A publication of the
IMPROVEMENT SCIENCE RESEARCH NETWORK ... improving patient outcomes

Network News

Volume 2 • No. 2 • Winter 2012

Expert Perspective

Orthogonal Design

Rigorous evaluation of improvement strategies is requisite to generating correct and credible evidence and is urgently needed to spread adoption and improvement. A significant challenge of improvement research is that it requires specialized methods other than those commonly known to clinical scientists. Clearly, randomized control trials (RCTs) have a place in healthcare research and are the gold standard for highly controlled comparisons of drugs and procedures.

"Application of orthogonal design in recent years includes reducing hospitalizations in care-managed populations by 5% to 20% sustained."

KIERON DEY, CONSULTING SCIENTIST/STATISTICIAN

However, testing improvement strategies must account for multiple, interacting variables, making RCTs less useful. Orthogonal design, is a solution to raise the scientific rigor and strength of

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ISRN - The Zenith of Evidence-Based Quality Improvement

"I stand tall because I stand on the shoulders of the mentors and colleagues who came before me, as well as with those who are working now to improve patient care."

KATHLEEN R. STEVENS, RN, EdD, MSN, ANEF, FAAN, ISRN PRINCIPAL INVESTIGATOR

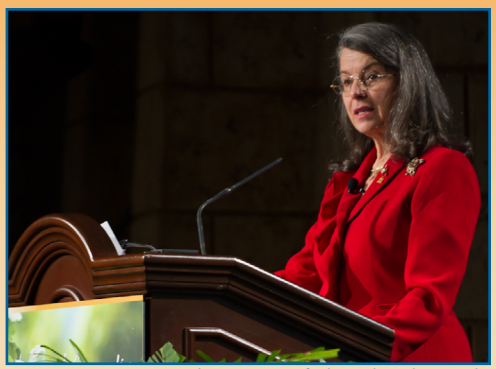

Photo Courtesy of John Hudson Photography

While multiple facets of her research program earned her the Episteme Laureate title, Dr. Kathleen R. Stevens, RN, EdD, MSN, ANEF, FAAN, points to the Improvement Science Research Network (ISRN) as the zenith of her program of evidence-based quality improvement research.

On October 30, 2011, the Honor Society of Nursing, Sigma Theta Tau International named Dr. Stevens the Baxter International Foundation Episteme Laureate. The Baxter International Foundation's Episteme Award acknowledges a major breakthrough in the development of nursing knowledge that has resulted in a significant and recognizable benefit to the public. "We are delighted to honor Dr. Stevens with the Episteme Award for her visionary leadership in making evidence-based practice an important part of healthcare improvement," said STTI President Karen H. Morin, DSN, RN, ANEF. "Dr. Stevens' pioneering work in this field has led to many new standards of care that continue to have a significant impact on improved healthcare delivery, patient safety, and clinical outcomes."

Through the ISRN, Dr. Stevens continues to perpetuate the research program for which she was recognized by the Episteme Award. "Receiving this award heightens my energy and strengthens my conviction to provide the national nexus for improvement science through the newly-established research network—Because of our timing and the centrality of the nursing profession to health delivery, this research is destined to transform healthcare systems," Dr. Stevens said. "I stand tall because I stand on the shoulders of the mentors and colleagues who came before me, as well as with those who are working now to improve patient care."

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Expert Perspective

quality improvement studies. "Orthogonal designs allow 20-30 interventions (changes) and interactions among pairs to be tested simultaneously with the same sample size used in RCTs on a single intervention," says Kieron Dey, Consulting Scientist/Statistician. "Orthogonal design allows far faster and more reliable learning to accrue since more than a million (2^{20+}) clinical models are evaluated," indicates Dey. Used as the "S" in the widely used Plan-Do-Study-Act (PDSA) approach to test changes, the advantage of orthogonal design is that it scientifically studies the impact of multiple changes on outcomes. "Application of orthogonal design in recent years includes reducing hospitalizations in care-managed populations by 5% to 20% sustained."

Improvement Science Summit

Learn more about robust approaches to evaluate care processes. Attend Dr. Dey's presentation "Raising the Rigor of PDSA: Orthogonal Design" at the 2012 Improvement Science Summit. For details and registration information **CLICK HERE**

First Landmark Network Study Launched with 15 Clinical Research Associates

STAR-2

In October 2011, the Improvement Science Research Network (ISRN) launched the first of three national network studies. The inaugural multisite network study, Small Troubles, Adaptive Responses (STAR-2): Frontline Nurse Engagement in Quality Improvement, investigates operational problems that frontline nurses work around on a daily basis, such as missing supplies, nonfunctioning equipment, and failed communication. This landmark ISRN study will help provide a better understanding of how small problems disrupt the quality of care and connect frontline staff with organizational learning for patient safety. "We hope that if nurses make changes to address small problems rather than leaving them in place, we can improve the quality and safety of care," says Robert L. Ferrer, MD, MPH, Network Study Co-PI.

The STAR-2 Network Study involves a Research Collaborative consisting of the ISRN Coordinating Center and associates from 15 clinical sites. The first wave of the study began with two sites, Deaconess Hospital in Evansville, IN and the University of South Alabama Medical Center (USAMC) in Mobile, AL. Linda Roussel, RN, DSN, Professor, College of Nursing, University of South Alabama and site PI says "As an academic partner with USAMC, this has further strengthened our collaboration as we integrate improvement science into our curriculum. Our students have the opportunity first hand to experience how teams work together to improve care. This experience has truly raised the bar of expectations all the way around!"

As part of the ISRN Research Collaborative, investigators work as a scientific team to generate the evidence necessary to implement change within the healthcare organization to provide care that is safe, timely, effective, efficient, equitable, and patient-centered. "It is exciting to partner with our College of Nursing and the ISRN to participate in TEAM research," says Lisa Mestas, Nursing Administrator at USAMC and Site PI. "A benefit from this unique collaboration is the engagement of bedside nurses as active investigators," Mestas added.

> ***"We hope that if nurses make changes to address small problems rather than leaving them in place, we can improve the quality and safety of care."***
>
> ROBERT L. FERRER, MD, MPH, NETWORK STUDY CO-PI

Data collection for the first wave of the study occurred October through December 2011 and showcased the unique infrastructure the ISRN has built to conduct multisite quality improvement studies. "The support provided by the ISRN Coordinating Center was outstanding – they were always very clear, concise and timely when questions arose throughout the study" said Ellen Wathen, PhD, RN-BC, Staff Development Specialist & Magnet Program Coordinator for Deaconess Hospital and site PI. "The Protocol Implementation Kit was instrumental as an ISRN resource throughout the study" added Wathen.

The research collaborative data collection will continue through April 2012 with 13 additional sites, including pediatric facilities.

Research Resources: *Orthogonal Design*

To learn more about Orthogonal Design, consult the following references:

- G. E. P. Box, Hunter, W. G. and Hunter, J.S. Statistics for Experimenters. Wiley (1974).
- C. F. J. Wu and Hamada, M. S. Experiments: Planning, Analysis and Optimization. Wiley (2009).
- G. E. P. Box and Draper, N.R. Empirical Model-Building and Response Surfaces. Wiley (1987).

High Performing Clinical Systems

Microsystems, in the form of clinical units where care and patients meet, are the basic building block of a health delivery system. The members of the clinical units share values and beliefs, creating a sort of 'mini-culture', that make actions and patterns on the unit predictable. This suggests that innovations to improve care should focus on this basic element of the system. When the ISRN surveyed stakeholders about needs for improvement, the research priority of "High Performing Clinical Systems and Microsystems" rose to the top. For more on the ISRN Research Priorities, visit www.ISRN.net/research.

Dr. Suzanne Beyea, RN, PhD, FAAN, ISRN Steering Council member, Associate Director at Dartmouth Centers for Health and Aging and Director of Nursing Research at Dartmouth-Hitchcock Medical Center, emphasizes that, "Microsystems are the most important interface for change within clinical environments. Frontline clinicians are in the best position to identify and solve problems [within the microsystem]."

The saying in the field of improvement, "culture trumps strategy," emphasizes that group norms tend to maintain status quo rather than support change. The best innovation can be foiled if the microsystem is not on board with the shared goal of making the improvement evolve and stick. "Research demonstrates that the performance of an organization is only as good as its underlying clinical microsystem ," states Dr. Deborah Kendall-Gallagher, PhD, JD, Assistant Professor at the University of Texas Health Science Center San Antonio School of Nursing. Paying attention to group norms is crucial to clinical changes intended to improve care processes.

A number of challenges emerge as change is introduced in the clinical unit. "Two of the challenges of implementing change at the clinical microsystem level include the complexity of the clinical environment and the limited focus on interdisciplinary training and work," advises Dr. Beyea. "Sustaining improvements over time is a challenge and requires involvement of the entire team," adds Dr. Kendall-Gallagher.

Successful change can occur in microsystems when performance is co-owned by everyone. To activate people in the microsystem, Dr. Beyea suggests involving frontline staff in designing the change and supporting them in evaluating that change. Equally important is to protect frontline staff's time to engage in the clinical microsystem's journey. To do this, the group must establish a shared mental model (goal) for what is to be accomplished.

The members of the ISRN launched three Network studies aligned with this Research Priority. Systems thinking, including emphasis on microsystems, is designed into each of these studies: Frontline engagement in quality improvement; cognitive load and medication errors; and building team performance. Through these landmark studies, the ISRN contributes to the knowledge needed to enhance quality and safety in healthcare. For more information about these studies, visit www.ISRN.net.

Research Resources: *Microsystems*

Visit the ISRN eReading Room for a collection of annotated bibliographies of targeted readings on high priority ISRN topics, organized into eBookshelves. The eBookshelf on Microsystems in Improvement, designed by Dr. Kendall-Gallagher, is available to members in this unique resource.

Also, a classic introduction to Microsystems is published by The Joint Commission Journal of Quality Improvement as the Microsystems in Healthcare Series. This series of articles provides useful ideas and methods to create conditions for adoption of sustained improvement. Accessible at **http://clinicalmicrosystem.org/materials/publications/**.

Web Events Update

Transitions in Care

Wednesday, April 25, 2012
2:00 pm EST

ISRN Research Priority, Transitions in Care, is an emerging topic in research that affects every patient that is hospitalized in our nation's healthcare system. There are major gaps in transitioning care within units in the hospital and more importantly, once the patient is released to their primary care provider, retirement home, hospice and/or self-care at home. Join us for this webinar as we discuss successful projects that address inadequate care transition.

Case Study: "Improving Our Work IS Our Work"

Wednesday, August 29, 2012
2:00 pm EST

Join us for this webinar as we present successful case studies as a follow up to our September 28, 2011 webinar on Improving Our Work IS Our Work: Creating a Climate for Improvement.

If you missed our earlier web events, you can access the archives by visiting the ISRN web site for links.

For details, registration, and past events, visit the ISRN web site: CLICK HERE

Specializing Quality Improvement

The ISRN Develops a Pediatric Special Interest Group

The Improvement Science Research Network is launching a Pediatrics Special Interest Group (SIG) this coming spring. The development of a Pediatric SIG comes as a response to requests for quality improvement initiatives aimed at pediatric hospitals. "Kids are not little adults" says ISRN member Ann Marie Kotzer, RN, PhD, Nurse Scientist at Children's Hospital Colorado. "With pediatrics you need to take into consideration age and developmental levels. For example, medications have to be calculated for each age group and this increases the chance for error," says Kotzer.

It is not clear if pediatric sites face similar healthcare delivery issues as adult sites. Often quality improvement studies are designed for adult units. Evidence generated from these studies and interventions that are crafted may not necessarily be generalizable to pediatric populations. A Pediatric SIG will position ISRN members to identify processes and outcomes that are unique to children. "We really do not know if pediatric units are different when there are very few studies geared towards pediatrics. Pediatric hospitals are ripe for research studies," iterated Kotzer.

The ISRN's plan to initiate the Pediatric SIG involves incorporating special populations to the network studies. The three landmark studies provide unique opportunities to study differences between pediatric and adult units. In the STAR-2 study, differences in the type and frequencies of first order operational failure can be evaluated. The first landmark study, STAR-2, includes four pediatric sites as part of the research collaborative. In the Medication Errors study, the effects of cognitive load on calculating dosages by weight can be documented. Finally, in the Team Performance study, the roles of parents and integration of the family into the healthcare delivery team can be assessed. Inclusion of pediatric settings in each of the ISRN Network Studies will strengthen generalizability of the research findings.

"We really do not know if pediatric units are different when there are very few studies geared towards pediatrics. Pediatric hospitals are ripe for research studies."

ANN MARIE KOTZER, RN, PHD, NURSE SCIENTIST, CHILDREN'S HOSPITAL COLORADO, ISRN MEMBER

Through the initial step of creating study sub groups, the ISRN can begin to coordinate more detailed pediatric research studies, identify unique outcomes, and create standards for pediatric indicators. "The creation of the ISRN Pediatric SIG takes advantage of the ISRN's unique infrastructure to conduct quality improvement research that is generalizable beyond adult medical-surgical units and spurs thinking for other SIGs within the ISRN," says Dr. Darpan Patel, PhD, Clinical Research Project Manger with the ISRN Coordinating Center.

Pediatric sites for the STAR-2 will begin data collection in February.

For more information regarding the Pediatric SIG or to discuss other SIGs, contact the ISRN at ImprovementScienceResearch@isrn.net or 1-210-567-1480.

What's New at the ISRN

The ISRN continues to develop premium content for its members. The newest addition to the Member Center is the *eLearning Room*. The *eLearning Room* provides a comprehensive library of materials focused around the Network's research priorities. Among its resources are the compendium of research instruments and learning modules. These resources help build capacity to conduct improvement research and raise the scientific rigor of quality improvement studies.

The ISRN will launch its second landmark study on medication errors early this year. ISRN members can become part of this new research collaborative by submitting a letter of intent to the ISRN Coordinating Center. Calls for letters of intent will go out early this year. For more information contact the ISRN Coordinating Center at **ImprovementScienceResearch@isrn.net**

Summer Institutes on Evidence-Based Quality Improvement

Improvement Science Summit

IQ for QI: Discovery and Spread

July 17 – 18, 2012

Transforming health care through quality improvement and patient safety initiatives is a national priority. Join us for this innovative 1½ day conference focused on advancing healthcare improvement.

Specialty Pre Conferences

July 18, 2012

- Educators' EBP Workshop®
- TeamSTEPPS™ Workshop
- Essential Elements: An Introduction to Evidence-Based Practice

Summer Institute on Evidence Based Practice

IQ for QI: Evidence, Action, Outcomes

July 19 – 21, 2012

Participants will learn 'what works' in building care processes and supporting care providers in the evolving environment of improvement. In each discussion, effective strategies are underscored with evidence. Because frontline and evidence are powerful drivers in building quality and safety, we look at 'what it takes' to move healthcare to a high level of quality and safety.

See **www.ISRN.net** for more details and to register and submit an abstract for this conference.

ISRN Member Spotlight: Steering Council

"The ISRN has a key role to play in enabling its members to help each other and to stimulate and disseminate practically useful knowledge about implementation of different types of change."

JOHN ØVRETVEIT, BSC (HONS), MPHIL, PHD, CPSYCHOL, CSCI, MIHM, DIRECTOR OF RESEARCH, PROFESSOR OF HEALTH INNOVATION IMPLEMENTATION AND EVALUATION, MEDICAL MANAGEMENT CENTRE, THE KAROLINSKA INSTITUTET, STOCKHOLM

Swedish Quality Improvement expert John Øvretveit is no stranger to the ISRN. He became involved in late 2010 and has been featured at the Improvement Science Summit and in previous editions of the ISRN Network News. He is now a member of the ISRN Steering Council.

Dr. Øvretveit hopes to use his position as a steering council member to create more awareness of the importance of improvement science and to spread informed guidance for practical implementers. "The ISRN has a key role to play in enabling its members to help each other and to stimulate and disseminate practically useful knowledge about implementation of different types of change."

Dr. Øvretveit identified two research methods that he considers important to improvement science: (1) Theory program evaluation which includes an understanding of context factors which help and hinder implementation; and (2) Methods for estimating the impact on budgets, costs-savings, audience, and time frames.

"I hope to complement the work of the ISRN by bringing a systems perspective to the study of improvement science issues and by supporting both the science and practice of effective teamwork within healthcare."

SALLIE WEAVER, PHD, ASSISTANT PROFESSOR, DEPARTMENT OF ANESTHESIOLOGY AND CRITICAL CARE MEDICINE, THE JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

Dr. Weaver became aware of the ISRN through Steering Council members Heidi King and Mary Salisbury. She now joins them as a member of the ISRN Steering Council. "I am excited to be a part of the ISRN team and to support this important work in a way that advances the science in a meaningful way!" she says.

One of Dr. Weaver's goals as a steering council member is to contribute to the development of the network study on team performance. "My stream of research focuses specifically on team processes and performance, strategies, and interventions to support and optimize team processes, and elements of the broader organizational system such as safety culture that influence both patient and provider outcomes," says Weaver. "I hope to complement the work of the ISRN by bringing a systems perspective to the study of improvement science issues and by supporting both the science and practice of effective teamwork within healthcare."

Dr. Weaver's expertise in team performance stems from her work with leading human factors researchers at the University of Central Florida on evaluating the effectiveness of the TeamSTEPPS program within the operating room. They found significant improvements in the degree to which team members actively engaged in high quality teamwork behaviors during surgical cases. Dr. Weaver and Heidi King will be presenting on Evidence in TeamSTEPPS at the 2012 Summer Institute on Evidence-Based Practice.

Note
FROM THE DIRECTOR

KATHLEEN R. STEVENS, RN, EdD, MSN, ANEF, FAAN, ISRN PRINCIPAL INVESTIGATOR

ISRN's Core Business: Conducting Research

With this New Year of 2012, the future is bright for the ISRN. Inside of 2 years, we moved from concept through R&D of the virtual laboratory infrastructure and are carrying out our core business: conducting landmark improvement studies. The quest for greater understanding of improvement clearly resonates with many passionate people from all aspects of healthcare. Those who study, receive, provide, manage, and design healthcare eagerly connected through ISRN venues to advance the field toward the goal of improved care processes, outcomes, and value. In a few short months, we have become a learning community dedicated to developing this important yet nascent scientific field. The ISRN is delivering on its core business promises: We are near completion of a 15-site research study on frontline engagement in quality improvement and have three additional studies in the wings. Our collective resolve is to continue our indefatigable focus on generating knowledge to guide improvement decisions. With ISRN as a nexus joining the vast talent in our ISRN membership, we can achieve our mission of rapidly advancing improvement science for improved health.

Taxonomy: "A Rose by Any Other Name"?

This "word cloud" poster was a popular conversation point at the 2011 ISRN Summit. It represents an important, albeit elementary, step in improvement science. This word cloud is an important representation of concepts in improvement science as we begin to make meaning out of words. The cloud was created from the words contained in the ISRN Research Priorities in recognition that a common knowledge is the beginning of our journey towards an improvement science taxonomy. Using the words contained in the Priorities, the word cloud was constructed to identify central themes. The size of the word reflects its relative importance in relation to the other terms. Dr. Grace Willard PhD, RN, Senior Research Scientist, University of Texas Health Science Center San Antonio, who leads the ISRN's work to build an improvement science taxonomy, commented, "It was no surprise that the standout phrase was the word "Improvement." The rest of the stand-out words were "research, patient, quality, science, and healthcare."

The words and names we assign to important concepts must convey the same meaning for everyone, across disciplines, if we are to move the field of improvement science forward. Taxonomy enables us to tag words and ideas so that this field of research can be searched, concepts can be related, and theories built. Working with other ISRN members, Dr. Willard has produced a glossary-type taxonomy that contains over 500 terms and identifies over 300 terms to be added. ISRN is collaborating with a number of other entities, nationally and internationally, to establish a taxonomy for improvement science. This type of rigorously constructed, well-defined, hierarchical, information architecture will provide a basis for strong scientific work that is highly accessible and relevant to clinicians.

How to get Involved

Become a member of the ISRN, the first national collaboration of clinical and academic leaders devoted to accelerating improvement science in a systems context across multiple hospital sites. Benefits include the following:

- Opportunities to participate in multisite collaborations on patient safety and quality improvement research initiatives;
- Access to members-only ISRN online resources;
- Leverage of a national test bed for evaluating improvement strategies;
- Training resources such as IRB training;
- Expert guidance in conducting research;
- Technology infrastructure for participating in multisite studies;
- Access to the ISRN web portal, which provides secure communication, storage, and sharing of documents and data;
- A technical support system that provides access to expert guidance in conducting research and using statistics; and
- Recognition as an ISRN member and use of the ISRN logo on presentations and publications.

To become a member of the ISRN visit: **www.ISRN.net** and click on "Join Us."

JOIN US

ISRN Steering Council

Network News

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ISRN Funding
NIH–National Institute of Nursing Research, with funds from the American Recovery and Reinvestment Act of 2009

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The project described was supported by Award Number RC2NR011946 from the National Institute of Nursing Research. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Nursing Research or the National Institutes of Health.