

# **FUTURE OF NURSING™**

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## Campaign for Action



Robert Wood Johnson Foundation

**AARP** Foundation®

## **Nurse-Driven Innovations to Improve Health**

April 17, 2018

- Examine strategies to prepare nurses as leaders in innovation to improve health and well-being of individuals, families, and communities.
- Examine the use of virtual and augmented reality to improve training and education for sudden cardiac arrest.
- Explore business and design tools and skills required for nurses to be transformative drivers of better patient and health care outcomes.



**Winifred V. Quinn, PhD**

Director, Advocacy and  
Consumer Affairs

Center to Champion Nursing in  
America

# Today's Presenters



**Therese S. Richmond  
PhD, CRNP, FAAN**

Andrea B. Laporte  
Professor, University of  
Pennsylvania, School of  
Nursing  
Associate Dean for  
Research & Innovation,  
University of Pennsylvania,  
School of Nursing



**Marion Leary, RN,  
MSN, MPH**

Director of Innovation  
Research, Center for  
Resuscitation  
Science, Penn  
Innovation Specialist,  
University of  
Pennsylvania School  
of Nursing



**Nancy P. Hanrahan,  
PhD, RN, FAAN**

Professor and Dean of  
the School of nursing,  
Northeastern University  
Senior Associate Dean of  
Innovation &  
Entrepreneurship for  
Bouvé College of Health  
Sciences

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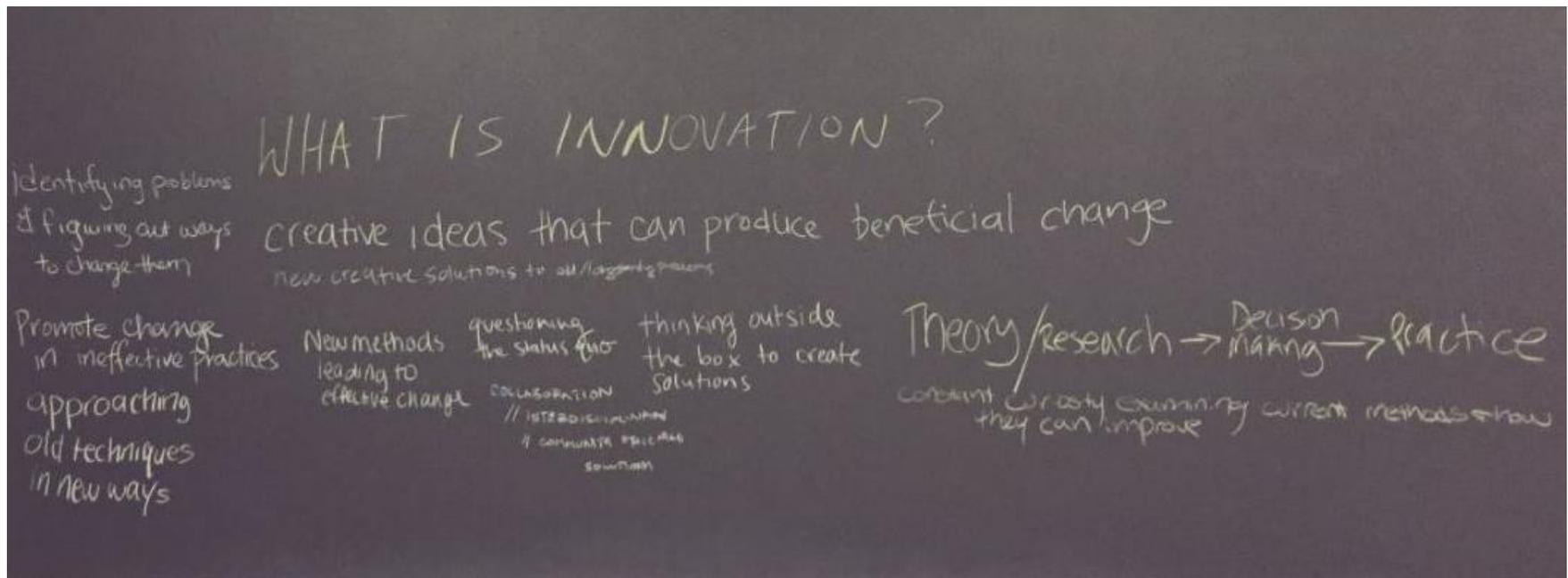
## **Nurse-Driven Innovations to Improve Health: Strategies in Education**

Therese S. Richmond PhD, CRNP, FAAN  
Andrea B. Laporte Professor of Nursing  
Associate Dean for Research & Innovation  
University of Pennsylvania School of Nursing

# Why Innovation?

- Health & well-being are in peril
- Systems are broken
- Continued health inequity & health disparity





- Transformative
- Broadly define innovation in the nursing space

- Improving health & well-being is central to the work of nurses
- Committed to vulnerable populations
- On the front lines
- Cross all settings where people live, play, work and heal
- Inherent problem solvers
  - “Necessity is the mother of all invention”
  - Expert at work arounds

- Innovation not core component of nursing curricula
- Solutions are typically “one and done”
- Enough!

- Nurses are natural innovators
  - Identify problems
  - Compelled to solve problems for patient's sake
  - Creative in variety of environments

Innovative solutions are often in the moment and not repeated

- Nurse researchers straddle research-innovation chasm

Clinicians: one-off solutions

Researchers: science

The Missing Link

# Foundational Principles

- Start early
- Create innovative educational programs
- Move beyond the health care system
- Keep health and well-being front and center
- Conceptualize innovation broadly – well beyond ‘widgets’<sup>1</sup>
- Provide rigorous innovation toolboxes<sup>2,3</sup>
- Bolster complex system thinking<sup>4</sup>



<sup>1</sup> Asch & Rosin (2015). Innovation as a discipline, not fad. *NEJM*, 373,, 592-594.

<sup>2</sup> Stanford d School Bootleg Bootcamp. <https://dschool.stanford.edu/resources/the-bootcamp-bootleg>.

<sup>3</sup> Mrad et al. (2015). Enabling a culture of innovation. *Touchpoint*, 7, 10-13.

<sup>4</sup>Browning & Sanders (2012). Can innovation be lean? *California Management Review*, 54, 5-19.

- Be true to the inherent interdisciplinary nature of innovation
- Create a culture of inquiry in all places nurses practice
- Infuse a rigorous methodological approach to innovation
- Get faculty up to speed

## **Penn Nursing Motto**

**Every product & process that touches a patient goes through a nurse**

- Exemplars
  - Hillman Scholars Program in Nursing Innovation
  - Preparing Students
  - Getting Faculty up to speed

- Vision
  - Cultivate the next generation of cutting edge researchers, leaders, & nurse innovators
- Integrated BSN-PhD



**Penn Nursing Motto**  
**Move from “Why we can’t” to “How do we?”**

Funded: Rita and Alex Hillman Foundation

- Integration
  - Fully integrated curriculum
  - Rigorous but streamlined
- Innovation
  - Smash molecules together
  - Challenge assumptions
  - Innovation lessons
  - Make new connections
- Impact
  - Rapid prototyping
  - Co-creation & co-problem solving
  - Principle-driven vs. rule-bound

# Exemplar

“**Play is a fundamental part of who we are**, because we all grow up playing games. Today, the games we're designing are incredibly rich experiences, experiences that have the power to entertain, teach, and inspire.

**As a designer**, I consider it a priority to make sure the games I help create are thoughtful, engaging, and accessible for people from walks of life - and **as a nurse**, I consider building resilience and helping players **develop positive mental health strategies** to be a vital part of this. We have to meet people where they are, and I believe that games, as activities enjoyed by billions worldwide, and as hubs for incredibly passionate and long lasting online communities, could well be the place to do just that.”

**Matthew Lee**  
**Hillman Scholar in Nursing Innovation**  
**Penn Nursing**



- Leave behind - “Why we can’t”
- Embrace “How do we?”
- Revel in the fun of rapid prototyping
- Don’t be afraid to course correct
- In education we must ‘walk the talk’

- Innovation club
- Student champions
- Student internships
- PhD fellowships
- Participate in accelerator/hackathon/make-a-thon programs
- Celebrate accomplishments

- Innovation in Health: Foundations of Design Thinking
  - Undergraduate
  - Graduate
- Approach
  - Interdisciplinary
  - Across academic levels
  - Ways of thinking
  - Community/provider partnerships for real-life problems
  - Develop to resonate with nursing culture
  - Flipped classroom



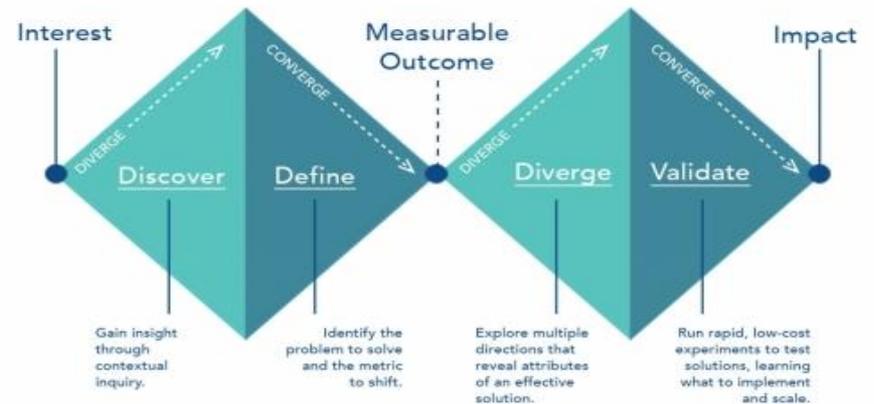
# Design Thinking

## Penn Nursing

### Empathy

- Define
- Ideate
- Prototype
- Iterate
- Test

## Penn Medicine Center for Health Care Innovation



## IDEO U “Hello Design Thinking”

Gather Inspiration - Generate Ideas - Make Ideas Tangible - Share the Story

# Getting Faculty Up To Speed

- Establish Faculty Innovation Fellows
- Participate in accelerator/hackathon/make-a-thon programs
- Highlight accomplishments
- Make innovation a strategic priority

 Penn Medicine



**CENTER FOR HEALTH CARE INNOVATION**  
Accelerating Ideas to Transform Health Care

[About](#) [People](#) [Portfolio](#)



**Innovation Accelerator Pitch Day**  
Monday, April 16 3:30 - 6PM

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# Nurse Innovation Starts at Penn Nursing.



Every Product and Process that Touches a Patient Goes Through a Nurse.

We Create and Test Innovative Solutions to Improve Health and Health Care.

At Penn Nursing, We Are Innovators.

**Tanja V.E. Kral, PhD**  
*Associate Professor of Nursing*

**MeMix:** Early stage interactive mHealth application to improve dietary outcomes for children with autism spectrum.

**Pamela Z. Cacchione, PhD, CRNP, GNP, BC, FGSA, FAAN**  
*Ralston House Endowed Term Chair in Gerontological Nursing*

**Smart Socks:** Monitors fluid retention and heart failure among the elderly.

**Barbara Riegel, PhD, RN, FAAN, FAHA**  
*Edith Clemmer Steinbright Professor of Gerontology*

**Welth:** A start-up that has partnered with Penn Nursing to test an electronic medication adherence system.

**Anne M. Teitelman, PhD, FNP-BC, FAANP, FAAN**  
*Patricia Bleznak Silverstein and Howard A. Silverstein Endowed Term Chair in Global Women's Health*

**EverHealthier Women:** mHealth bi-lingual application to track cancer screenings and prevention behaviors through the web and text messaging with links to online resources.

**Kathryn H. Bowles, PhD, RN, FAAN, FACMI**  
*Professor of Nursing and vanAmeringen Chair in Nursing Excellence*

**Mary D. Naylor, PhD, RN, FAAN**  
*Marian S. Ware Professor in Gerontology*

**Right Care Solutions:** Commercialized decision-support tool embedded in the electronic health care record to improve discharge planning for vulnerable, older adults.

**Penn Nursing is at the Forefront of Innovation.**

For more information, e-mail [innovation@nursing.upenn.edu](mailto:innovation@nursing.upenn.edu).

## University of Pennsylvania School of Nursing



Therese S. Richmond

<http://www.nursing.upenn.edu/live/profiles/50-therese-s-richmond>

# **FUTURE OF NURSING™**

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## Campaign for Action



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### **Nurse-Driven Innovations to Improve Health: Using Virtual and Augmented Reality to Improve Training and Education for Sudden Cardiac Arrest**

**Marion Leary, RN, MSN, MPH**

Director of Innovation Research, Center for Resuscitation Science, Penn Innovation  
Specialist, University of Pennsylvania School of Nursing

# Disclosures

- American Heart Association, Grant Support; Scientific Committee; Guidelines Writing Group; Digital Strategies Writing Group; Education Summit Education Innovation Working Group
- Laerdal Foundation, Grant Support; In-Kind Support
- Medtronic Foundation, Grant Support
- Astrazeneca Foundation, Grant Support
- ImmERge Labs, LLC, Ownership



# Sudden Cardiac Arrest (SCA)

**350,000/year in U.S.**



**12%**

High-quality bystander CPR and AED use can **DOUBLE** survival

Most victims **DO NOT** receive high-quality bystander CPR



Created by Luis Pineda  
from Noun Project

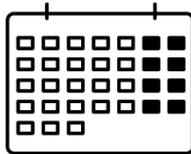
Cardiac arrest by nature is **sudden**



Created by Luis Prado  
from Noun Project



Created by Ben Peetermans  
from Noun Project



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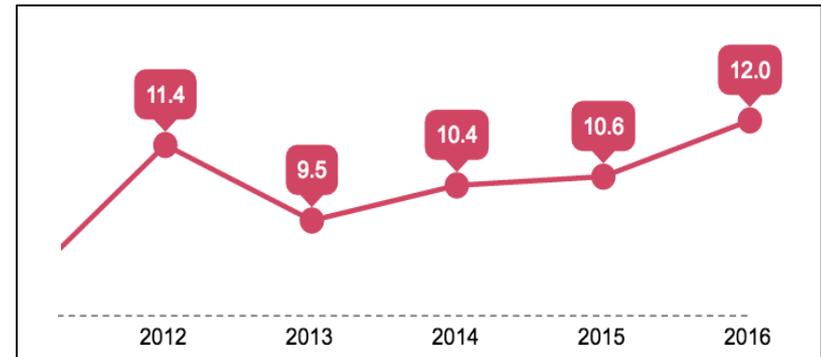
We don't know **who, when, or where**

*Which makes it really difficult to treat and study!*

# Problem #2

CPR training has been around  
for **50 yrs**

**Survival** has plateaued



Practicing on a mannequin **IS NOT** the  
same as real-life

## **ORIGINAL ARTICLE**

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### **“Please. Don’t. Die.”**

#### **A Grounded Theory Study of Bystander Cardiopulmonary Resuscitation**

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**See Editorial by Dukes and Girotra**

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**Justin Mausz, MSc  
Paul Snobelen  
Walter Tavares, PhD**

**BACKGROUND:** Bystander cardiopulmonary resuscitation (CPR) is an

**Conclusions:** Our study suggests that current CPR training programs may not adequately prepare lay rescuers for the reality of an OHCA and identifies several key knowledge gaps that should be addressed. The long-term psychological consequences of bystander intervention in OHCA remain poorly understood and warrant further study.



Virtual Reality

Sudden Cardiac Arrest Training System



Virtual Reality

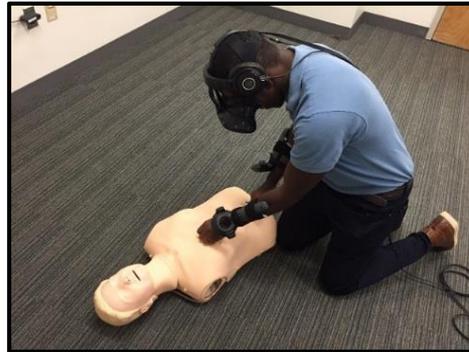
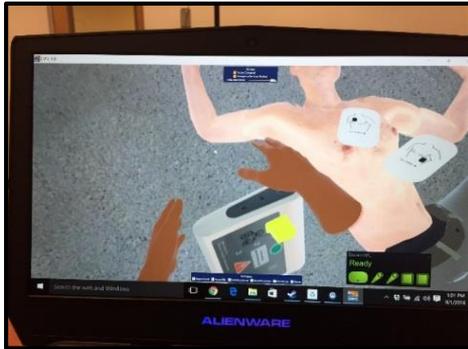
Sudden Cardiac Arrest mApp



Augmented Reality

CPRReality

# Using Virtual Reality to Observe Bystander Response to Cardiac Arrest

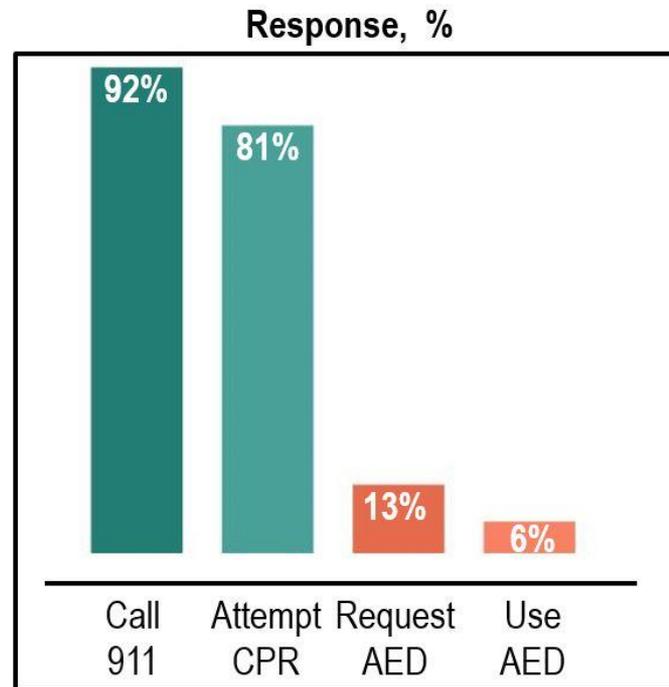


- Using a VR wearable device (HTC Vive) combined with a CPR recording mannequin, we created a three-minute multisensory SCA scenario
- We sought to characterize lay bystander response to an unannounced SCA
- Subjects were unaware of the nature of the emergency event but were told to respond however they would to an emergency situation

From June 2016 – June 2017, 119 subjects enrolled

<b>Age, mean±SD</b>	<b>37±14*</b>
Gender, n (%)	
Female	53 (45)
Race, n (%)	
White	60 (51)
Black	38 (32)
Other	19 (17)
Education, n (%)	
Some high school	1 (1)
High school or GED	9 (8)
Some college/voc	40 (34)
Bachelors	31 (26)
Masters	43 (29)
Doctorate	4 (3)
Annual income, n (%)	
Less than \$20,000	20 (17)
\$20,000-\$34,999	8 (7)
\$35,000-\$49,999	19 (16)
\$50,000-\$74,999	17 (15)
\$75,000-\$99,999	17 (15)
\$100,000-\$149,999	20 (17)
\$150,000-\$199,999	13 (11)
\$200,000 or more	3 (3)

CPR Training	
Less than 2 years	36 (31)
2-5 years	44 (36)
6-10 years	9 (8)
Greater than 10 years	6 (5)
Not trained	24 (21)
Know how to use an AED	
Yes	60 (51)
No	43 (36)
Unsure	13 (11)
Don't know what that is	2 (2)



***82 percent of subjects felt as if they were involved in a real SCA event***

Of the 96 subjects who attempted CPR, we were able to obtain CPR quality data from 81 subjects

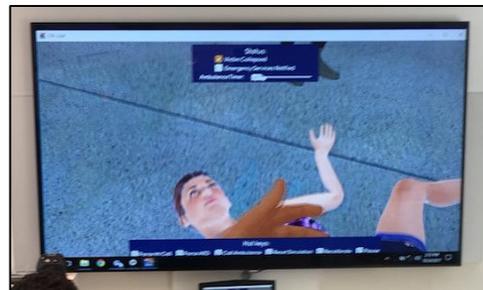
<b>CPR Quality</b>	
CC Rate	94±22 cpm
CC Depth	38±13 mm

***Guidelines: CC rate: 100-120 bpm  
CC depth: at least 2 inches (50 mm)***

## Phase 2

Observed lay bystander response to an unannounced SCA with randomization of the victim (race and gender)

Enrolled 75 subjects between September 1, 2017 – December 31, 2017



Grant Support:



## Scientific Sessions 2017

Anaheim, CA | November 11–15

**Submit Your Science!**  
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[scientificsessions.org](http://scientificsessions.org)



American Heart Association.  
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**SCIENTIFIC 20**  
**SESSIONS 17**

**Session Type:** Abstract Oral Session  
**Session Title:** Oral Abstracts- Cardiac Arrest Epidemiology  
**Presentation Title:** Gender disparities among patients receiving bystander cardiopulmonary resuscitation in the United States

### Men were 1.23 times more likely to receive CPR.

**AARP** Real Possibilities. Join Renew Member Benefits Rewards for Good Register | Login

## Study: Women Less Likely to Get CPR From Bystanders

Researchers cite a reluctance to disrobe or touch a woman's chest

by Marilyn Marchione, Associated Press, November 14, 2017 | Comments: 0

**Women CPR Study**  
EGOR KULINICH/GETTY IMAGES

Only 39 percent of women suffering cardiac arrest in a public place were given CPR, versus 45 percent of men.

Women are less likely than men to get CPR from a bystander and more likely to die, a new study suggests, and researchers think the reluctance to touch a woman's chest might be one reason.

Only 39 percent of women suffering cardiac arrest in a public place were given CPR, versus 45 percent of men, the study found.

It involved nearly 20,000 cases around the country and is the first to examine gender differences in receiving heart help from the public versus professional responders.

"It can be kind of daunting thinking about pushing hard and fast on the center of a woman's chest," and some people may fear they are hurting her, said Audrey Blewer, a University of Pennsylvania researcher who led the study.

Rescuers also may worry about moving a woman's clothing to get better access, or touching breasts to do CPR, but doing it properly "shouldn't entail that," said another study leader,

**AARP** Auto Insurance Program THE HARTFORD

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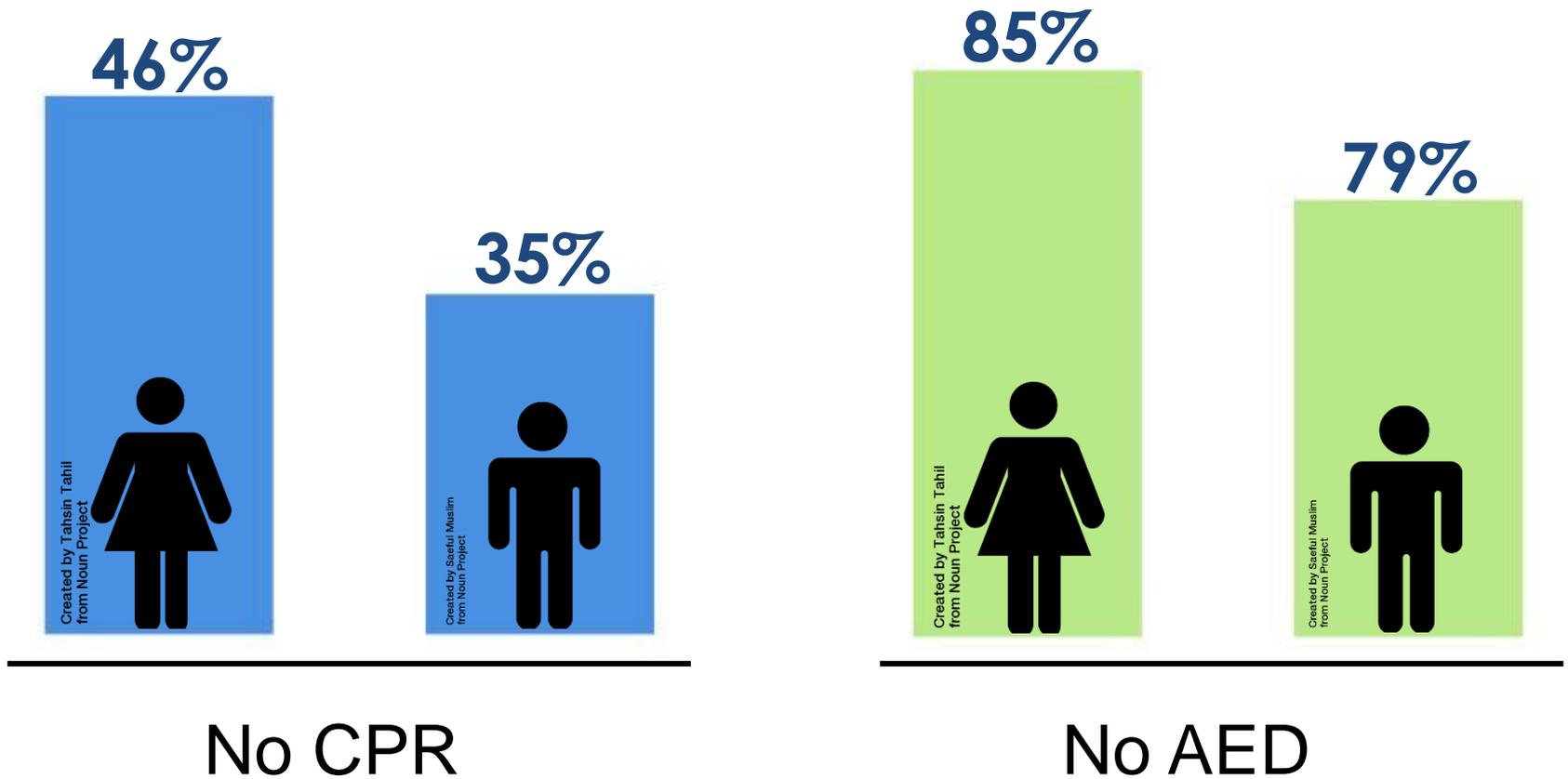
**START YOUR QUOTE >**

# Results

n=75	
Age, mean±SD	31±11*
Gender, n (%)	
Female	26 (35)
Race, n (%)	
White	35 (49)
Black	11 (15)
Other	26 (36)
Education, n (%)	
Some college/or less	24 (32)
Bachelors	33 (44)
Masters or higher	18 (24)
Annual income, n (%)	
\$49,999 or less	33 (46)
\$50,000-\$99,999	16 (22)
\$100,000 or more	21 (30)

CPR Training	
2 years or less	25 (33)
5 years	10 (13)
6-10 years	4 (5)
Greater than 10 years	4 (5)
Not trained	32 (43)
Know how to use an AED	
Yes	28 (37)
No	35 (47)
Unsure	7 (9)
Don't know what that is	5 (7)
Post-intervention	
Called 911	70 (93)
Performed CPR	44 (59)
Asked for AED	13 (17)
Used AED	8 (11)

# Results



P=NS

# Virtual Reality Mobile Application

Comparing the impact of a VR SCA training mobile application (mApp) with a standard CPR training mApp via randomized trial



Grant Support:

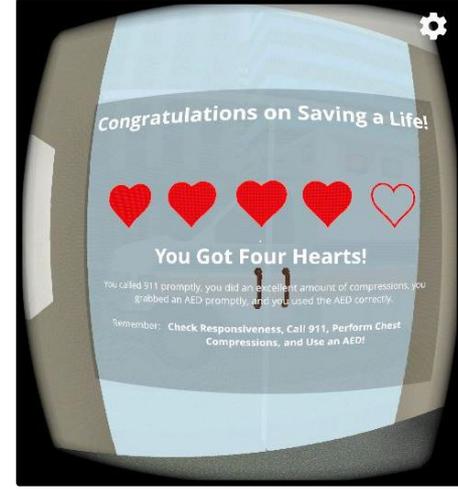
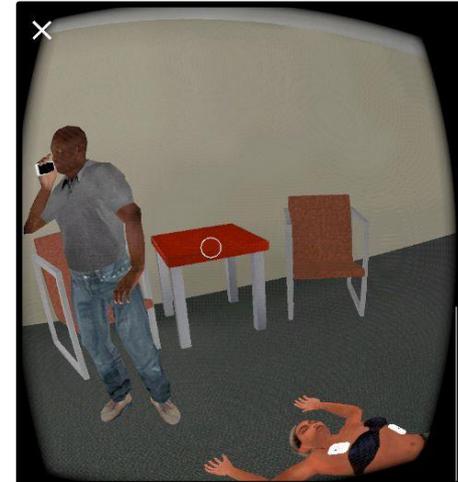


# Virtual Reality Mobile Application

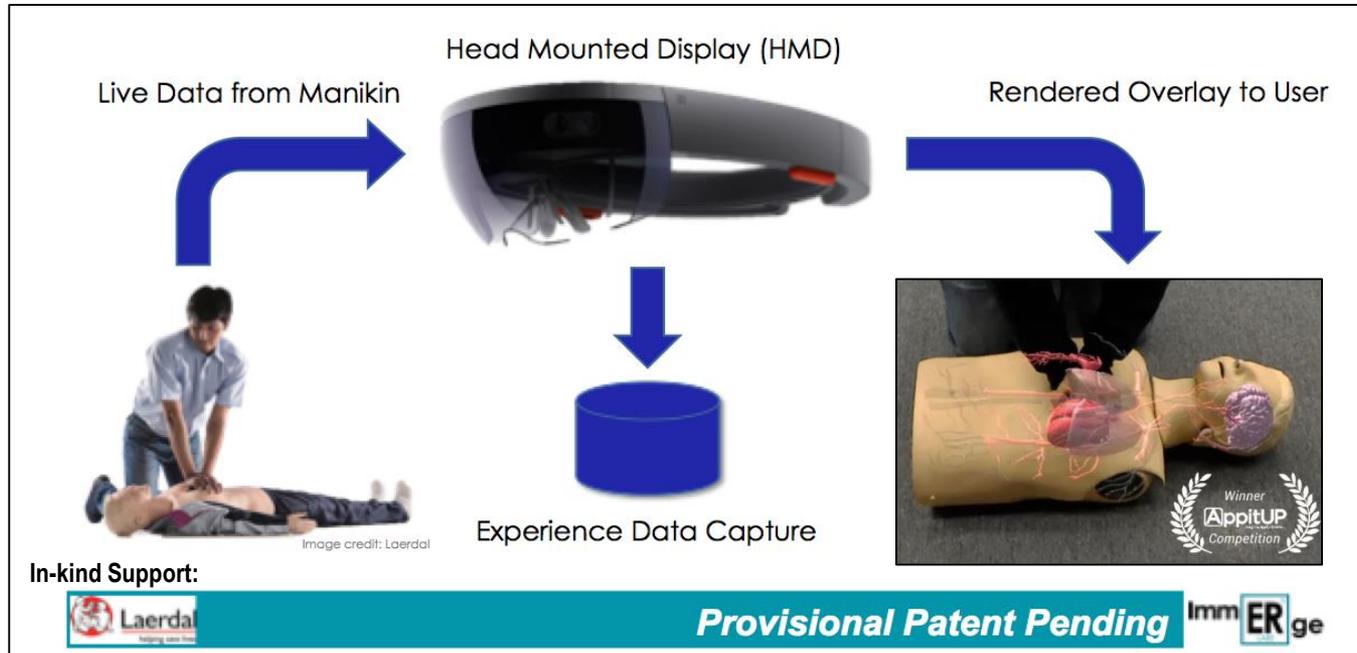
**FUTURE OF NURSING™**  
Campaign for Action\*



# Virtual Reality Mobile Application



# Augmented Reality



- Overlay a holographic circulatory system over the mannequin
- View blood flow to vital organs based on the actual quality of CPR being performed

<https://www.youtube.com/watch?v=QfiP62A-2qk>

# Augmented Reality



# Future Directions



Surgery



Anaphylaxis



First aid



Stroke

Created by Dorothy Thomas  
from Ncar Project



Mass casualty



Heimlich maneuver

Created by Lisa Prida  
from Ncar Project



Trauma

Created by Egorov Valentin  
from Ncar Project



Heart attack

Created by Lisa Prida  
from Ncar Project

— Connect —



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Dedicated to research, education and clinical care that saves the lives of people who suffer cardiac arrest.

📍 Philadelphia, Pa  
[med.upenn.edu/resuscitation/](http://med.upenn.edu/resuscitation/)

<http://marionleary.strikingly.com/>

# **FUTURE OF NURSING™**

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## Campaign for Action



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## **Nurse-Driven Innovations to Improve Health: The Innovation Economy**

**Nancy P. Hanrahan, PhD, RN, FAAN**  
Executive Director, Associate Dean of  
Innovation & Entrepreneurship  
Northeastern University

- Forces shaping health care reform
- Forces shaping the future of nursing practice
- Business and design tools/strategies required for nurses to be transformative drivers of better patient and health care outcomes
  - What is innovation?
  - How do nurses become valued innovators?
  - What are some design tools and skills?

# Demand for Digital Health Solutions

- In 2016, the global digital health market was at \$179.6 billion. Growth is anticipated to rise 13.4 percent between 2017 and 2025, reaching \$536.6 billion.
- Clinical decision support system (CDSS), EHR/EMR, computerized physician order entry (CPOE), telehealth, mHealth, and population health management are the key segments of innovative solutions.

<https://www.transparencymarketresearch.com/digital-health-market.html>

- Explosion of knowledge within a health system that is too fragmented and disorganized to absorb it
- Radical transformation about how we manage health and health care
- Forces shaping digital health Innovation include:
  - Human
  - Policy
  - Economic
  - Technology

***Nurses take notice!***

- **Problem #1: Escalating medical costs**

Aging population—growing need for medical care, changes in legislative policy, and more costly treatment options—expenses related to medical care are increasing day by day.

- **Problem #2: Outdated medical business models**

Standard medical business models are widely understood to be lacking, yet these approaches still dominate how health care is delivered.

- **Problem #3: Patients confused and not supported**

- Dealing with diseases or conditions can be a solitary experience
- Multiple providers don't communicate
- Support from family, friends, and other patients can often be missing or lack coordination

## Nurses:

- Not educated to meet today's health challenges
- Need new competencies
  - **Radical collaborative teams** that inspire creative thinking among practitioners from all disciplines, perspectives, and backgrounds. Different points of view are key in pushing “out of the box” thinking, radical/unreasonable ideas.
  - **A focus on real-world projects:** Nurses and other health providers want to make an impact. Need the space and coaching to evolve an idea into a prototype.
  - **Decision-making processes** that empower rapid and iterative decision-making, while fostering co-creation and co-ownership. High tolerance of failures.

- **Nurse leadership** competencies include expertise in state of the art communication skills that integrates provider teams and are driven by information technology.
- **Nurses** must understand how to apply data to understand the “context of care” and support decision-making across the health care enterprise.
- **Nurse researchers** must go beyond regression models in their research and integrate social determinants using big data and machine learning.
- **Health professionals** must be able to "(1) provide patient-centered care, (2) work on interdisciplinary teams, (3) employ evidenced-base practice, (4) apply quality improvement and, fundamental to the preceding four, (5) make use of informatics.”

and Fitzgerald-Miller 2006: 29)

(IOM. 2003, cited in Dreher

- Dave deBronkart *Let Patients Help*
  - Knowledgeable and empowered patient patients can—and must—be a central part of the treatment process.
- Tom Ferguson coined the term ePatients, or “individuals who are equipped, enabled, empowered, engaged in their health and health-care decisions.”

# What Is Innovation?

*Innovation is the accomplishment of the impossible, the unbelievable, the unreachable, the unattainable—until it is done and then it is the possible, the believable, the reachable, the attainable.*

# The First Nurse Innovator

*Florence Nightingale, the founder of modern nursing, challenged the conventional practice and long-held beliefs in medicine that people did not need to wash their hands or sterilize their tools between patients to prevent disease. She challenged the status quo, the way things had always been done, and led to the creation of the Nursing Profession.*



- Marybeth Pompei, RN – who from simply touching her husband’s forehead to see if he had a fever, led to inventing the Exergen Temporal Thermometer.
- Maggie McLaughlin, RN – who through her experience as an IV nurse saw a better Luer lock system to prevent injuries to patients.
- Marion Leary, RN – a resuscitation nurse who recognized that using artificial reality could better train nurses in CPR.
- Matthew Lee, RN – developed a game for college students to understand depression and use mindful techniques.

- For the past 16 years, nurses have been valued by patients as the top ethical and honest profession.
  - In 2017, the Gallup organization once again announced that nurses continue to hold top honors for ethics and honesty, with 84% of those polled rating those characteristics as high or very high.
  - More than 8 out of 10 Americans describe nurse ethics as "very high" or "high."
- The nursing profession continues to serve as the very lifeblood and connective tissue of the U.S. health care system.

*What would it take to transform nurses into leading agents for the redesign of the health care system?*

*A leader takes people where they want to go. A great leader takes people where they don't necessarily want to go, but ought to be. Rosalyn Carter*

- Our mission is to advance nurses to the forefront of health care innovation and entrepreneurship.
- We provide experiential lifelong learning opportunities for all nurses to grow competence in business/finances, technology, and policy in addition to the practice of patient care.
- We provide a space away from the busy clinical settings to relax and innovate with colleagues.

<https://www.northeastern.edu/nurseinnovation/>

- **Nurse Accelerator:** Educates, incubates, and launches innovative ideas from students, nurses, and faculty. The Nurse Accelerator exposes them to interdisciplinary opportunities from business, engineering, design, and computer science. Through partnerships with health systems, businesses, and foundations, we source funding opportunities to start new companies and become leaders in the innovation economy.
- **Feasibility and pilot random control trials for new devices**

- **Nurse Leadership and & Entrepreneurship Courses + Certificates:** <https://www.northeastern.edu/nurseinnovation/leadershipcertificate/>
- **Nurse Hackathon** May 18-20 2018 Opioid Hackathon: A three-day event set to tackle the opioid epidemic in new, innovative ways. <https://www.northeastern.edu/nurseinnovation/hackathon-2018/>.
- **Reverse Pitch Hackathon with AARP:** June 4, 2018 Technology to let people age at home. Nurse SharkTank that is designed to support nurse and healthcare entrepreneurs. This event brings bright minds together to help their product gain traction and support. This is a fantastic opportunity to expand awareness of a product and potentially receive funding to further its development. <https://www.northeastern.edu/nurseinnovation/nurse-sharktank-2018/>
- **Nurse Practitioner Entrepreneurship Conference:** This conference is for NPs who want to grow their understanding of the business side of health care, regardless of their work setting. <https://www.northeastern.edu/nurseinnovation/np-entrepreneurship-conference-2018/>
- **Nurse Innovation & Entrepreneurship Summit:** September 2018. Interpreting innovation pedagogy for nurses and nursing education. <https://www.northeastern.edu/nurseinnovation/nurse-innovation-and-entrepreneurship-summit/>

Spread the word: Nurses are key leaders in health reform. See online our Gallery of Nurse Innovators & Entrepreneurs:

<https://www.northeastern.edu/nurseinnovation/gallery-nurse-innovators-entrepreneurs/>

***THANK YOU!***

# Facilitated Dialogue



**Molly K. McCarthy**  
**MBA, RN-BC**  
National Director, US  
Provider Industry and  
Chief Nursing Officer  
Microsoft US Health &  
Life Sciences



**Christel  
Anderson, MA**  
Senior Director,  
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# Questions or Comments?



**Press \*1 on your telephone key pad to ask a question  
(Please be sure to record your name after the prompt)**

**OR**

**Use the “chat” feature to send “everyone” a question.**



If you are having trouble asking a question, please click the “Raise Hand” button on the bottom right of your screen

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