The Role of the Nurse in Research and Quality Improvement

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Objectives

At the end of this presentation, the participant will be able to:

1. Differentiate nursing research and quality improvement
2. Provide two examples of a nurse's role in research activities
3. Describe the importance of nursing scholarship on patient outcomes

Differentiate Nursing Research and Quality Improvement

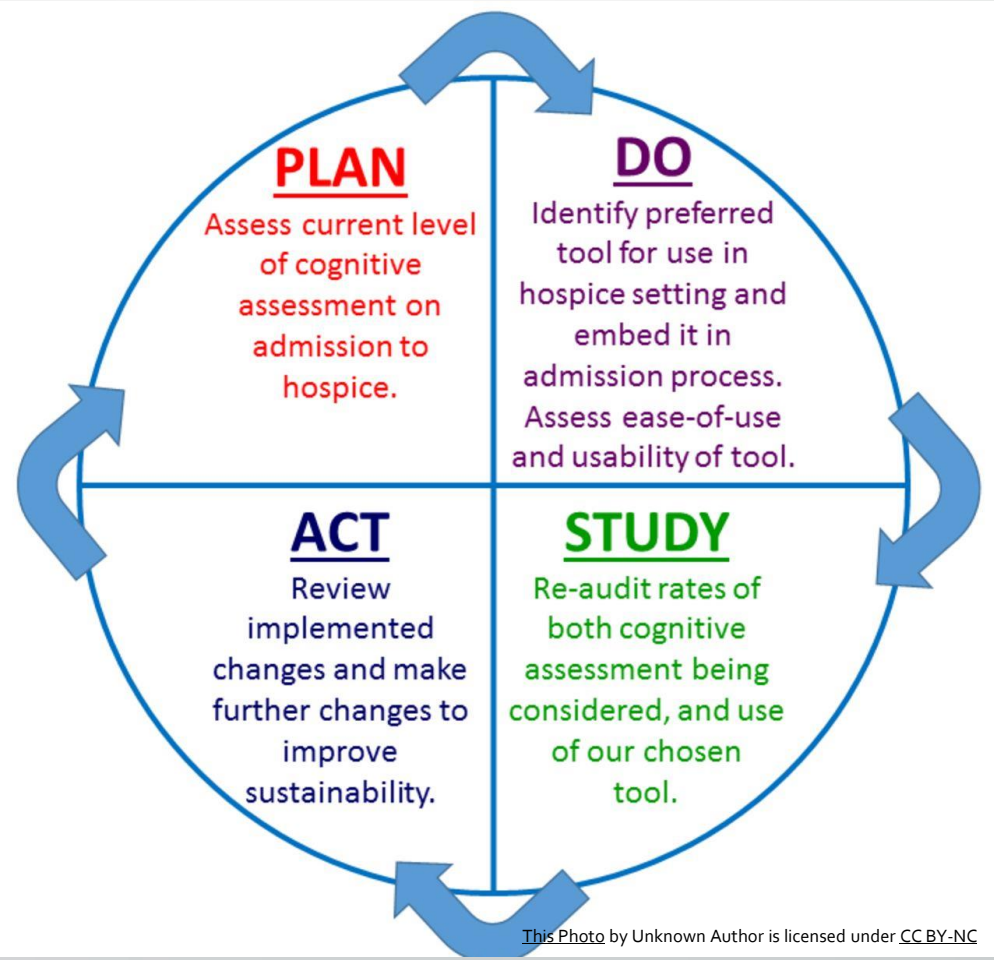
Katherine Moran

Quality Improvement

- The degree to which health services for individuals and populations increase the likelihood of desired health outcomes; consistent with current professional knowledge (Centers for Medicare & Medicaid Services, 2021).
- Framework used to systematically improve care; standardize processes and structure to reduce variation, achieve predictable results, and improve outcomes (Centers for Medicare & Medicaid Services, 2021).

Why Health Systems Engage in Quality Improvement Initiatives

- Institute of Medicine
  - *To Err is Human: Building a Safer Health System* (2000)
  - *Crossing the Quality Chasm: A New Health System for the 21st Century* (2001)
- Initiated to identify, explore, prevent, and resolve systems and processes leading to unintended or poor-quality outcomes (Gillespie, 2018).



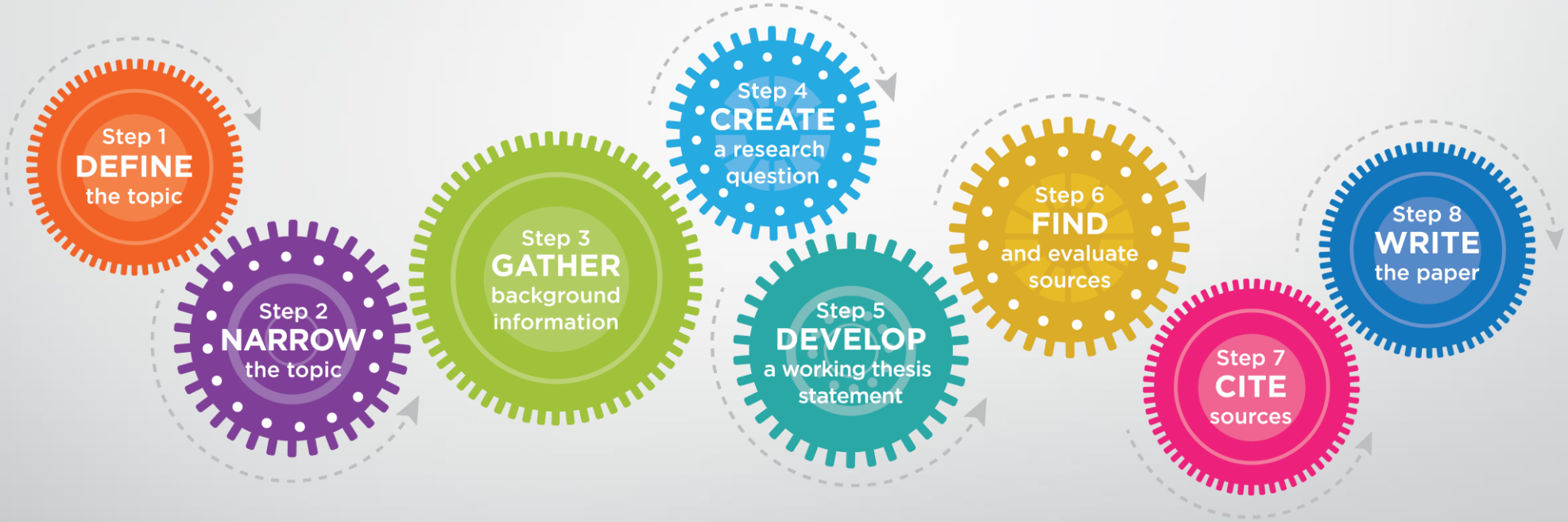
Quality Improvement (QI)

- Goal: measurable improvement in health care delivery or health status of a population using data-driven methods.
- Overview: involves systematic, data-guided processes (Gillespie, 2018).
- Methods:
  - Mechanisms of the intervention are expected to change over time.
  - Plan for intervention and analysis includes an assessment of the system.
  - Statistical methods evaluate system level processes and outcomes over time (Ogrinc, et al., 2013).
- Federal regulations: IRB oversight not required.

QI Examples

- Measuring staff compliance with clinical guidelines for toxicities from immunotherapy.
- Interventions to reduce costs related to readmission rates.
- Patient/employee service surveys.
- Strategies to decrease wait times for an infusion center (Gillespie, 2018).

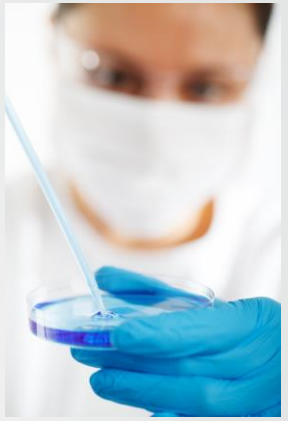
THE RESEARCH PROCESS



Research

- *A* systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge (US Department of Health and Human Services, 2018).

Research



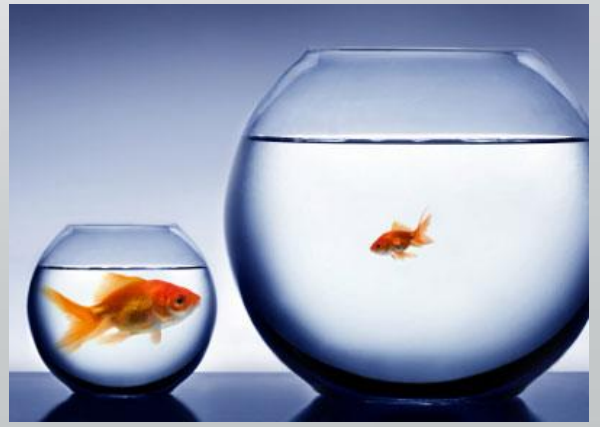
- Goal: Add new knowledge to the literature through testing of a hypothesis or a scientific question (National Archives, 2023).
- Methods:
  - Protocol defines the intervention, interaction, and use of collected data; may rely on the randomization of individuals.
  - May use qualitative or quantitative methods to make observations, make comparisons between groups, or generate hypotheses.
  - Statistical methods primarily compare differences between groups or correlate observed differences with a known health condition (Ogrinc, et al., 2013).
- Federal regulations: requires review/approval by the IRB.

Nursing Research Questions

- Does the administration of pain medication at time of surgical incision reduce the need for pain medication twenty-four hours after surgery?
- What maternal factors are associated with obesity in toddlers?
- Is yoga as effective as traditional physical therapy in reducing lymphedema in patients who have had head and neck cancer treatment?
- Do teenagers with Type 1 diabetes who receive phone tweet reminders maintain lower blood sugars than those who do not?
- How can siblings' risk of depression be predicted after the death of a child (Vanderbilt, n.d.)?

Quick Comparison

- **QI:** systematically apply what is already known into the local practice.
  - Focus on improving system/outcomes
  - Making it more cost-effective
  - Increase in productivity
  - Continual gains
  - Knowledge is specific to the organization
  - Limited audience
- **Research:** uses a systematic approach to discover something that is unknown.
  - Process of generating new knowledge
  - Test a hypotheses
  - Results focused on generalizability
  - Scientific framework
  - Control of variables
  - HSIRB review



Research vs. Quality Improvement

	RESEARCH	QUALITY IMPROVEMENT
INTENT	Develop or contribute to generalizable knowledge (e.g., testing hypothesis)	Improve a practice or process within a particular institution or ensure it conforms with expected norms; not designed to contribute to generalizable knowledge
DESIGN	Systematic; follows a rigid protocol that remains unchanged throughout the research; may involve randomization	Adaptive, iterative design; may or may not be systematic; generally does not involve randomization
MANDATE	Activities not mandated by institution or program	Activity mandated by institution or clinic as part of its operations
EFFECT ON PROGRAM OR PRACTICE EVALUATED	Findings are not expected to directly affect institutional or programmatic practice	Findings are expected to directly affect institutional practice and identify corrective action(s) needed
POPULATION	Usually involves a subset of individuals; no obligation to participate; may involve statistical justification of sample size to achieve endpoints	Responsibility to participate as a component of the program or process; information on all or most involved in the practice or process is expected to be included; exclusion of some individuals significantly affects conclusions
BENEFITS	Participants may or may not benefit directly; often a delayed benefit to future knowledge or individuals	Directly benefits a process, program, or system; may or may not benefit participants
RISKS	May place participants at risk	Does not place participants at risk with the possible exception to risks to privacy or confidentiality of data
ANALYSIS	Statistically prove or disprove hypothesis	Compare program, process or system to established standards
DISSEMINATION OF RESULTS	Intent to disseminate results generally presumed at outset of project as part of professional expectations, obligations; results expected to develop or contribute to generalizable knowledge by filling a gap in scientific knowledge or supporting, refining, or refuting results from other research studies	Intent to disseminate results generally not presumed at outset of project; dissemination often does not occur beyond the institution evaluated; when published or presented to a wider audience the intent is to suggest potentially effective models, strategies, assessment tools or provide benchmarks rather than to develop or contribute to generalizable knowledge

Adapted in part from University of Wisconsin-Madison Health Sciences IRBs Comparison of the Characteristics of Research, Quality Improvement, and Program Evaluation Activities (Virginia Commonwealth University, n.d.)

QI vs. Research: Similar but Different

- Example: investigating infection rates in one hospital's ICU over time.
  - ICU staff notice that the rates have increased over the past year.
- QI question: "Could certain interventions reduce infection rates in this setting?"
- The IRB for the hospital would likely decide such a project does not meet the definition for research.
- Findings from the QI project need to be disseminated, just like for research (Gillespie, 2018).

Research vs. QI: Similar but Different

- How could this same project about infection rates in an ICU be redesigned as a research study?
  - Investigators recruit collaborators from different hospitals – that represent diverse populations in varied regions of the country.
  - Each ICU team collects the exact same data, and it is combined for analysis.
- The results would be *generalizable* as well as *reproducible* (Gillespie, 2018).

The Value of QI vs. Research

- Both QI and research are needed – both are important!
- QI and research projects use the same methods such as rigorous design, data collection and analysis, and the measurement of health outcomes.
- Determining whether a project is QI or research depends on the question being asked and how *generalizable* the findings might be (Gillespie, 2018).

Provide Two Examples of a Nurse's Role in Research Activities

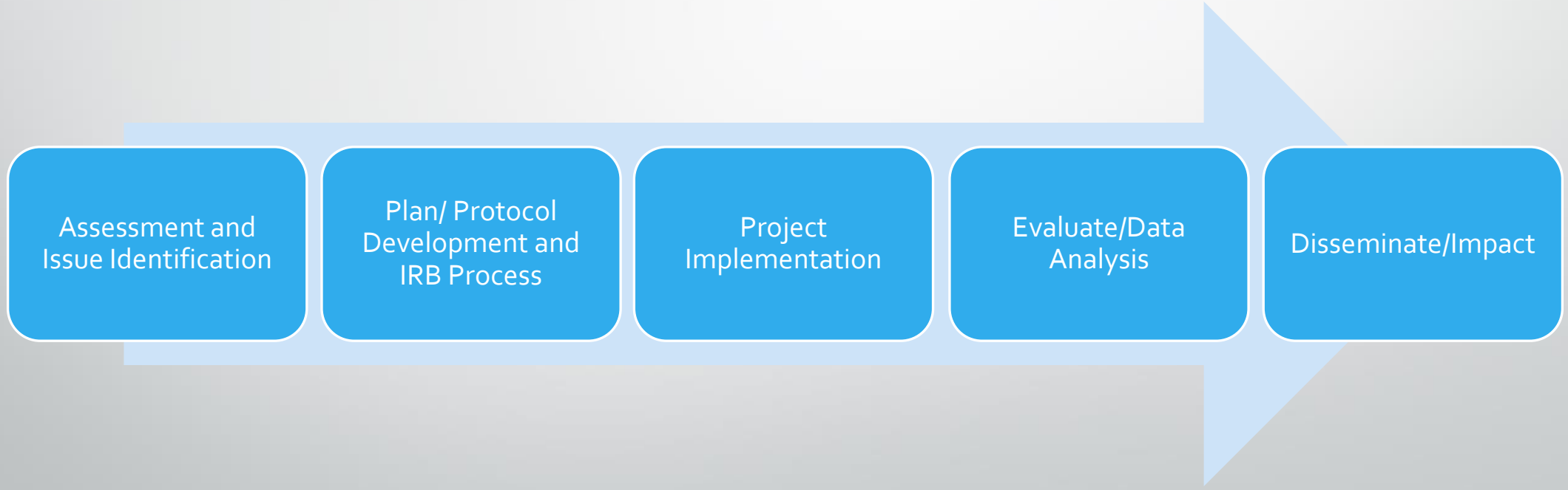
Katherine Moran
Lisa Zajac

Florence Nightingale
Founder of Professional Nursing

- A social reformer and statistician.
- Parents discouraged her from being a nurse as it wasn't a respected profession in the early 1800s.
- 1844: Began working as a manager in a hospital
- 1854: Recognized decreasing health of soldiers in the Crimean War; used mathematical and statistical knowledge to record mortality rate of soldiers
  - By providing a clean environment, medical equipment, clean water, and fruit she was able to decrease mortality rate from 60% to 2%
- 1860: Established Nightingale Nursing School to transform nursing into a respected profession

(Karami & Masoudi Alavi, 2015)

Nursing Participation Scholarly Activities



Assessment and Issue Identification Begins with an Idea…

- Patient Care Staff - ICU nurses recognize an increase of infection rates
- Nursing Leadership – Recognize a need/gap in care after reviewing data
- Nurse Researchers – Comparison of wound care outcomes using the current practice vs. a new practice
- Nursing Students – Identify an issue during an organizational assessment

Plan/ Protocol Development and IRB Process
It Takes a Village

- Principal Investigator (PI) – Person who leads the study/project
- Organization/Departmental Approver – Leader who provides approval for study/project to be conducted in organization/department
- Scientific Merit Reviewer – Provides an unbiased review of the study/project proposal for technical and scientific merit.
- IRB Staff – Chairperson, Manager, Analysts who ensure that the proposal ensures protection of human subjects

Project Implementation

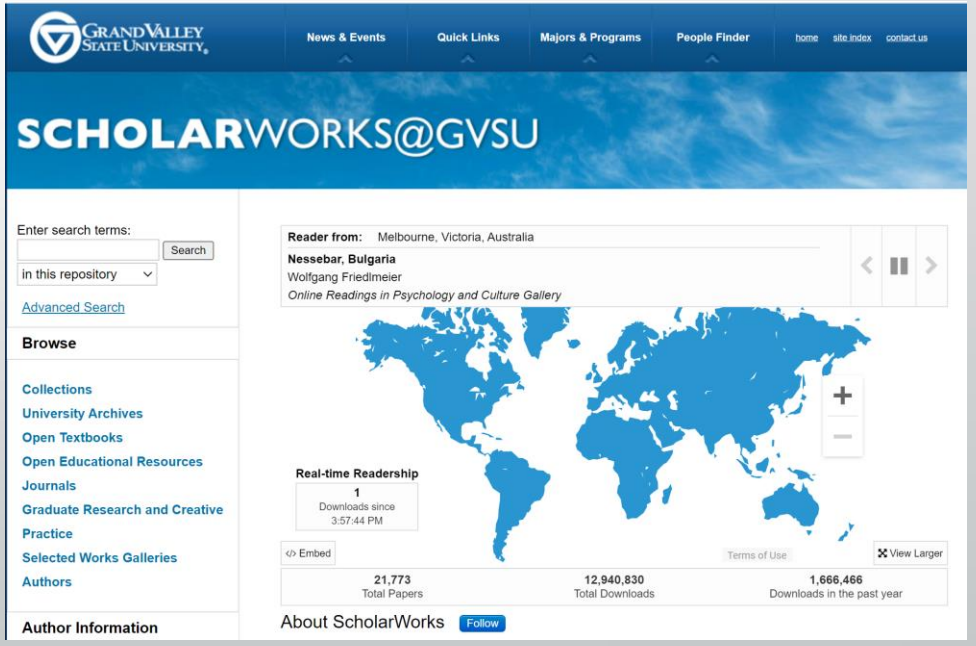
- PI
- Key Clinical Personnel: Staff who directly interact with the study/project data (e.g., Research Nurses, Pharmacists, Research Support Staff)
- Patient care staff
  - Indirectly: Study/project reviews nursing documentation during retrospective chart audits
  - Directly: Nurses participating in pressure injury dressing changes as part of a randomized control trial.

Data Analysis

- PI
- Nursing Researchers with Strong Statistical Knowledge: assist in testing hypotheses, comparing pre-and post-implementation data, etc.
- Project Team – once statistical analyses are complete, the PI and key personnel provide review of the results and compare to previous literature (if applicable) to prepare for dissemination of results.

Disseminate/Impact

- Upload project to ScholarWorks
- Submission of scholarly work to a peer-reviewed journal
  - Author, Secondary Authors, and Reader
- Presenting work at conferences
- Replicating results of prior scholarly work

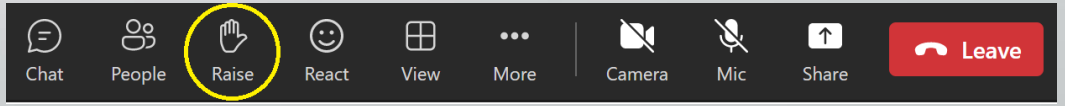


https://scholarworks.gvsu.edu/

Group Activity…Share Your Story!

- Have you ever been a part of nursing research or quality improvement? If so, share your involvement with the group.

Utilize the Raise Hand function on Teams to share your story with the group.



Describe the Importance of Nursing Scholarship on Patient Outcomes

Lisa Zajac

Scholarly Activity Through the Decades

- Examples of nursing scholarship regarding pressure injury
  - 1970s through 2022
  - Decubitus Ulcer → Pressure Ulcer → Pressure Injury

1976: Pilot Study for Use of Topical Insulin for Treatment of Decubitus Ulcers: Overview

- Research: Adding new knowledge to test a hypothesis
- Hypothesis: "There will be a significant increase in the rate of healing of the decubitus ulcers for subjects who receive the topical insulin therapy as evidenced by a decrease in the diameter of the ulcer.(p. 10)"
- Randomization of subjects to experimental (6) or control group (8).
- Both groups received supportive care and experimental group had 10 units of regular insulin applied twice a day, with ulcer left open to air.
- Also examined extraneous variables: etiologic or prognostic indicators that could impact wound healing (e.g., fasting blood glucose, hemoglobin, protein intake, comorbidities

(Van Ort & Gerber, 1976)

1976: Pilot Study for Use of Topical Insulin for Treatment of Decubitus Ulcers: Outcomes

- Results supported the hypothesis: significant difference in days of treatment (t value =2.647; *p* = .05) and rate of healing (t value= 2.4744; *p* =.05) in the experimental group. The small sample size impacted generalizability.
- Extraneous variables showed that a hemoglobin ≥ 12 and antibiotic administration enhanced wound healing; an underlying respiratory, nervous system, musculoskeletal, or mental disease increased healing time.

(Van Ort & Gerber, 1976)

1985: Comparative Study of Decubitus Ulcer Care: Overview

- Research: Testing Hypotheses:
  - When compared with an alternative treatment for decubitus ulcers, Op-Site will reduce healing time;
  - When compared with an alternative treatment for decubitus ulcers, Op-Site will reduce nursing time.
- One-year, random assignment alternating between the two groups
- Nursing personnel were responsible for standard care and the application of the dry wound care. The PI applied the Op-Site moist dressing.
- Time sheets were used to document time spent; PI documented wound stage, measurements.

(Kurzuk-Howard, Simpson, & Palmieri, 1985)

1985: Comparative Study of Decubitus Ulcer Care: Outcomes

- Total sample size was 43, however, attrition rate was a problem; discharges, transfers, and death of patients – on day 5, 15 subjects were in the Op-Site group and 9 in the alternative treatment group; decreased to 5 and 6, respectively by day 11.
- No significant difference in size, depth, and redness of ulcers between the groups – hypothesis 1 was rejected
- A significant difference ($t = -7.14$, 41 dt, $p < .00$) was noted in nursing time per day: 8.5 minutes for Op-Site group and 53.9 minutes for alternative treatment group.

(Kurzuk-Howard, Simpson, & Palmieri, 1985)

1996: Implementing a Comprehensive Skin Care Program Across Care Settings: Overview

- QI: Focus on improving the system
- Program Development
- Multiple nursing experts conducted a needs assessment and developed educational programs (guidelines, quick reference guides, and training packets) based on the need of the care setting.
  - Incorporated education regarding the Braden Scale for predicting risk of pressure ulcers and National Pressure Ulcer Advisory Panel (NPUAP) for staging.
- Skin care fair for acute care staff , development of a Continuous Quality Improvement program for extended care facilities and created wound care product reference booklets for home health.

(Suntken, Starr, Ermer-Seltum, Hopkins, & Preftakes, 1996)

1996: Implementing a Comprehensive Skin Care Program Across Care Settings: Outcomes

- Guidelines and quick reference guides were user-friendly resources
- Continuity across care settings improved – all settings using Braden Scale and NPUAP staging system
- Program allows nursing process to serve as the basis for pressure ulcer prevention
- Project objective was met

(Suntken, Starr, Ermer-Seltum, Hopkins, & Preftakes, 1996)

2006: Implementing a Pressure Ulcer Program and Enhancing the Role of the CWOCN: Overview

- QI: Focus on improving the system
- Planning and implementation: 2001 - 2004
- Used a team approach to performance improvement; developed an education plan to prevent and treat pressure ulcers.
  - Initiated quarterly prevalence reporting
  - Established risk assessment treatment plan using the Norton Risk Assessment with the Braden Scale
  - Enhancing the role of the CWOCN
  - Support surface changes

(Hiser, Rochette, Philbin, Lowerhouse, TerBurgh, & Pletsch, 2006)

2006: Implementing a Pressure Ulcer Program and Enhancing the Role of the CWOCN: Outcomes

- Prevalence rates began to decrease when ~25% of the program implementation occurred (from 9.2% to 6.6%).
- The Medical Intensive Care Unit (MICU) had the highest prevalence (29.5% average) prior to the program, then remained near zeroafter incorporating specialty beds with new support surfaces
- Financial Analysis: had the MICU prevalence rate remained ~29.5% during 2003 and 2004, 317 patients may have acquired a pressure ulcer.
  - If each patient had a 1-day reduction in length of stay in the MICU, a minimal annual cost reduction would be ~ $317.000 for the organization.

(Hiser, Rochette, Philbin, Lowerhouse, TerBurgh, & Pletsch, 2006)

2013: Value of Decreasing Hospital-Acquired Pressure Ulcers: Overview

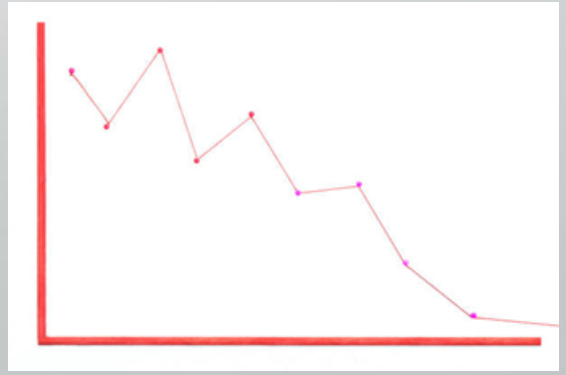
- QI: Making it more cost-effective
- Created a model for nursing leaders to use to assess potential cost-savings from investments to prevent hospital-acquired pressure ulcers (HAPU)
- Used data from the Collaborative Alliance for Nursing Outcomes (CALNOC) incorporated the Return on Investment (ROI) framework from the Agency for Healthcare Research and Quality (AHRQ) toolkit that has clear instructions for calculating ROI.
- Prevention program training and patient assessment time was estimated 3 to be ~$11.00 per patient for variable surveillance costs.

(Spetz, Brown, Aydin, & Donaldson, 2013)

2013: Value of Decreasing Hospital-Acquired Pressure Ulcers: Outcomes

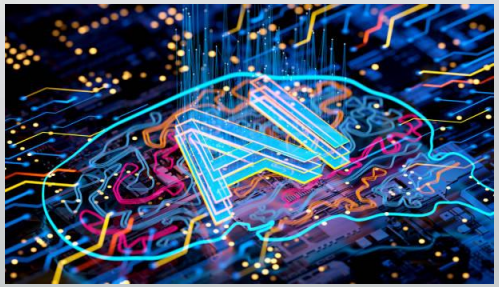
- The assumption was made that a hospital could achieve the same HAPU reduction rates as observed between 2003 and 2010:
  - In baseline years, the cost of HAPU was $832.27 per patient; reducing HAPU rates to 2010 levels would have lowered the cost by $335.87 from baseline
- Mean cost for HAPU surveillance/prevention is $208.36.
  - ROI ratio of 1.61 (>1 = cost-saving investment for then hospital) = net savings of $127.51 per patient.

(Spetz, Brown, Aydin, & Donaldson, 2013)



2022: Using Artificial Intelligence for Predicting Hospital-Acquired Pressure Injuries: Overview

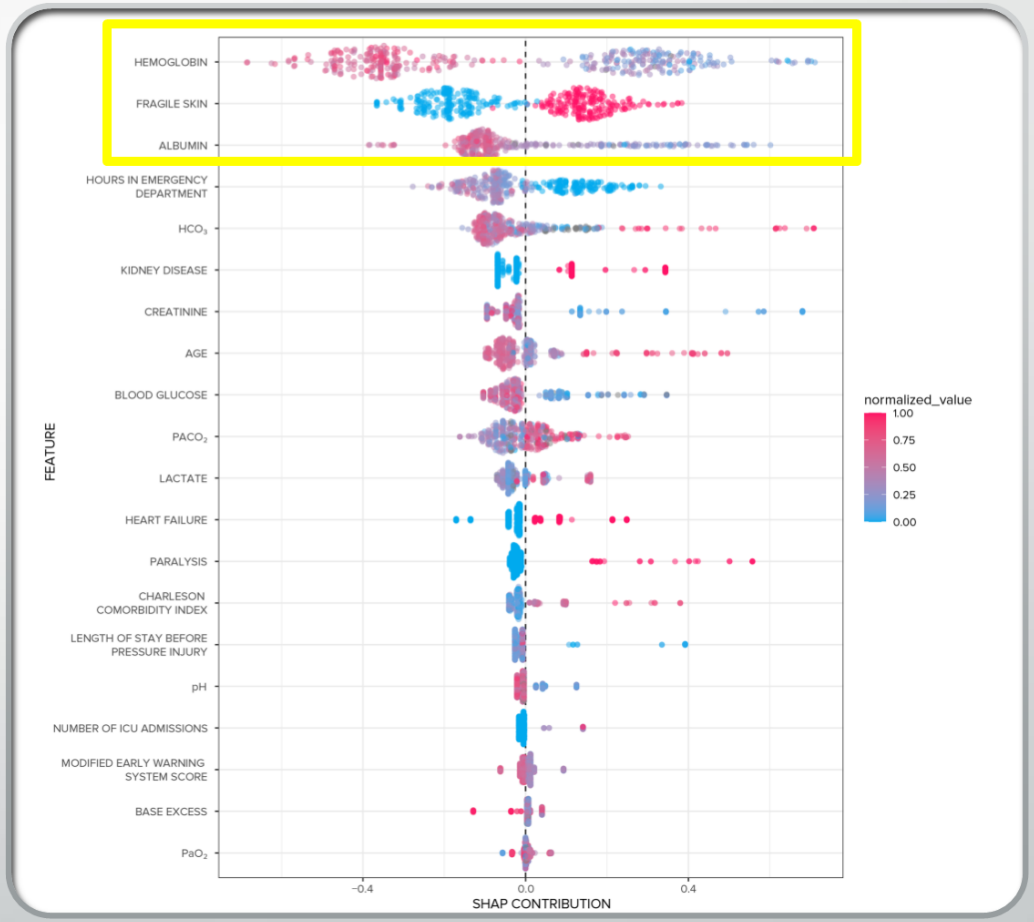
- Research: Designed to develop or contribute to generalizable knowledge (?)
- Purpose: Evaluate hospital acquired pressure injury risk in COVID-19 positive patients
  - Develop Machine Learning (ML) model to predict risk…nonlinear approach – different from traditional Braden Scale
  - Apply SHapely Additive explanation (SHAP) Artificial Intelligence (AI) method for interpretability
- Retrospective study with EHR data between April 2020 and April 2021; 407 patients



(Alderden, Kennedy, Wilson, Dimas, McFarland, Yap, Zhao, & Yap, 2022)

2022: Using Artificial Intelligence for Predicting Hospital-Acquired Pressure Injuries: Outcomes

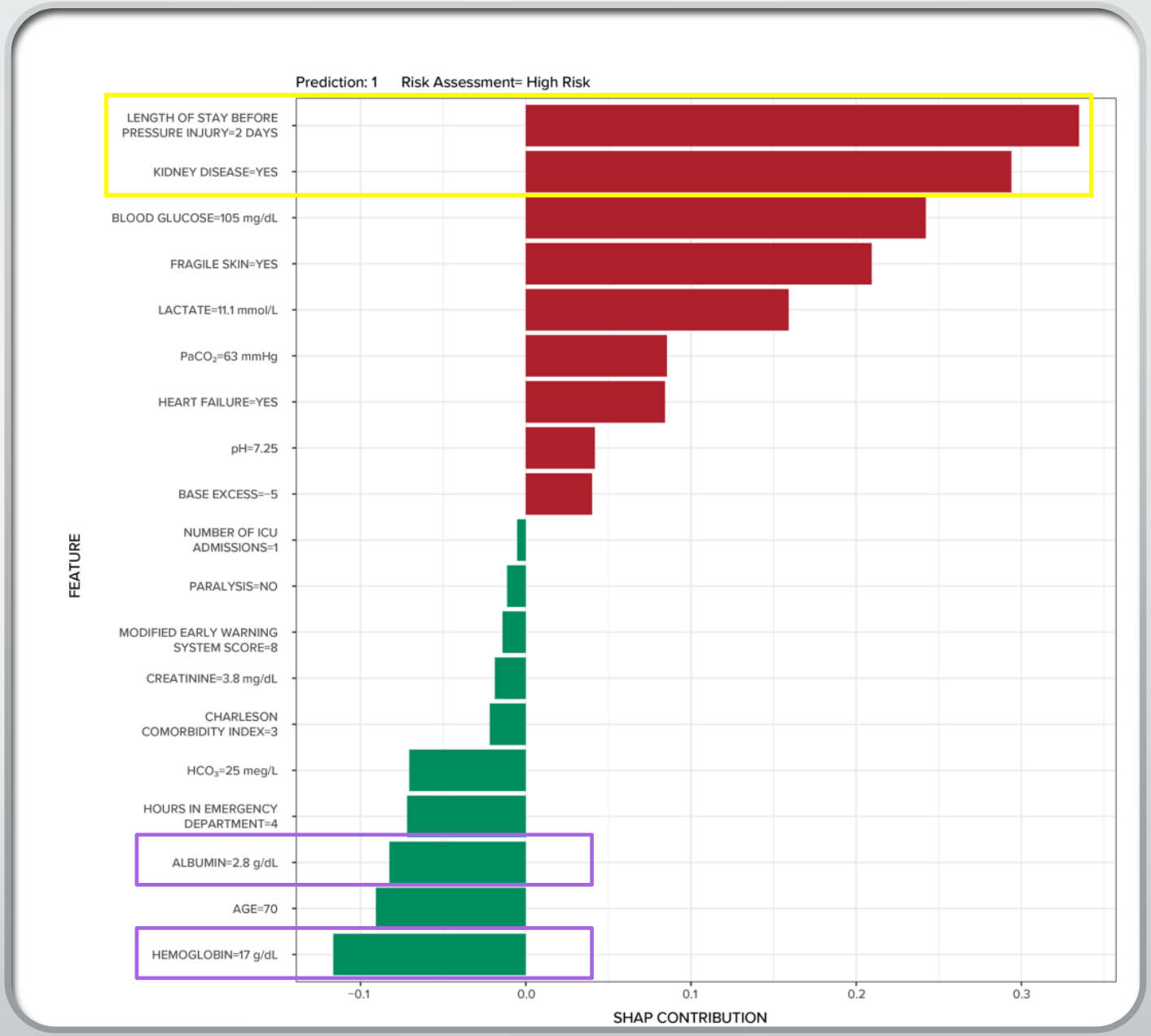
- Most important variables were hemoglobin, fragile skin, and albumin level.
- SHAP plot:
  - Red indicates a negative correlation; blue indicates positive correlation:
    - Low levels of hemoglobin increased risk, while high levels were protective
    - If Yes was selected for Fragile Skin, it increased risk.



(Alderden, Kennedy, Wilson, Dimas, McFarland, Yap, Zhao, & Yap, 2022)

2022: Using Artificial Intelligence for Predicting Hospital-Acquired Pressure Injuries: Outcomes, cont.

- Synthetic Patient Model: AI predicted patient would develop a Hospital Acquired Pressure Injury due to the risk factors of length of stay and renal disease



(Alderden, Kennedy, Wilson, Dimas, McFarland, Yap, Zhao, & Yap, 2022)

Thank You

Questions or comments?

Contact Information

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