for better health care, their number in the literature is growing rapidly. An organization specifically committed to summarizing the evidence is the Cochrane Collaboration, a worldwide enterprise designed to produce and disseminate systematic reviews of effectiveness. While the Cochrane Collaboration publishes large numbers of reviews, many more are published throughout the healthcare literature. Although still not easy, clinicians wanting to engage in evidence-based practice as well as researchers needs to learn reliable and quick ways of finding valid systematic reviews of the literature.

When using Medline, one puts in medical subject headings (MeSH) that identify the topic of interest (health problem, therapy type), e.g., "cancer," another indicative of a component of interest, e.g., "pain", and perhaps if you want to know about interventions that are well controlled, you can put in RCT for randomized controlled trial. When using a Medline search engine, you can retrieve review articles, meta-analyses or practice guidelines. This

can be done by adding to whatever Medical Subject Heading (MeSH) terms are used to identify the problem and "exposure", the search term: REVIEW or META-ANALYSIS or PRACTICE GUIDELINE.

For example, when I put *music therapy reviews* into the PubMed/Medline search engine, it yielded 131 entries and when I put in *music therapy meta-analysis* the following 8 articles were retrieved:

1. Evans D. The effectiveness of music as an intervention for hospital patients: a systematic review. *J.Adv.Nurs.* 2002;37:8-18.
2. Gold C, Voracek M, Wigram T. Effects of music therapy for children and adolescents with psychopathology: a meta-analysis. *J.Child Psychol.Psychiatry* 2004;45:1054-63.
3. Koger SM, Chapin K, Brotons M. Is Music Therapy an Effective Intervention for Dementia?A Meta-Analytic Review of Literature. *J.Music.Ther.* 1999;36:2-15.
4. Smith CA et al. Complementary and alternative therapies for pain management in labour. *Cochrane Database Syst.Rev.* 2003;CD003521.
5. Standley JM. Music research in medical/dental treatment: meta-analysis and clinical applications. *J.Music.Ther.* 1986;23:56-122.
6. Standley JM. A meta-analysis of the efficacy of music therapy for premature infants. *J.Pediatr.Nurs.* 2002;17:107-13.
7. Whipple J. Music in intervention for children and adolescents with autism: a meta-analysis. *J.Music.Ther.* 2004;41:90-106.
8. You ZY, Wang JZ. [Meta-analysis of assisted music therapy for chronic schizophrenia]. *Zhongguo Yi.Xue.Ke.Xue.Yuan Xue.Bao.* 2002;24:564-7.

The publication rate for review articles is growing but they are not yet numerous for nursing practice. In 2000, five nursing clinical journals publishing the most systematic reviews were:

| Journal | No. all reviews (% all articles) | No. systematic (% of all reviews) |
|----------------------|-------------------------------------|--------------------------------------|
| J ADV NURS | 33 (12.5) | 6 (18.2) |
| PATIENT EDUC COUNS | 4 (6.3) | 3 (75.0) |
| J CLIN NURS | 14 (17.5) | 3 (21.4) |
| J PEDIATR ONCOL NURS | 9 (64.3) | 1 (11.1) |
| J NURS SCHOLAR | 11 (25.0) | 1 (9.1) |

In 2000, the five medical clinical journals publishing the most systematic reviews were:

General Medicine

| | | |
|------------------|-------------|------------|
| COCHRANE LIBRARY | 444 (100.0) | 427 (96.2) |
| LANCET | 61 (9.7) | 23 (37.7) |
| ARCH INTERN MED | 61 (17.4) | 21 (34.4) |
| BMJ | 154 (32.6) | 20 (13.0) |
| ANN INTERN MED | 34 (21.1) | 14 (41.2) |

In: Montori, VM, Wilczynski, NL, Morgan, D, Haynes, RB and the Hedges Team. Systematic reviews: a cross-sectional study of location and citation counts. BMC Med. 2003; 1: 2. <http://www.biomedcentral.com/bmcmed>

3) Appraising the Evidence:

What about reading the articles? When looking at the literature, a major issue is to judge the strength of the evidence and how much confidence one should have in the results in order to apply it to clinical practice. The evidence is in primary studies, i.e., reports of original studies, or in systematic or integrative reviews.

When reading *primary studies* of tests of interventions or therapies the following guidelines serve as a guide by which to judge the validity of results:

1. Were there clearly identified comparison groups that did not receive the intervention and were similar with regard to factors that might affect outcomes?

Generally, investigators should report the extent to which groups to be compared for outcomes are similar at the start for any factors believed to affect the outcomes of interest at the beginning, i.e., at baseline. The smaller the sample size the more chance there is that any differential distribution will affect results. If the groups do differ, did

the investigators conduct statistical analyses that adjust for these differences? Agreement of the results with both an adjusted and unadjusted analyses is reason for having more confidence in the outcomes.

2. Were patients randomly assigned to the treatment conditions?

Random (by chance) assignment means that subjects are not assigned to the therapy or control groups according to any particular criteria. They were assigned using numbers selected through an open probability method of selection. The advantage of randomization is that it assures, if sample size is sufficiently large, that both known and unknown outcome other than the ones being studied are evenly distributed between treatment and control groups.

3. Regardless of whether subjects finished or completely received the intervention, at the conclusion, were all subjects who entered the trial documented as to completion of or 'extent of exposure'?

If many subjects do not complete the trial, the more likely it is that the remaining individuals are a biased group and factors other than the ones being studied might be affecting the results.

4. Were subjects analyzed in the groups to which they were randomized?

When subjects do not or only partially complete interventions, it might be tempting to exclude their data from analysis. For reasons just mentioned, this can lead to bias in the results.

This principle of attributing all patients to the group to which they were randomized results is an "intention-to-treat" analysis. This strategy preserves the value of randomization: prognostic factors that we know about, *and* those we don't know about, will be, on average, equally distributed in the two groups, and the outcomes that we see will be most likely due to the treatment assigned

5. Were the groups treated equally except for the application of the intervention?

It is important that all groups are treated as similarly as possible on factors other than the ones of interest (the intervention) so that the results can be attributed to the intervention.

6. Was the intervention outcome compared with an accepted reference standard?

7. Were the members of the investigative team judging the outcomes unaware of (blinded to) whether the subjects received the intervention or not?

The data collectors run the risk of being biased in their judgments about the outcomes if they are aware of which subjects were exposed to which condition, intervention or control.

8. Did the sample appropriately represent the type of subjects to whom the therapy will be applied in clinical practice?
9. Was follow-up sufficiently long and complete?
10. Results:
 - How large was the treatment effect?
 - How precise was the estimate of the treatment effect?

A variety of calculations can be used to determine the strength of the effects in relation to intervention trials. For example, fairly common ones are relative risk and relative risk reduction or effect size calculations.

Integrative reviews are those that evaluate or analyze multiple studies related to the same topic. They may be narrative review articles, systematic review articles, reviews using meta-analyses or reviews as evidence for practice guidelines.

Narrative reviews are summaries of multiple primary studies on the same topic that lack an explicit description of a systematic approach to selecting the studies for review. They are useful in revealing a predominance of outcomes but they are not necessarily comprehensive or critically analytical. Although narrative reviews have been predominant in the past, the trend is now to rely on systematic reviews.

Systematic reviews do outline the specifics of studies selected and often take the form of meta-analyses or constitute the rationale for practice guidelines. Systematic reviews should include:

- a statement of the clinical topic (i.e., a focused review question);
- explicit statements of the inclusion and exclusion criteria that were used to select studies for review;
- a description of the strategy for comprehensively finding studies and the study sources that were searched;

- for each type of study by purpose, at least 1 study that meets all of the criteria for methodological rigor.

For evidence-based medicine, types of studies by purpose most often address diseases. Types of studies include those addressing: 1) etiology, 2) prognosis, 3) diagnosis, 4) treatment, 5) clinical prediction, and 6) economics.

For evidence-based nursing, types of studies by purpose include:

- 1) health problem, symptom or nursing diagnosis by contributing/predicting factors (person, environment).

E.g., an integrative review might be written on the risk factors contributing to diabetes in adolescents.

- 2) patterns of experiences in health or wellness, e.g., an integrative review on patterns of fatigue in older women with chronic illness or patterns of symptoms in midlife women.

- 3) clinical therapeutics (biological, biobehavioral, behavioral interventions) efficacy/effectiveness, e.g., integrative review of the use of music therapy for pain management.

- 4) systems features & change, e.g., integrative review of organizational factors affecting morbidity and mortality in acute care units.

- 5) healthcare economics, e.g., integrative review of the cost impact of nurse-practiced telehealth in chronic disease management.

In summary, evidence-based practice is important to ensuring the quality of care delivered. Research reports as primary studies or integrative reviews exist across a broad variety of literature. However, access to the literature via computers is increasingly available at the 'point of care'. To practice using evidence, nursing clinicians must learn how to access and appraise published primary or integrative studies to determine whether the evidence is sufficient to apply to patient care. To generate evidence, nursing researchers must use the strongest designs for primary studies, and if possible, use randomized clinical trials for testing interventions. To create evidence as systematic reviews, scholars must use the most thorough and systematic methods to critically appraise multiple studies. Teachers of nursing must master the skills mentioned and guide learners to master them also. In this way, we can all become competent in evidence-based nursing.

I thank you for inviting me to speak about evidence-based and for thinking with me about issues related nursing science and nursing practice, that is the evidence base from which we practice.

(Other reference upon request)