The Potential for Real Influence: Leveraging Innovations in Nursing Education

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Why Innovate?

To create tools, technologies, and solutions that advance health and meet the changing needs of the individual, community, or healthcare system through innovative nursing education
A 2005 paper by Benjamin Jones of the National Bureau of Economic Research studied Nobel Prize winners in physics, chemistry, medicine, and economics over the past 100 years, as well as the inventors of revolutionary technologies. Jones found that people in their thirties contributed about 40 percent of the innovations, and those in their forties about 30 percent. People over 50 were responsible for 14 percent, the same share as the twenty-somethings. Those under the age of 19 were responsible for exactly nothing.
Why Look to Silicon Valley?

Silicon Valley in California is the place to be for innovation and entrepreneurs. It’s where the capital investment is, where the movers and shakers are in world technology and thinking. Coupled with an ability to fuse together nations and races from around the world in the same place and you have an equation for top end success. This is what the ultimate innovation hub looks like.
The context within which innovation and creativity thrives, or conversely wanes, is the environment.

The importance of multi-disciplinary teams and approaches to solving problems.

Safe places for innovation such as innovation laboratories

Organizational leadership and support for innovation
Clinicians collaborated with faculty from engineering schools and industry regarding potential solutions to address the needs of the NICU including: (a) optimal lighting and sound that is developmentally appropriate for premature babies, (b) technologies for minimally invasive monitoring and blood testing, (c) continuous monitoring of organ structure and function, and (d) systems to improve intra-team coordination among NICU caregiver staff.

(Blakeney, Carleton, McCarthy, Coakley, 2009)
User-driven innovation focuses on the ability of product users to adapt and customize products, including devices, processes, and outcomes.

(von Hippel, 2005)
In collaboration with industry, the MGH team created the "smart" infusion pump, an electronic pump device that contains an updated, hospital-specific, electronic library of hundreds of IV drugs and infusion protocols embedded in the pump's software. This pump prevents errors by comparing the dose rate the clinician enters with the hospital-specific, predefined rate limits for that drug. If the programmed dose is outside of the limits, the system alerts the clinician and, in the case of certain drugs, the system will prevent the administration of the medication. Smart infusion pump technology has been adopted worldwide by all major infusion pump manufacturers. (MGH, 2007).
Disruptive innovation occurs by thinking differently and asking new and different questions in each situation.

In disruptive innovation an important question to ask regarding a potentially new products is, “What is the job to be done?” When one considers the “job to be done” instead of the “product to be improved,” it broadens the field thus allowing for the disruptive innovation. (Christensen, 2003)

It is aimed at new consumers.
The recent emergence of “retail clinics” constitutes a potentially disruptive innovation in healthcare. These clinics are based in convenient retail spaces, such as neighborhood drug stores or grocery stores, and offer a simple menu of walk-in services at affordable prices.
Innovations in academic settings are often hindered by the pressure to meet institutional processes, educational and regulatory requirements established national organizations, accrediting agencies, and the state boards of nursing that govern and set standards for nursing practice at the baccalaureate and graduate levels. (Melnyk and Davidson, 2009)
Nurse researchers and nurse educators are becoming innovators impacting healthcare or nursing education with solutions that include medical devices, information technologies, as well as, partnering with industry and other disciplines to solve problems.

(Dr. Jackie Campbell)
Nursing Education Innovations

- Using Mobile devices at the point of care
- Using Standardized patients and hybrid simulation
- Virtual Clinical Communication Centers
- The fusion of gerontology and technology in nursing education: The Gerontological Informatics Reasoning Project—GRIP (Glasgow & Dreher, 2001)
Researchers at Drexel University are combining fashion design with wireless technology to produce a belly band that will be able to monitor uterine contractions and fetal heart rate in real time. Using electrically conductive thread, the knitting machines are programmed to seamlessly knit a pattern across the center of the band that serves as a wireless, passive radio frequency identification (RFID) tag.
UG Biomedical Engineering and Nursing Dual Degree Program at Duquesne – 1st in the Country

Clinical experience would greatly enhance a biomedical engineer’s ability to solve clinical problems.

This 5-year program brings together two rapidly expanding fields, and provides students with a distinctive set of credentials that will help them truly standout in a competitive job market. Students will have hands-on experience in biomedical engineering and direct patient care.
Why a Nurse Engineer?

- Biomedical Engineers are charged with advancing healthcare treatment for diagnostic and therapeutic purposes. A health care background with requisite clinical experience will greatly enhance a biomedical engineer's ability to solve clinical problems.

- The biomedical engineer/nursing majors will gain a deep clinical perspective and will learn to develop technologies and solve real clinical problems as a result of the addition of the nursing expertise.

- Nurses are in the best position to assess the functional health status and technology needs of patients given their close interactions with patients.
It is our hope that the biomedical engineer/nursing major will not only develop technologies to assist patients and create efficiencies for nurses in the hospital, outpatient, and home care arenas, but will also develop life-saving technologies for third-world countries in a cost-effective manner.
Dr. Patricia Brennan's research focuses on designing and evaluating home care community computer systems for use by patients. Her work ranges from the development and evaluation of computer networks as a mechanism for delivering nursing care to homebound ill persons and their caregivers to assessing the impact of patient-centered computer technology on the health outcomes of persons following coronary artery bypass graft surgery.

Her most current projects include exploring how individuals and families manage health information in their homes, studying the usability of secure email use in clinics, and is developing information tools and resources to support self-care and health self-management.
Living Environments Lab will accelerate the development and deployment of personal care and therapeutic technologies. Its aim is supporting individuals and families in the detection, recognition and management of health problems.

The Living Environments Laboratory is a collaborative venture created with the vision of emphasizing contextual design for the creation of healthcare products that better integrate with the home. In the virtual reality CAVE researchers will simulate a home environment and study how people interact with this environment while performing healthcare tasks, using this as the basis for contextual design.
The technologically advanced Neonur may decrease the risk of failure to thrive (FTT), which currently affects half of all newborns with congenital heart defects. This novel feeding device was conceived by Barbara Medoff-Cooper and developed in collaboration with Penn Engineering. The Neonur can measure the complex choreography of sucking, breathing, and swallowing that can herald developmental issues in these infants.
Why are so many older adults coming back to the hospital so soon after discharge? D2S2 is a new software tool to improve healthcare outcomes using the HER based on research conducted by Drs. Kathryn Bowles and Mary Naylor. A successful first case study demonstrated a significant reduction in 30-day readmissions when D2S2 was used to inform discharge planning.
Using Models from Industry: The Toyota Production System in Nursing Education
About 18 percent of patients were harmed by medical care, some more than once, and 63.1 percent of the injuries were judged to be preventable — this corresponds to **155,000 deaths per year** (NYT, 2010)
3% or more of hospital patients are hurt by medical error

1 in 300 patients die from such mistakes

24% of people say they or a family member have been harmed by medical error

90,000 people die of hospital-acquired infections annually. More than half of these may be preventable. Healthgrades puts the number of preventable deaths at 200,000 annually.
Statistics - A Casualty Count

- 55% of recommended care actually gets administered.
- $2,000 Annual cost to employers per insured worker due to poor-quality care
- 61% of doctors wash their hands before examining a patient if they know someone is watching. Only 44% wash their hands if they think no one is watching.

Sources: Lucian Leaper; New England Journal of Medicine; Forbes Magazine; The Institute of Medicine; Quality and safety in Health Care; Rand.
According to the report from the IOM, *To Err is Human*, the most common cause for medical errors is miscommunication among healthcare providers.

Further, nursing students as well as experienced nurses are often hesitant to voice patient care concerns to physicians.


Guiding Vision: Hippocratic Oath and Florence Nightingale Pledge

First, do no harm

Mistakes are inevitable but defects are mistakes that were not fixed soon enough and are relatively permanent.

In most instances, mistakes are least harmful and easiest to fix when recognized at the time of occurrence or close to the incident

Henry Otero, MD
Toyota Production System: Mistake Proofing

- Culture of Safety
- Processes to prevent errors or the negative impact of errors
- Eliminate opportunities for errors
- Patient Safety Alert System
- Standard Work and Training
- Checklists
- Communication and Collaboration
- Engagement and Education
What We Know!

- Clinical Quality Dashboard
- Core Measures
- Performance Improvement Initiatives
- Failure to Rescue
- Never Events
Failure to Rescue: How is it determined?

Evaluation and measurement of the following:
1. careful surveillance
2. timely identification of complications
3. appropriate interventions
4. activating a team response
Incorporate Toyota principles
Promote collaboration and improve clinical reasoning, communication, and skill development across disciplines utilizing innovative team building and multi-level simulation to reduce errors
Faculty and health care professionals must commit themselves to teaching, learning, and working across disciplinary boundaries;

They must exchange information, knowledge, and skills;

They must have a full understanding and respect of the facets of each discipline.

(Derry & Fischer, 2005)
This project entails the revision of the nursing curriculum to include substantive content on enhancing safety, improving inter-professional communication, and reflecting some of the Toyota Production System Safety (TPS) Principles.
Goals

- Revise nursing curriculum in order to enhance safety, improves inter-professional communication; and reflect selected Toyota Production System Safety Principles

- Create Failure to Rescue Theory/Simulation Scenarios and Inter-Professional Communication Theory/Simulation Scenarios for use in the Undergraduate Nursing Curriculum to enhance patient safety
Goals

- Incorporate complex safety simulation scenarios in a senior capstone course, in which students must demonstrate safety competence in order to successfully pass the course.
- Implement a Medication Administration Safety System in the clinical area to decrease interruption when students are administering medications.
Task Forces

- Inter-professional Education
- Failure to Rescue
- Toyota Principles
- Medication Protocol (Safety Checklist and Nurse Interruption)
The Power of Simulation in Teaching Quality and Safety Principles
Inter-Professional Simulation

GOALS:
- Role Understanding and Respect
- Improved Communication
- Teamwork Development
- Patient Safety
- High Quality Patient Care
- Knowledge and Skill Development
- Collaborative Environment
Inter-Professional Education Scenarios
Simulation Scenarios

**Outpatient** (Standardized Patients)
3 Scenarios in 10 rooms
   - 2 emergent women’s health histories
   - 2 pre-natal histories
   - 3 giving bad news

**Inpatient** (Standardized Patients/High Fidelity Patient Simulation)
2 Scenario Rooms
   - 1 Ectopic (code)
   - 1 Delivery and Neonatal Care
Observing the Interaction
The Power of Debriefing
Debriefing: A Step Beyond Feedback

General Goals:

- Acknowledge and support the student
- Clarify knowledge
- Integrate new knowledge with current situation
- Create a link to future clinical practice
Inter-professional simulation educational experiences among multidisciplinary healthcare students may enhance mutual support and communication and promote better patient outcomes.

Failure to Rescue Scenarios
Why Toyota?

Virginia Mason Medical Center’s outcomes in the Harvard Business Review

*In Health Care, TPS results in patient first, waiting is bad, defect-free medicine, rigorous accountability, no new resources, real-time quality assurance, management on site, we have no time*
Transforming Health Care
Virginia Mason Medical Center’s Pursuit of the Perfect Patient Experience
Charles Kenney
Foreword by Donald M. Berwick, MD, MPh
The Toyota Philosophy

- Problem Solving – continuous organizational learning and improvement
- People and Partners – respect, develop and challenge them
- Process oriented – eliminate waste
- Philosophy – long term thinking
Toyota Principles

- Base management decisions on long-term philosophy, even at the expense of short-term financial goals
- Create a continuous process flow to bring problems to the surface
- Use “pull” systems to avoid overproduction
- Level out the workload
- Build a culture of stopping to fix problems, to quality right the first time
**Toyota Principles**

- Standardize tasks and processes
- Use visual control so no problems are hidden
- Use reliable, tested technology that serves people and processes
- Grow leaders who understand the work, live the philosophy, and teach it others
- Develop exceptional people who follow philosophy
- Respect extended network or partners, challenge them to improve
Go and see for yourself to thoroughly understand the situation

Make decisions slowly by consensus, consider all options, implement decisions rapidly

Become a learning organization through relentless reflection and continuous improvement
Standardization

“Without standards there can be no improvement.” Taiichi Ohno
The "4 P" Model of the Toyota Production System

- Problem Solving (Continuous Improvement and Learning)
- People and Partners (Respect, Challenge, and Grow Them)
- Process (Eliminate Waste)
- Philosophy (long-term Thinking)

What I Learned at Virginia Mason?

- Going to the “Genba”
- An Obsession with Safety
- Standardization of Skills, Language, and Systems
- Engaged Staff
- Transparency
- #1 in Safety in U.S. according to Leap Frog for 10 years
- Healthy Bottom Line
Incorporation of TPS in Curriculum

- TPS introduced in the first nursing course
- Utilize a standardized tool to communicate critical patient information – SBAR: Situation, Background, Assessment, and Recommendation
- Standardization of clinical skills
- Standardization of medication administration
- Inter-Professional Simulation
Incorporate TPS principles in curriculum revision with a community orientation

Incorporate TPS into administrative structure/functions in a School of Nursing

For example: Re-examine processes for clinical placements, clinical contracts, workflow etc. to increase efficiency
The Future: Where Do We Go From Here?

- Curriculum Revision
- Build Toyota Principles into Simulation Scenarios
- Implement Toyota into all nursing curricula
- Examine effect on student’s critical thinking skills
What I learned...

My emphasis has shifted from an initial “quick fix” orientation on quality standards to a “process,” people-oriented focus for curriculum revision embodying long-term thinking, efficient and effective systems, technology as added value, and teamwork within an environment committed to quality outcomes and continuous improvement.
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Many of us don’t recognize our own creativity... Let your creativity emerge!