



# National Institute of Nursing Research commentary on the Idea Festival for Nursing Science Education

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The Council for the Advancement of Nursing Science (CANS) Idea Festival (IF) produced important and timely recommendations (Henly et al., 2015a, b) for nursing science education and priorities for nursing science that should be incorporated into research-focused doctoral programs. The National Institute of Nursing Research (NINR) supports the premise that doctoral research training needs to keep pace with our complex and global environments. This commentary outlines several NINR and National Institutes of Health (NIH) programs and initiatives that contribute to the growth and development of nursing science.

The NINR's strategic plan seeks to harness the strengths of nursing science to meet current and future health care needs and anticipate future health challenges and priorities (NINR, 2013). The strategic plan is being implemented along four scientific themes (NINR, n.d.-a) or focus areas:

- Symptom Science: Promoting Personalized Health Strategies focuses on developing personalized strategies to treat and prevent the adverse symptoms of illness across diverse populations and settings.
- Wellness: Promoting Health and Preventing Illness relates to understanding the physical, behavioral, and environmental causes of illness; assesses behaviors that lead to healthy lifestyle choices; and develops evidence-based interventions to promote wellness.
- Self-Management: Improving Quality of Life for Individuals with Chronic Illness involves developing evidence-based strategies to assist individuals and families living with chronic illness by developing effective approaches to improve quality of life and reduce the burden of illness.
- End-of-Life and Palliative Care: The Science of Compassion includes the management of pain and other symptoms and emotional, social, spiritual, and informed decision-making support.

The NINR views innovation and technology as vital to the advancement of nursing science and health care, so this is a science focus area that cuts across the other areas.

These themes provided the structure for an Innovative Questions Initiative (NINR, 2014a; Grady, 2014, 2015) that engaged the scientific community in identifying research questions that will point the way forward for science. As part of the Innovative Questions process, the NINR hosted a series of workshops that brought together leaders and experts to discuss and debate innovative research questions regarding each of the science focus areas. A public website solicited additional questions from the scientific community, professional organizations, and the general public, and invited review and comment on previously submitted questions. The questions are available, and it is our hope that these questions will serve as a valuable resource to the entire nursing scientist community, from experienced investigators to trainees, in considering future directions for their own programs of research (NINR, 2014a; Grady, 2014, 2015).

The CANS IF identified seven priority areas for nursing science. The NINR and NIH programs and initiatives relevant to these recommendations are highlighted.

## PhD Preparation and Further Nurse Scientist Training

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The NINR supports the CANS IF priorities for students and faculty in PhD programs and encourages critical examination of nurse scientist training. At the predoctoral level, undergraduate students need to be encouraged to consider science as a career option that can extend their experiences beyond the clinic and into academic administration, teaching, and mentoring,

and translating the science into clinical practice and health care policy (NINR, 2014d). A 2014 report from a working group of the NIH's Advisory Council to the Director encouraged early involvement of predoctoral nurses in research and continuation toward doctoral research (NIH, 2014a), such as programs to pursue doctoral training immediately after undergraduate training. Another opportunity to promote the pipeline of nursing scientists is to encourage second-degree nursing students toward a research career. It is also critically important to promote diversity in the scientific workforce (NIH, 2014b).

At the postdoctoral level, the NINR offers funding mechanisms such as the T32, F32, and several different career development awards (K01 and K23) to allow nursing scientists to continue to develop their research expertise (NINR, n.d.-b). In particular, the K99/R00 or Pathway to Independence Award is designed to facilitate timely transition from a mentored postdoctoral position to an independent research position. This mechanism can be used either extramurally or intramurally. For example, applicants interested in biological science in symptoms research could propose to conduct the K99 portion of this award in the NINR's Intramural Research Program and then carry the R00 portion to an extramural tenure-track faculty position.

As outlined in the CANS IF articles, schools of nursing are encouraged to identify their strengths and build programs that focus in those science areas. The NINR offers funding opportunities (NINR, n.d.-b) such as the F33 or K24 that faculty could use to develop expertise in the identified science priorities. For example, the Ruth L. Kirschstein National Research Service Award Individual Senior Fellowship (F33) Award provides fellowship support to experienced scientists who wish to make major changes in the direction of their research careers or who wish to broaden their scientific backgrounds by acquiring new research capabilities as independent investigators. The NIH Midcareer Investigator Award in Patient-Oriented Research (K24) provides support to midcareer scientists (typically at the associate professor level) for protected time to conduct patient-oriented research and to act as research mentors, primarily for clinician scientists.

### **Biological Science: Omics and the Microbiome**

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The analysis conducted for the CANS IF reinforces the need to include the biological foundations for nursing science in doctoral research education. The NINR's strategic plan, and the themes that flow from it, focus on improving our understanding of biological systems and their impact on symptoms and conditions. As early as 2000, the NINR recognized the importance of understanding biological systems and established the Summer Genetics Institute (NINR, 2015). The graduates of the Summer Genetics Institute can facilitate

adoption of this science into doctoral research education by building programs of research in genetics, disseminating genetics-related research results in peer-reviewed scientific publications and at scientific conferences, and integrating genetics content into curricula and practice (Cimino, 2014).

The NINR collaborates with schools of nursing across the country through the Graduate Partnership Program to offer nursing doctoral students the opportunity to complete their dissertations with a biological component at an NIH intramural laboratory (NINR, 2014b). Recent Graduate Partnership Program participants have conducted research projects in cancer-related fatigue, epigenetic changes in immunity, and factors contributing to endometriosis.

To encourage applications focused on biological systems and their impact on symptoms and conditions, the NINR issued funding opportunity announcements that incorporate the biological sciences (e.g., Maternal Nutrition and Pre-pregnancy Obesity: Effects on Mothers, Infants, and Children; Synergizing Omic and Symptom Science; and The Influence of the Microbiome on Preterm Labor and Delivery). As other disciplines incorporate symptom science, self-management, and end-of-life/palliative care topics into their research programs, our scientists have the opportunity to use their current and growing expertise to lead multidisciplinary teams in these areas.

### **Health Behavior, Behavior Change, and Biobehavioral Nursing Science**

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Within the broader NIH community, there are several trans-NIH initiatives that focus on behavior. The NIH Office of Behavioral and Social Sciences Research (NIH, 2015a) is interested in the linkages between biology and behavior (e.g., basic science mechanisms that underlie self-management of chronic conditions, and fostering systems science approaches that integrate multiple levels of analysis, from cells to society, to better understand the ways in which individual, contextual, and organizational factors interact over time to determine health status). Another trans-NIH effort, the Science of Behavior Change program (NIH, 2015b), is interested in basic science mechanisms associated with behaviors such as adherence and resilience, and the development of measures and techniques that support a more mechanistic approach to behavior change.

### **Emergence of Big Data**

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All NIH institutes, including the NINR, are involved with the Big Data to Knowledge initiative (NIH, 2015c). Important areas for nursing science include working effectively in multidisciplinary research teams, privacy

issues associated with increased use of electronic health records for research, and applying big data approaches to obtain better data visualization and better access and more efficient use of real-time data to enable more rapid intervention with more effective and tailored treatments. These methods are new and unfamiliar to a large percentage of biomedical and behavioral researchers. Hence, Big Data to Knowledge is sponsoring several funding opportunities for curriculum development and training in data science, including open educational resources for sharing, annotating, and curating biomedical big data and a “massive open online course” for the management of biomedical big data.

Another aspect of big data is common data elements (CDEs). Scientists who conduct clinical research may be challenged with recruiting sufficient numbers of research participants to yield adequate statistical power. CDEs are a potential solution to the problem of small sample sizes in individual studies by allowing the consolidation of several data sets. The National Library of Medicine and the National Institute of Neurological Diseases and Stroke are among the NIH Centers and Institutes leading initiatives in the use of CDEs (NIH, 2013; National Institute of Neurological Disorders and Stroke, 2014). The NINR has engaged with the directors of the NINR-funded centers to identify CDEs for symptom science research (Redeker et al. 2015. Submitted) and the NINR plans to work with the scientific community to further develop CDEs.

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## Innovative Methods

Advancing nursing science in the priority areas identified by the CANS IF will require innovative methods such as pragmatic trials that capitalize on nursing science’s clinical focus. The NINR is a member of the NIH Health Care System Collaboratory (NIH, 2014c), a trans-NIH effort to support large-scale and cost-effective clinical research on multiple chronic conditions in settings that serve sizeable patient populations, such as health maintenance organizations and other large integrated care institutions. The NINR and the National Institute on Aging are coadministering a recent Collaboratory award for the Pragmatic Trial of Video Education in Nursing Homes (PROVEN). The project will evaluate video education as a tool for decision-making for the patient, family, and health care team about advanced care planning in nursing homes, where residents typically have multiple chronic conditions.

To solicit applications that use innovative methods, the NINR issued a funding opportunity announcement to investigate the prevention and management of symptoms in chronic illness (U.S. Department of Human Services, n.d.-a). Among these methods are sequential multiple assignment randomization trials (SMART), which allow re-evaluation of treatment options based on an individual’s progress toward treatment goals, and a multiphase optimization strategy

(MOST) that identifies the most effective interventions through an iterative process of empirical research and discovery.

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## Translation Science

Scientists engaged in research to generate new knowledge must remain cognizant of the need for interventions to be sustained after the study. The Clinical and Translational Science Awards (CTSAs) work to increase the efficiency and speed of clinical and translational research (Clinical & Translational Science Awards, n.d.), and nurse scientists are actively involved with the CTSAs (Sampselle, Knafl, Jacob, & McCloskey, 2013). Key areas in which they have made significant contributions to CTSA efforts include developing community partnerships to enhance community-based models of care, and facilitating the translation of basic and clinical research into clinical care research (Sampselle et al., 2013).

There are opportunities for dissemination and implementation of interventions that have been developed through NINR funding. For example, the NINR-funded Palliative Care Research Cooperative Group (Palliative Care Research Cooperative Group, n.d.) conducts and translates research into more effective ways to relieve suffering and improve quality of life for patients who have advanced, potentially life-limiting illnesses (NINR, 2014c). The NIH and other federal agencies sponsor research initiatives to encourage the movement of interventions from research settings into clinical practice and communities for sustainable use, such as a current NIH funding opportunity, Dissemination and Implementation Research in Health (U.S. Department of Human Services, n.d.-b). Also, the NINR participates in the trans-NIH Dissemination and Implementation Committee, which is involved in planning an annual dissemination and implementation training institute (Training Institute for Dissemination and Implementation Research in Health, 2014) and research conference (Academy Health, 2014).

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## Health Economics

NINR-funded science incorporates economic outcomes to demonstrate the value of nursing in improving patient outcomes. For example, lower patient-to-nurse ratios were associated with significantly lower patient mortality (Aiken et al., 2010), and increasing nurses’ workload by one patient increased the likelihood of in-hospital death (Aiken et al., 2014). Other research found that infections with anti-microbial-resistant pathogens were associated with longer hospital stays and higher death rates (Neidell et al., 2012). By focusing on patient outcomes, it is possible to identify ways that cost and quality interact in the clinical environment.

## Conclusion

In conclusion, the NINR is excited about and supportive of the CANS IF vision for preparing the next generation of nurse scientists. This commentary outlines some of the ways in which the NIH and the NINR are contributing to the growth and development of nursing science, and we look forward to collaborating in our shared vision.

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