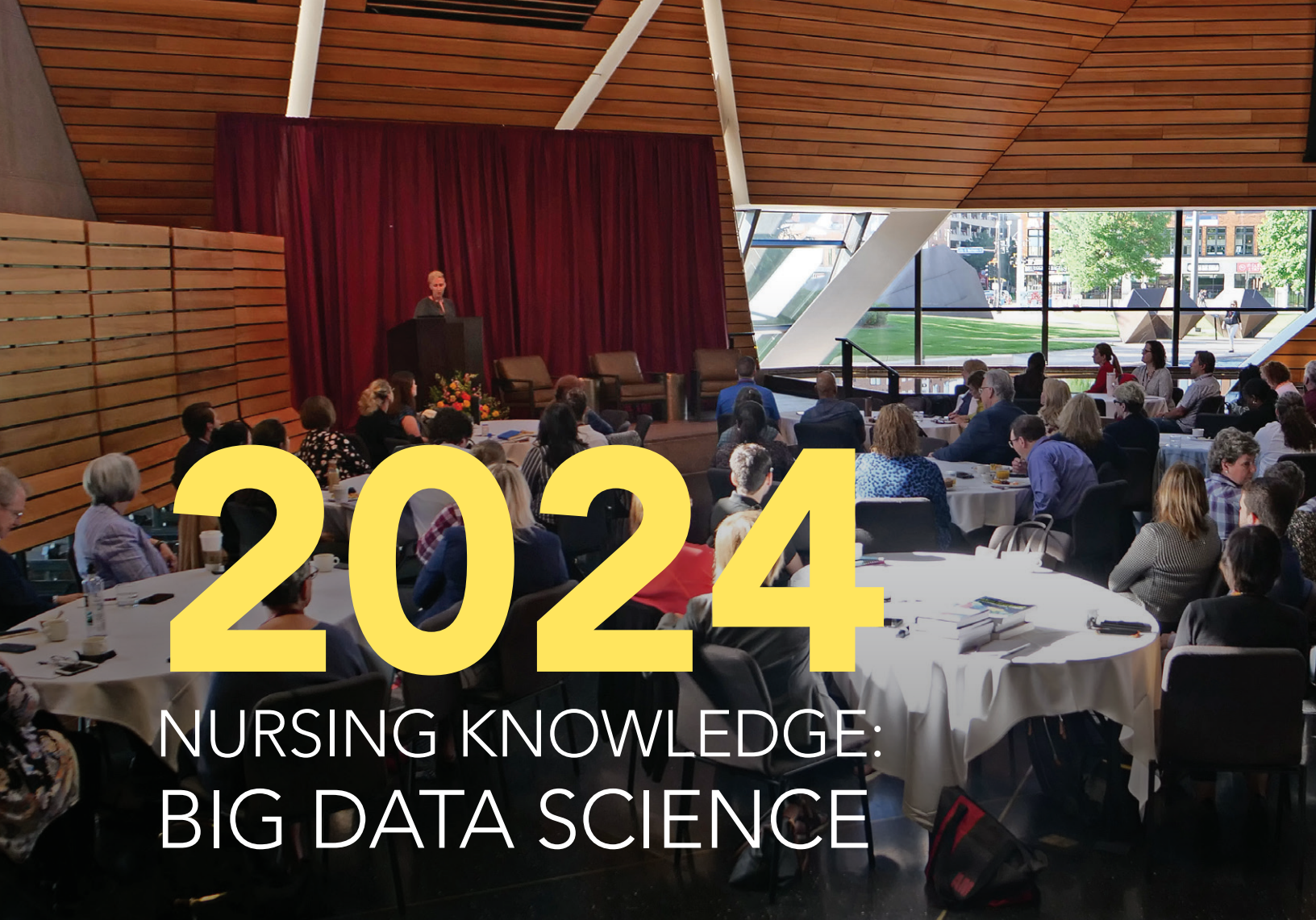




2024

NURSING KNOWLEDGE: BIG DATA SCIENCE

CONFERENCE PROCEEDINGS

JUNE 5-7, 2024

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Complete Conference Information

For more information on the Nursing Knowledge Big Data Science Initiative and Conference, visit z.umn.edu/bigdata. For all available resources and products from previous conferences, visit the eRepository at nursingbigdata.org.

Save the Date

2025 Nursing Knowledge: Big Data Science Conference, June 4-6, 2025, in Minneapolis, Minnesota.

The pre-conference workshop on Social Drivers of Health (SDOH) is supported with financial support from the TRaining in Informatics for Underrepresented Minorities in Public Health (TRIUMPH). This project is supported by the Office of the National Coordinator for Health Information Technology (ONC) of the U.S. Department of Health and Human Services (HHS) under 90PH0005/01-08, The PHIT Workforce Development Program. This information or content and conclusions are those of the authors and should not be construed as the official position or policy of, nor should any endorsements be inferred by ONC, HHS or the U.S. Government.

Land Acknowledgement

We acknowledge that the University of Minnesota Twin Cities is built within the traditional homelands of the Dakota people.

We acknowledge and honor the peoples on whose land we live, learn, work, and today celebrate, as we seek to strengthen our relations with our tribal nations.

We acknowledge that the health care system, meant to protect and heal people, has supported structures of racism causing ongoing trauma and health inequities.

Most importantly, we acknowledge that words are not enough.

We will ensure that our institution provides support, resources, and programs that increase access to all aspects of higher education for our American Indian students, staff, faculty, and community members.

Introduction

The 12th annual Nursing Knowledge: Big Data Science (NKBDS) Conference welcomed national experts and vibrant attendees to discuss the value of nursing and the ways informatics can foster improvements in nursing practice, research, education, and leadership. The conference, held June 5-7 at McNamara Alumni Center, University of Minnesota, Minneapolis, MN, USA, focused heavily on the emergence of artificial intelligence (AI) and innovation, highlighting the impact of legacy and emerging technologies on nursing data and the use of those data by informaticians, nurse leaders, clinicians, and executives.



The June 5th pre-conference was comprised of four tracks. "Project Showcase on Multi-Modal Approaches to Social Drivers of Health (SDOH)" was led by Sripriya Rajamani, MBBS, PhD, MPH, FAMIA, and Robin Austin, PhD, DNP, DC, RN-BC, FAMIA, FNAP. The track focused on the numerous tools being developed to collect Social Drivers of Health (SDOH) data and the many projects being implemented to use those data to impact health outcomes. Various projects were showcased, and the role of informatics was discussed throughout the session.



Track 2, “Encoding Nursing Knowledge Models with LOINC and SNOMED CT,” was presented by Susan A. Matney, PhD, RNC-OB, FAAN, FACMI, FHIMSS. The track described the mapping process for nursing knowledge model content, or nursing process documentation, to LOINC and SNOMED-CT. Attendees engaged in

exercises to identify the alignment of terminology and semantic types to the components of the nursing process and learned use of LOINC and SNOMED CT browsers to find matching content.



Track 3, “Playing with FHIR, Safely” was presented by Laura Heermann Langford, PhD, RN, FAMIA. The workshop discussed basic FHIR concepts and their strengths and limitations, while inviting participants to learn more about the fundamental principles of HL7 FHIR. Participants were guided through using online tools to examine HL7 FHIR

Resources (the basic building blocks of FHIR) and build the common FHIR Profiles (implementation guides for specific use cases).

The fourth and final track, “Advancing Excellence: The Adaptable, Transformative Multimodal Nursing Informatics Framework for use in Education and Practice” was curated by Dorcas Kunkel, DNP, RN/PHN, CNE, CPHIMS, FNAP and Mary Jane Rivard, DNP, NI-BC (Nursing Informatics). The track was divided into three 50-minute sessions. Session 1, “Unlocking the Potential of MNIF in Nursing Education Leadership,” was presented by Chito Belchez, DNP, RN, NPD-BC and Brenda Kulhanek, PhD, DNP, NI-BC, NPD-BC, NE-BC, FAAN, with supporting presenters Barbara Pinkenstein, DNP, NI-BC, FAAN, and Mary Jane Rivard. They explored the Multimodal Nursing Informatics Framework (MNIF) and its transformative role in nursing education. They focused on strategic leadership for integrating MNIF into curricula and programs to prepare nurses for the evolving healthcare landscape. Session 2, “Navigating Technostress: MNIF Strategies for Nursing Leaders,” was presented by Mari Tietze, PhD, RN, NI-BC, FHIMSS, FAAN, and Dorcas Kunkel, with supporting presenters Barbara Pinkenstein and Chito Belchez. The presenters explored the concept of technostress in healthcare and discussed how to address it effectively using the MNIF. This session equipped nursing leaders with the tools to identify and mitigate technostress challenges, promoting nurse well-being and



optimizing patient care. Session 3, “Mastering Academic-Practice Partnerships for Leadership Excellence”, was led by Katherine Taylor Pearson, DNP, RN, NI-BC, CPHIMS, CLSSBB, CPBI, CKM, and Amy Rosa. DNP, MSMI, RN, with supporting presenters Rebecca Freeman and Mari Tietze. This session discussed the positive impact of academic-practice partnerships on nursing education and practice. This session empowered attendees to lead and optimize these partnerships, enhancing practice quality, safety, satisfaction, and retention, while aligning seamlessly with the objectives of MNIF.

The conference opened with Peter Klein, Chairman at Educated Change, delivering the keynote, “AI, Your Social Mirror to Your Data, Your Digital Twin is in the Data.” Klein’s presentation delved into the fascinating intersection of AI and human behavior. This exploration is particularly pertinent to nursing informatics, where understanding human behavior and predicting outcomes through digital interaction are paramount. The keynote presentation discussed how AI, especially through Large Language Models (LLMs), mirrors humanity and how the extensive use of social media and digital interactions in training these AI systems has created a feedback loop where AI learns from human inputs and reflects our collective psyche back to us. Klein challenged nurse informaticists to adopt a deeper understanding of how AI can be a transformative tool in healthcare, particularly in personalized patient care. He concluded by highlighting the importance of embracing new digital technologies and mindsets in nursing informatics, ultimately leading to improved

healthcare outcomes. A panel moderated by Connie White Delaney titled “AI, Ethics, and Innovation” fostered discourse among Tracee M. Coleman, MS, NI-RN-CPHIMS; Ryannon K. Frederick, MS, RN; and

Maxim (Max) Topaz, PhD, RN, MA, FAAN. The panelists discussed how the intersection of AI, ethics, and innovation is complex and multifaceted; the discernment of this intersection and articulation of goals for nursing, health care, and humanity, and next steps for impact are critical. The panelists highlighted the role of numerous stakeholders, including governments, health care and nursing





leaders, researchers, and civil society, in shaping policies that include the importance of integrating ethics into the innovation process to foster responsible and sustainable advancement of AI technologies for the betterment of society.

On the final day of the conference, a keynote address was delivered by Oriana Beaudet, DNP, RN, PHN, vice president of Nursing Innovation for the ANA Enterprise. Beaudet discussed, with great breadth and contrast, the myriad of innovations in today's high-tech healthcare landscape. She identified trends creating new paths to be taken and risks to be navigated for both nurses and society. She stressed the importance of bringing and retaining humanity as a core component of the equation accelerating transformational change in modern healthcare and nursing practice.

Beaudet was followed by a panel, moderated by Rebecca Freeman, PhD, RN, FAAN, including Joe Zillmer and Kersten Bartelt from Epic Systems; CJ Robison, BSN, RN, from Oracle Health Innovation & Scientific Advisory; and Cathy Turner, from MEDITECH. The panelists showcased their latest advancements in technology, design, usability, and innovation — especially highlighting how they harness data within the electronic health record to drive innovation in patient care. Each presentation unveiled transformative ways in which technology is being leveraged and intersecting with patient



care at the bedside, to include AI and big data sets at the fingertips of the registered nurse. Following the presentations, the panelists engaged in a lively discussion with the audience, exploring topics from genomics to AI to big data inquiry.

The conference supported engagement of the multiple workgroups to meet in person and reflect on their virtual yearlong work. After reporting their achievements over the last year, they created action plans for 2024-25. Reports and action plans are discussed in the following pages.

The 2025 Nursing Knowledge: Big Data Science Conference will be held June 4-6 in Minneapolis, MN, USA. Updated information, as available, can be found on the NKBDS Initiative website z.umn.edu/bigdata.



Steering Committee

CO-CHAIRS:

Connie White Delaney, PhD, RN, FAAN, FACMI, FNAP, Professor & Dean, University of Minnesota School of Nursing, Minneapolis, MN

Lisiane Pruinelli, PhD, MS, RN, FAMIA, Associate Professor, University of Florida College of Nursing, Gainesville, FL

Rebecca Freeman, PhD, RN, FAAN, Vice President of Health Informatics, IT Training & Education, and IT Operations for the University of Vermont Health Network, VT

MEMBERS:

Whende M. Carroll, MSN, RN, NI-BC, FHIMSS, Clinical Informatics Advisor, Healthcare Information Management and Systems Society (HIMSS)

Alvin Jeffery, PhD, RN, CCRN, FNP-BC, Assistant Professor of Nursing & Biomedical Informatics, Vanderbilt University; Nurse Scientist, U.S. Department of Veterans Affairs, Nashville, TN

Cathy Ivory (eRepository Liaison), PhD, NI-BC, NEA-BC, FAAN, Associate Nurse Executive, Nursing Excellence, Vanderbilt University Medical Center and Associate Professor, Vanderbilt University School of Nursing, Nashville, TN

Laura Heermann Langford, PhD, RN, FAMIA, FHL7, University of Utah College of Nursing, Salt Lake City, UT

Susan Matney, PhD, RNC-OB, FAAN, FACMI, FHIMSS, FAMIA, FHL7, Principal, Wise Owl Originals, Farmington, UT

Erin D. Maughan, PhD, RN, PHNA-BC, FNASN, FAAN, Executive Director Center for School Health Innovation & Quality, Arlington, VA. Associate Professor, George Mason University, Fairfax, VA

Judy Murphy, DN (hon), RN, FACMI, LFHIMSS, FAAN, Nurse Executive, Health IT Leader, Lake Elmo, MN

Joyce Sensmeier, MS, RN, FHIMSS, FAAN, Former Clinical Informatics Advisor, HIMSS, San Marcos, CA

CONSULTANT:

Charlotte Weaver, PhD, RN, MSPH, Board Chair Elect, PIH Health, Whittier, CA and Seattle, WA

2023-2024 WORKGROUPS AND LEADERS

Context of Care/Nursing Value (Nursing Value going forward)

Co-leaders:

Greg Clancy,
DNP, MA, RN

Liz Swanson,
PhD, RN

PURPOSE

To examine, measure, and disseminate examples of nursing value within the evolving context of care and supporting the tenets of health equity, diversity, inclusion, and belonging.

Data Science and Clinical Analytics

Co-leaders:

Steven G. Johnson,
PhD, FAMIA

Lisiane Pruinelli,
PhD, MS, RN, FAMIA

PURPOSE

To apply data science and clinical analytic methods, incorporating validated information models derived from diverse sources of health care data, to address nurse-sensitive clinical research questions that have the potential to inform and educate nursing and multidisciplinary approaches for better patient care and outcomes.

Determinants of Health

Leader:

Ruth Wetta,
PhD, MPH, MSN, RN

PURPOSE

To support the standardized collection of determinants of health data into sharable, comparable, and actionable nursing practice to improve the health of individuals, families, communities, and populations.

Digital Health and Innovation

Co-leaders:

Whende M. Carroll,
MSN, RN, NI-BC, FHIMSS

Christie Martin,
PhD, RN (Incoming)

PURPOSE

Identify and support activities and resources to address unmet needs and create opportunities in digital health and innovation.

Knowledge Modeling and Encoding

Co-leaders:

Stephanie Hartleben,
MSN, MHA, RN, NI-BC

Kay Lytle,
DNP, RN, NI-BC, NEA-BC,
CPHIMSS, ACHIP, FHIMSS,
FAMIA

Tess Settergren,
MHA, MA, RN-BC

PURPOSE

1. Derive nursing knowledge models from EHR documentation and “best evidence.”
2. Map the core, essential concepts, and values to data standards for interoperability, while documenting heuristics.
3. Submit requests for new LOINC® terms and SNOMED CT® concepts where gaps exist.
4. Disseminate the deliverables for replicability.

Learning Collaborative for Digital Health

Co-leaders:

Dorcas E. Kunkel,
DNP, RN/PHN, CNE, CPHIMS,
CDP (outgoing)

Mary Jane Rivard
DNP, RN, NI-BC

Nancy Husson
DNP, RN, CHSE (incoming)

PURPOSE

The Learning Collaborative for Digital Health’s purpose is to engage nurse educators and practice partners with the knowledge, skills, and attitudes (KSAs) to educate nurses at all levels of participation and to lead the digital evolution improving healthcare and health globally.

Policy and Advocacy

Co-leaders:

Brenda Kulhanek,
PhD, DNP, RN-BC, NPD-BC,
FAAN (outgoing)

Susan Alexander,
DNP, CRNP, ADM-BC

Dana Bensinger,
DNP, RN, NI-BC (incoming)

PURPOSE

Develop, review, and support policy recommendations to advocate for the improvement of health and healthcare by using nursing knowledge, empowered by informatics.

Transforming Documentation

Co-leaders:

Bonnie Adrian,
PhD, NI-BC

David L. Boyd,
DNP, RN, CNS, NI-BC, CPHIMS

PURPOSE

Explore ways to decrease the documentation burden and serve up information in the electronic health record at the right time in the workflow to support evidence-based and personalized care. Elevate purpose-driven, role-based, patient-centric, evidence informed documentation transformation to capture nurse observations and interventions and drive purposeful secondary-use and precision nursing. Transformation supports enhanced data utilization to drive and measure improvement in patient outcomes and illuminate nursing’s value and contribution in healthcare.

Activities and Products Aligned with the NKBDS Initiative

CONTEXT OF CARE/NURSING VALUE

Over the past six months, the workgroup has met monthly, with attendance varying between three to nine members. Agendas included discussions about Dropbox updates, manuscript topics, data dictionary updates, member updates, and collaboration opportunities with other workgroups.



The workgroup aimed to delve deeply into the intricate relationships between key value elements such as compassion, engagement, caring, patient satisfaction, and connectedness within the context of care. They planned to meticulously map nursing terms that embodied compassion, engagement, and connectedness, thereby creating a richer, more precise vocabulary for nursing practice. Additionally, they assessed the professional value that nurses contribute through their work, ensuring that the intrinsic worth of nursing was both recognized and articulated. A thorough review and update of the Nursing Value data dictionary was on the agenda, alongside the development of compelling user stories that highlighted scenarios in maternal health, substance abuse, and COVID-19. These user stories were then rigorously tested to ensure their effectiveness. Finally, the workgroup focused

on developing cohesive themes for manuscript submissions, aiming to disseminate their findings and insights broadly within the nursing community. The workgroup appreciates Sam Theesfeld's contributions over the past 18 months, including a poster presentation accepted for the Big Data Conference June 2024 titled "Nursing value through data mapping: Practicing with user stories." Sam will continue contributing as his schedule allows.

DATA SCIENCE & CLINICAL ANALYTICS

The workgroup engaged in hands-on data science studies to generate new knowledge and developed educational materials to build workforce capacity in data science. They collaborated within the All of Us data enclave to learn data science techniques and developed a study to explore if metformin protects against long COVID. A special task force led by Mikyoung Lee focused on defining data literacy and data science literacy, critically reviewing literature, and creating a paper to be presented at NI 2024. The final manuscript is nearing submission to a nursing journal.

DETERMINANTS OF HEALTH

The workgroup had several internal changes and during the year was not able to work on the proposed goals for the year. Further discussion is planned to direct the next steps and move the proposed work forward, while engaging members.

DIGITAL HEALTH AND INNOVATION

The workgroup crafted detailed recommendations to assist nurses in innovating within the realms of digital health and technology, resulting in a deliverable that included a publication in JMIR, a comprehensive whitepaper, and an ongoing manuscript. They also developed guiding principles for integrating the unique nurse identifier into digital health systems, culminating in the creation of an infographic prototype for the UNI. Additionally, in collaboration with the steering committee, they meticulously planned

a platform designed to facilitate the sharing of digital health and innovation resources, aiming to connect nurse innovators and enhance collaborative efforts.

KNOWLEDGE MODELING AND ENCODING

In 2023-24, the workgroup tackled three major projects:

1. **Fall Prevention Knowledge Model:** Focused on standardizing fall risk assessment tools for interoperability, including LOINC submissions and analysis.
2. **Head-to-Toe Assessment:** Collaborated with the Transforming Documentation workgroup to update nursing assessment content in LOINC and SNOMED CT.
3. **Pain Information Model Revision:** Reviewed and refined mappings of patient-reported values to SNOMED CT concepts.

These projects align with the mission by enabling data extraction to validate current practice and generate new nursing insights. Mapping nursing documentation to interoperable terminologies supports clinical decision-making, reduces documentation burden, and highlights nursing value.

LEARNING COLLABORATIVE FOR DIGITAL HEALTH

The workgroup produced tools and materials for educators and practice partners, aiming to leverage data to improve health and healthcare. Several products were completed, and others are in progress for the coming year, including a white paper, best practices for teaching and learning, and case studies. They presented a symposium at the Sigma International Congress, reaching a broad audience and enhancing knowledge dissemination.

POLICY AND ADVOCACY

The workgroup published and disseminated information about the unique nurse identifier, highlighting its value. Their work involved collaboration with the American Nurses Association and other stakeholders to promote awareness and integration of this technology.

TRANSFORMING DOCUMENTATION

The Head-to-Toe Assessment Task Force defined a model for nursing assessments in acute care. This work addresses variability in assessment approaches and aims to provide a standardized dataset for patient care, population management, and research. The goal is to reduce documentation burden while enhancing care quality.

Collaboration and Impact

Collaborations across the NKBDS workgroups significantly advanced their goals and amplified their impact. By partnering with various stakeholders, the Context of Care/Nursing Value workgroup published influential articles and participated in key summits to raise awareness about nursing value. The Digital Health and Innovation workgroup improved visual communications and developed innovative technological solutions, while Knowledge Modeling and Encoding refined data standards to enhance clinical decision-making. Support from HIMSS enabled the Learning Collaborative for Digital Health to expand its educational reach. Policy and Advocacy worked to promote the unique nurse identifier, fostering professional growth and recognition. Transforming Documentation partnered with healthcare organizations to standardize nursing content, reducing documentation burden and improving patient care. These collaborative efforts collectively strengthened the NKBDS Initiative, driving significant advancements in nursing practice, education, and policy.

CONTEXT OF CARE/NURSING VALUE

Dr. Cathy Ivory, Greg Clancy, Liz Swanson, and Dr. Peggy Jenkins facilitated collaborations with various stakeholders, leading to publications in Nursing Economics and participation in the Nursing Value Nursing Summit. Their publications aim to raise awareness among nurse executives, practicing nurses, and educators about the importance of defining and demonstrating nursing value.

DATA SCIENCE & CLINICAL ANALYTICS

The workgroup collaborated with the Knowledge Modeling and Encoding workgroup to apply their models in data science literacy efforts. Their studies using the All of Us data enclave contribute to education and original research, potentially impacting individuals and communities.

DIGITAL HEALTH AND INNOVATION

The workgroup collaborated with a graphic designer to optimize their whitepaper's visual communication for nurse leaders and industry professionals. They provided guidance for technology use, created models for mHealth app solutions, and developed an infographic prototype for nurse identifiers.

**KNOWLEDGE MODELING AND ENCODING**

The workgroup collaborated with LOINC staff, clinical experts, and the SNOMED Nursing Clinical Reference Group to refine assessment scales and mapping processes. Standardized nursing documentation content in clinical systems will enhance data usability, inform clinical decision-making, and enable big data insights.

LEARNING COLLABORATIVE FOR DIGITAL HEALTH

HIMSS supported the workgroup by producing webinars on nursing informatics and digital health, extending their reach and capacity for future educational initiatives. The workgroup disseminated materials to improve healthcare quality and safety, reaching a broad audience through conferences and educational initiatives.

POLICY AND ADVOCACY

The workgroup is planning to collaborate with the education workgroup to further spread awareness of the unique nurse identifier. Their efforts on the unique nurse identifier foster growth and competency, raising awareness in healthcare systems and academia.

TRANSFORMING DOCUMENTATION

The workgroup collaborated with multiple healthcare organizations and vendors to harmonize nursing assessment content for standardization and reuse. Their efforts aim to reduce documentation burden while supporting patient care and research, aligning with Future of Nursing priorities.

Core Concepts Engaged and Their Utilization

The workgroups within the NKBDS Initiative engaged in a variety of core concepts, each utilizing specific strategies to advance their goals. They focused on policy, leadership, analytics, innovation, standards, education, and practice to drive improvements in nursing practice, education, and technology. By operationalizing these core concepts, the workgroups were able to create impactful educational materials, promote technological advancements, and enhance the overall quality of patient care.

CONTEXT OF CARE/NURSING VALUE**Emphasizing Policy and Leadership**

This workgroup focuses on defining and demonstrating the value of nursing through effective policy formulation and strong leadership initiatives. They emphasized operationalizing nursing value concepts to nurse executives.

DATA SCIENCE & CLINICAL ANALYTICS**Driving Analytics and Innovation**

Harnessing advanced analytics and innovative methods, this group pioneers data-driven insights to improve nursing practices and patient outcomes. They developed a data literacy matrix and conducted research on metformin's protection against long COVID.

DIGITAL HEALTH AND INNOVATION**Fostering Analytics, Innovation, Education, and Practice**

Integrating cutting-edge analytics and innovation with robust educational frameworks and practical applications, this team propels nursing into the digital age. They aggregated and analyzed data to create educational guidance and promote technology in nursing practice.

KNOWLEDGE MODELING AND ENCODING**Upholding Standards and Education**

Dedicated to the meticulous application of standards and educational advancements, this workgroup ensures semantic interoperability and accurate knowledge representation in nursing. They applied data standards to map nursing content, ensuring semantic interoperability.

LEARNING COLLABORATIVE FOR DIGITAL HEALTH**Championing Policy, Leadership, Innovation, Standards, Education, and Practice**

This collaborative brings together policy formulation, leadership, innovative practices, standards adherence, and comprehensive education to transform digital health landscapes. Informed by AACN Essentials and National League for Nursing guidance, they created educational and practice products.

POLICY AND ADVOCACY**Promoting Policy, Leadership, and Education**

Advocating for the unique nurse identifier, this group drives policy changes, fosters leadership, and develops educational materials to enhance nursing practice and recognition. They collaborated with ANA to promote the unique nurse identifier, providing leadership and educational materials.

TRANSFORMING DOCUMENTATION**Integrating Policy, Analytics, Leadership, Innovation, Standards, Education, and Practice**

Through policy integration, analytical insights, leadership initiatives, innovative practices, standards application, and education, this workgroup aims to reduce documentation burden and improve patient care quality. They partnered with healthcare organizations and vendors to standardize nursing documentation content.

Informatics and Data Resources Utilized

The various workgroups under the NKBDS Initiative effectively leveraged a wide array of informatics and data resources to advance their specific goals. These resources, ranging from HealthIT.gov and the All of Us data enclave to large language models and electronic health records, enabled the workgroups to stay informed, conduct significant research, and create impactful educational and practical tools. By utilizing these resources, the workgroups contributed to the broader mission of the NKBDS Initiative, driving advancements in nursing practice, education, and policy.

CONTEXT OF CARE/NURSING VALUE

The workgroup leveraged a range of resources to stay informed and advance their goals. They utilized HealthIT.gov for the latest updates in health information technology, the Commission for Nurse Reimbursement to understand financial aspects of nursing practice, the American Nurses Association (ANA) for professional standards and advocacy, and the journal Nursing Economics for research and publication opportunities. These resources enabled them to keep abreast of current issues and progress in healthcare informatics, thus supporting their efforts to emphasize and operationalize nursing value concepts to nurse executives.

DATA SCIENCE & CLINICAL ANALYTICS

The All of Us data enclave provided a rich repository of health data that the workgroup used for hands-on studies. This platform allowed them to conduct significant research, such as exploring the protective effects of metformin against long COVID. By engaging with this extensive dataset, the workgroup enhanced their data science literacy and contributed to original research that could impact individual and community health outcomes.

DIGITAL HEALTH AND INNOVATION

To drive innovation in digital health, the workgroup aggregated and analyzed various data sources. They utilized informatics tools, web-derived literature, and survey findings to create comprehensive educational guidance.

Additionally, they employed large language models (LLMs) to generate innovative ideas and refine their research questions. Library science platforms were used to manage and organize literature data, ensuring thorough and well-informed outputs that promote technology in nursing practice.

KNOWLEDGE MODELING AND ENCODING

This workgroup focused on applying data standards to ensure interoperability and semantic accuracy in nursing documentation. They used resources from the Office of the National Coordinator for Health Information Technology (ONC) Interoperability Standards Advisory, the United States Core Data for Interoperability (USCDI), and educational content from Logical Observation Identifiers Names and Codes (LOINC) and the Systematized Nomenclature of Medicine – Clinical Terms (SNOMED CT). These tools and resources were crucial for mapping nursing content correctly and facilitating the development of interoperable knowledge models.



LEARNING COLLABORATIVE FOR DIGITAL HEALTH

The workgroup pooled a wide array of resources and conducted extensive literature searches to support their projects. These resources were stored in accessible drives to ensure easy access and collaboration among members. By synthesizing information from various sources, they created educational and practice products informed by the AACN Essentials and National League for Nursing guidance, aiming to transform nursing education and practice.

POLICY AND ADVOCACY

The workgroup focused on raising awareness and promoting the unique nurse identifier. They presented these concepts to various organizations, emphasizing the importance of this technology in enhancing nursing practice and recognition. This advocacy work involved creating and disseminating educational materials and collaborating with the ANA to drive policy changes.

TRANSFORMING DOCUMENTATION

The workgroup utilized clinical content datasets from electronic health records (EHRs) in healthcare facilities across the United States and Canada. These datasets provided a comprehensive foundation for their efforts to harmonize nursing assessment content and standardize documentation practices. By applying guiding principles for data harmonization, they aimed to reduce documentation burden and support high-quality patient care.

By effectively leveraging these informatics and data resources, each workgroup was able to advance their specific goals, contributing to the broader mission of the NKBDS Initiative. These resources enabled the workgroups to stay informed, conduct thorough research, and create impactful educational and practical tools.

Addressing Previous Year Goals

By addressing the proposed goals, each workgroup significantly contributed to the overarching mission of the NKBDS Initiative, driving advancements in nursing practice, education, and policy through targeted efforts and collaborative achievements.

CONTEXT OF CARE/NURSING VALUE

- The workgroup focused on developing manuscripts for submission and acceptance for publication. Due to joint efforts, three pieces related to the concept of nursing value were published or will be published in Nursing Economics.
- Developed user stories, leading to the acceptance of a poster presentation at the Big Data Conference June 2024.

- Monthly meetings facilitated ongoing discussions and updates, ensuring alignment with the established goals.

DATA SCIENCE & CLINICAL ANALYTICS

- Developed a data literacy matrix to enhance the understanding of data science within nursing.
- Conducted research using the All of Us data enclave to explore if metformin protects against long COVID.
- Educated members through hands-on data science studies, contributing to both knowledge generation and workforce capacity building.

DIGITAL HEALTH AND INNOVATION

- Created comprehensive recommendations and principles for digital health innovation, including a whitepaper and an infographic prototype.
- Collaborated with a graphic designer to optimize the visual communication of their work, particularly in a whitepaper aimed at nurse leaders and industry professionals.
- Planned a platform to connect nurse innovators, facilitating the sharing of resources and ideas.

KNOWLEDGE MODELING AND ENCODING

- Standardized fall risk assessment tools for interoperability, including LOINC submissions and analysis.
- Collaborated with the Transforming Documentation workgroup to update nursing assessment content.
- Reviewed and refined mappings of patient-reported values to ensure accurate representation in SNOMED CT.
- These efforts ensured that nursing documentation content is standardized and interoperable, supporting clinical decision-making and reducing documentation burden.

LEARNING COLLABORATIVE FOR DIGITAL HEALTH

- Produced tools and materials for educators and practice partners, including a white paper, best practices for teaching and learning, and case studies.

- Presented a symposium at the Sigma International Congress, reaching a broad audience and enhancing knowledge dissemination.
- HIMSS supported the group by producing webinars on nursing informatics and digital health, extending their educational reach.



POLICY AND ADVOCACY

- Published and disseminated information about the unique nurse identifier, highlighting its value through collaborations and publications.
- Worked with the ANA to develop a joint policy statement to increase the audience and reach of their efforts.
- Provided leadership and educational materials to foster growth and competency in nursing practice and recognition.

TRANSFORMING DOCUMENTATION

- The Head-to-Toe Assessment Task Force defined a model for nursing assessments in acute care, aiming to standardize datasets for patient care, population management, and research.
- Collaborated with healthcare organizations and vendors to harmonize nursing assessment content, reducing documentation burden while enhancing care quality.
- Ensured alignment with the Future of Nursing goals, supporting the reduction of nursing documentation burden and improving care quality.

2024-2025 WORKGROUP ACTION PLANS

Changes in workgroups leadership and structure approved by the NKBDS Steering Committee follow. The Learning Collaborative for Digital Health workgroup welcomes the new co-leader Nancy Husson, DNP, RN, CHSE; Dorcas Kunkel will step down. Susan Alexander, DNP, CRNP, ADM-BC and Dana Bensinger, DNP, RN, NI-BC are the new co-leaders of the Policy and Advocacy workgroup; Brenda Kulhanek will step down. Christie Martin, PhD, RN joins Whende Carroll as co-leader of the Digital Health and Innovation workgroup. The Context of Care and Nursing Value workgroup will change its name to Nursing Value.

CONTEXT OF CARE/NURSING VALUE

The Workgroup has chosen to focus on the care interaction, health equity, inclusion, diversity, and belonging, nurses' perception of value, the patient's experience, and the patient's story for the upcoming year. These elements incorporate the concepts of analytics, leadership, practice, and education. It is our contention that if nurses become more aware of the situations in which they are valued by peers and patients, the professionals will empower themselves to see their internal value. Goals set are:

- Establish a LinkedIn portal and other platforms for reporting pivotal nursing activities.
- Compare components of the Nursing Value Model (Weldon/Harper) and the Human Capital Framework (Yakusheva/Weiss) to identify common and missing elements.
- Review and update the nursing data dictionary based on the comparison of the models.
- Investigate partnerships with the Encoding and Modeling Workgroup and the Data Science and Clinical Analytics Workgroup.
- Collaborate with external nursing organizations that align with the value of nursing and the group's purpose.
- Continue seeking publishing opportunities to increase awareness and disseminate data supporting nursing value.

- Develop and pursue research opportunities for Workgroup User Stories.
- Explore grant support from funding agencies, focusing on projects like testing the User Story of pain.
- Review data from the LinkedIn platform to develop new user stories.
- Refine goals to align with new activities and products, ensuring a broader focus.



DATA SCIENCE & CLINICAL ANALYTICS

The following goals will affect individuals and communities working with data, which will highly impact population (nurses and not nurses) outcomes.

- To expand the Data Literacy goal to explore the value of developing such literacy and will implement a journal club to discuss data science-related nursing papers.
- To explore additional concepts related to AI literacy and consider reintroducing the Year-In-Review initiative.

DETERMINANTS OF HEALTH

The workgroup, active for approximately 13 years, reflected on its evolving role amidst advances in informatics, technology, and data, questioning its current and future direction. Discussions centered on the group's purpose in relation to the NKBDS Initiative, particularly in data science, standards, and gaps, and whether nursing education prepares nurses to handle SDoH data. Concerns were raised about definitions, buzzwords, and the discomfort in addressing social risks in healthcare, as well as biases and the limited scope of SDoH EHR data. The group emphasized shifting from "patient-centered" to "person-centered" care, considering the drivers of social determinants of health, and highlighted the need for community engagement studies and understanding patient perspectives on SDoH terminology. Challenges around data privacy, trust, and ethical implications, especially for marginalized communities, were also discussed.

Based on the workgroup purpose and members feedback, the workgroup will focus next on:

- Reviewing the history of the SDoH workgroup to inform its future direction by asking, "If we were starting this group new, what would we be doing?"
- Conducting a landscape assessment to understand the current research and initiatives in SDoH (including ONC, SIREN, Gravity Project, Unite Us, All of Us, etc.) to identify gaps that the SDoH workgroup could address.
- Exploring opportunities for collaboration with other workgroups that may have overlapping interests, given the growing focus on SDoH research and documentation; and
- Considering the development of a manuscript on the terminology and language around social determinants of health, incorporating perspectives from the community.



DIGITAL HEALTH AND INNOVATION

The workgroup work and goals are dedicated to educating all nurses and nursing informaticists about digital health and innovation tools and concepts to improve health and healthcare for all. The focus is on helping nurses create new and different ways to create and impact how nurses practice using technologies for safe, quality, and effective care for improved clinical and behavioral outcomes for patients and caregivers and the nurse experience. Goals include:

- Write a journal article on nurses using innovative technologies, such as AI, VR, and monitoring sensors.
- To create an infographic to educate nurses on using the NCSBN ID and National Provider Identifier (NPI).
- To organize a nursing innovation pre-conference track at the 2025 Nursing Knowledge: Big Data Science conference.



KNOWLEDGE MODELING AND ENCODING

Achieving the proposed goals will support strong knowledge models and terminology mappings as the foundation of comparable data that allows for large scale research and data comparison to truly show us how nursing can support the health of all populations and also show the value nurses bring to the care of those populations. With the addition of AI, these models and mappings will be used to teach AI, clarifying what we are looking for and ensure we are truly comparing and analyzing comparable data. Goals include:

- Map Fall Prevention Knowledge Model content to LOINC® and SNOMED CT®.
- Test the Pain Information Model proof of concept.
- Develop and update heuristics for new projects.
- Map Head-to-Toe Assessment and Nursing Admission History content.
- Publish an article on LOINC® Standardized Assessment Scales submission heuristics.
- Update and maintain Value Sets according to current heuristics.

LEARNING COLLABORATIVE FOR DIGITAL HEALTH

To achieve the proposed goal, the workgroup brings academicians and practice partners together working on tools, techniques, and methods influencing the work of nurses in all areas. The education nurses gain impacts the care they are able to provide to all populations. Goals include:

- Identify new methods for academic and practice nurse educators to educate students and practicing nurses in various settings.



POLICY AND ADVOCACY

The proposed goals will impact the provision of healthcare by nurses using AI. Development of a position statement and information will impact individual nurses and patients, their families, communities served by healthcare organizations and nurses, and entire populations as effective and more complete data is collected through the use of AI. Goals include:

- Review existing AI policy statements from other organizations to determine relevance.
- Gather input from other workgroups for a new AI policy position statement.
- Validate the position statement with end-users.
- Develop toolkits, starting with ambient listening.

TRANSFORMING DOCUMENTATION

Completion and dissemination of the Med/Surg nursing Adult Head to Toe (H2T) assessment minimized, harmonized dataset has the potential if widely adopted to impact a large percentage of overall hospitalizations in the United States. We've committed to work with the Transforming Documentation group and the NKBDS Steering Committee on publication and dissemination plans with toolkit and content release slated for early Q4 2024. Aligned with the NKBDS mission to enable nursing insights and evidence for community health and care delivery, the workgroup commits to:

- Highlighting the importance of documentation for frontline nurses and C-Suite executives.
- Elevating the role of Nursing Informatics (NI) specialists in all care settings to support emerging AI and ambient listening documentation technologies.
- Emphasizing the usability of EHR tools and the importance of ongoing training.

Targeted Strategies

The workgroups plan to address their goals through various targeted strategies. The Context of Care/Nursing Value group will hold monthly meetings with small breakout groups to focus on specific activities, create a strategic plan with achievable goals, and establish partnerships with allied workgroups. The Data Science & Clinical Analytics group will leverage data science educational content to support the Future of Nursing Report and AACN essentials by developing data science skills among members and other workgroups. The Digital Health and Innovation group will create and disseminate an infographic to educate nurses on using identifiers to measure nursing contributions. The Knowledge Modeling and Encoding group aims to impact the Future of Nursing Report by assisting facilities in gathering data to show the value of nursing documentation, influencing the AACN Essentials through publications, and discussing important competencies for nursing knowledge models. The Learning Collaborative for Digital Health will complete three manuscripts based on their multi-modal framework, work on a scoping

review whitepaper, and identify new educational methods for nurse educators. The Policy and Advocacy group will finalize and disseminate a joint statement about the unique nurse ID, work with vendors and organizations to implement it, and update existing policy statements. The Transforming Documentation group will align their H2T work with the Future of Nursing priority goals to reduce documentation burden and support patient care and research, enhancing nursing education and well-being.

Utilizing the NKBDS Framework Concepts

The workgroups plan to utilize various concepts to enhance nursing practice and education. The Context of Care/Nursing Value group will establish joint activities with other workgroups, set standards for measuring nursing value, engage the community, review conceptual frameworks, and provide input to ensure nursing value is represented in documentation systems. The Data Science & Clinical Analytics group will develop analytics skills and educate nurses to build data science leadership, an innovative effort given its novelty in the field. The Digital Health and Innovation group aims to educate both informaticians and non-informaticians on the value of technologies like AI, VR, and monitoring sensors in clinical practice; teach the use of nurse identifiers; and present at the 2025 conference on innovation concepts. The Knowledge Modeling and Encoding group will review and potentially influence policies on nursing documentation, leverage AI creatively, and continue educational outreach to ensure accurate implementation of their products. The Learning Collaborative for Digital Health will identify new educational techniques for nurse educators and produce a scoping review whitepaper on best practices for informatics and technology education. The Policy and Advocacy group will guide the use of AI in nursing through policy statements and educational materials. Finally, the Transforming Documentation group will continue partnerships to improve EHR documentation standards, clinical informatics design, leadership, and innovation to support clinical education and demonstrate nursing value.

SUMMARY OF WORKGROUP REPORTS AND ACTION PLANS

Over the past year, the NKBDS Initiative workgroups have made significant progress in various domains, driving advancements in nursing practice, education, and policy. The Context of Care/Nursing Value workgroup focused on exploring key value elements like compassion and engagement through monthly meetings, data dictionary updates, and manuscript development. They aimed to map nursing terms to create a richer vocabulary and assess the professional value that nurses contribute to their work. The Data Science & Clinical Analytics workgroup engaged in hands-on studies to advance data science knowledge and literacy, developing educational materials to build workforce capacity, which resulted in a paper for presentation at NI 2024. Their collaboration within the All of Us data enclave allowed them to explore the protective effects of metformin against long COVID. The Digital Health and Innovation workgroup created recommendations and principles to support nurses in adopting digital health technologies, including AI, VR, and monitoring sensors. They also developed guiding principles for integrating the unique nurse identifier into digital health systems and planned a platform to facilitate sharing digital health and innovation resources.

The Knowledge Modeling and Encoding workgroup undertook major projects such as the Fall Prevention Knowledge Model, Head-to-Toe Assessments, and Pain Information Model Revision to enhance clinical decision-making and reduce documentation burden. Their efforts aligned with the mission by enabling data extraction to validate current practices and generate new nursing insights. The Learning Collaborative for Digital Health produced educational tools and materials for educators and practice partners, leveraging data to improve health and healthcare. They presented a symposium at the Sigma International Congress, extending their reach and enhancing knowledge dissemination. The Policy and Advocacy workgroup promoted the unique nurse identifier through collaborations and publications, highlighting its importance in nursing

practice and recognition. Finally, the Transforming Documentation workgroup defined a model for nursing assessments in acute care, aiming to standardize datasets and reduce documentation burden while enhancing care quality. These collaborative efforts collectively strengthened the NKBDS Initiative, driving significant advancements in nursing practice, education, and policy, particularly in the context of integrating artificial intelligence into nursing informatics.

As captured by the several workgroups, key milestones are addressing the NKBDS 2021-2025 strategic goals. To advance the future of nursing and nursing informatics, nurses and leaders need focus on integrating cutting-edge technologies such as artificial intelligence (AI), virtual reality (VR), and advanced monitoring sensors into clinical practice. They should emphasize the importance of data literacy and analytics skills to drive evidence-based practice and improve patient outcomes. Establishing robust frameworks for measuring and demonstrating nursing value, through standardized documentation and the use of unique nurse identifiers, will be crucial. Collaborative efforts across workgroups and with external organizations will help to harmonize nursing assessment content, reduce documentation burden, and support innovative educational methods. By fostering a culture of continuous learning, embracing technological advancements, and advocating for strong policy support, nurses and leaders can ensure that the profession remains dynamic, impactful, and well-prepared for the challenges of the future.

WORKGROUP MEMBERS

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Context of Care/Nursing Value

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Presentations:

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Digital Health and Innovation

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Knowledge Modeling and Encoding

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- Susan A. Matney, PhD, RNC-OB, FAAN, FHIMSS, FAMIA, FHL7, AL2., & Christine Spisla, DNP, RN. (10-18-2023). Developing Nursing Assessments Using LOINC and SNOMED CT. 2023 LOINC Conference.
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- Cynthia Lundberg, RN, MSN. (4-22-2024). LOINC Overview. Knowledge Modeling & Encoding Workgroup Quarterly Meeting.

Learning Collaborative for Digital Health

- Abstract #1: *Bold Actions to Advance Informatics Preparedness: An Education Workgroup to Address Nursing Informatics and Digital Health Competency Gaps*
Presenters: Dorcas Kunkel (presenter) standing in for Marisa Wilson (primary), Mari Tietze. Contributing authors: Mary Jane Rivard, Tracia Forman. 47th Biennial Convention, 11-15 November 2023, San Antonio, Texas, USA. <https://www.sigmanursing.org/connect-engage/meetings-events/convention>

- Abstract #2: *Bold Actions to Advance Informatics Preparedness: How Prepared Are We? Self-Assessment on Digital Health Competencies*. Presenters: Dorcas Kunkel (presenter) standing in for Christina Bivona-Tellez (primary) and Marisa Wilson. Contributing authors: Connie Bishop, Toni Hebda, Susan Newbold, Marie VanderKooi, Heather Carter-Templeton. 47th Biennial Convention, 11-15 November 2023, San Antonio, Texas, USA. <https://www.sigmanursing.org/connect-engage/meetings-events/convention>
- Abstract #3: *Bold Actions to Advance Informatics Preparedness: Case Studies as Nursing Informatics Teaching Tools*. Presenters: Mary Jane Rivard (primary), Mari Tietze, Tracia Forman, Marisa Wilson, Dorcas Kunkel, Chito Belchez, Nancy Husson. 47th Biennial Convention, 11-15 November 2023, San Antonio, Texas, USA. <https://www.sigmanursing.org/connect-engage/meetings-events/convention>
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POSTER PRESENTATIONS

Innovative Use of Artificial Intelligence or Data to Advance the Practice and Understanding of the Nursing Profession

Acceptance of Explainable Artificial Intelligence in Clinical Decision Making: A Critical Review of the Literature

Authors:

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Learning Objectives: To describe the current knowledge of nurse attitudes towards explanations of artificial intelligence (AI) model output that have been designed to inform their clinical decision making (CDM).

Description of the Problem: Solutions are desperately needed to combat national nursing shortages, improve the documentation systems nurses work within, and support recruitment and retention of top talent.¹ Nurses are experiencing increasing dissatisfaction as they are making clinical decisions in high-risk situations and their documentation systems, designed to improve patient outcomes and billing processes, have resulted in more burden, inefficiencies, and duplications.² AI has significant potential to reduce this burden and support CDM, yet its acceptance remains tentative under ethical and societal uncertainties and the lack of transparency in how AI models generate outputs.³ Explainable AI methods provide explanations to help improve transparency and understanding,⁴ however, the current research focuses on mathematical evaluation of these methods, and there is opportunity to increase our knowledge of nurse evaluation of explanations.

Methods: The Institute of Medicine methodological standards for critical review of the literature were used to present the current state of nurse attitudes of acceptance and use of explanations in CDM.⁵ Study appraisal and synthesis was further guided by Joanna Briggs Institute critical appraisal tools.⁶

Results: Twelve studies were included, approaches varied from mixed methods (5), quantitative (5), and qualitative (2). The strength of the evidence ranged from low to very low. Findings suggested nurses are more accepting of explanations when they address CDM risks, clinical relevance, and holistic care. There was limited use of conceptual frameworks to guide and instruments to measure acceptance of explanations. Studies evaluating explanations focused on mathematical evaluations and less on nurse evaluation. Study samples focused primarily on physicians, and nurse participants were included in two of the twelve studies.

Discussion and Conclusions: There is a need to generate broad knowledge of nurse attitudes toward explanations in the context of CDM and the nurse-patient relationship. Future research should aim to include evaluation of explanations by nurses. More research with nurse samples and with more settings is needed to deepen our understanding and inform the designs of explanations.

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Social Screening by School-based Health Providers: A Work-in-Progress

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Learning Objectives:

 The viewer will:

1. Describe the role of school-based health providers in SDoH-related social risk factors and social needs screening
2. Verbalize the variety of perspectives of school-based health providers in care of social needs

Introduction/Description of the Problem: Many childhood chronic conditions are influenced by the 5 domains of social determinants of health (SDoH) (see Figure 1).¹ Located in/near schools, school-based health centers, often staffed with nurse practitioners, are ideally placed to facilitate identification of social risk factors and social needs.²⁻⁴ It is unclear whether school-based health center providers currently consider SDoH information, particularly in chronic conditions such as asthma, possibly related to lack of SDoH knowledge or data availability.⁵ There is a critical need to understand the awareness of SDoH information and assessment of social risk factors in school-based care, especially with patients at risk for asthma exacerbations.

Methods: This presentation reviews the methods and findings of Aim 1: *Describe the information gathering behaviors for SDoH and social risk factors performed by school-based health center providers for prevention of asthma exacerbations*. Our conceptual framework (see Figure 2) depicts this aim as a first step towards an informatics resource for school-based health centers. Using the first phase of an exploratory sequential design,⁶ (see Figure 3), we are collecting and analyzing qualitative data from 3 virtual focus groups, each with 6-8 participants using a semi-structured interview. We are recruiting individuals from the over 100 school-based health centers across Connecticut, to capture many experiences and perspectives (see Table). We are focusing on perspectives regarding SDoH usefulness, information gathering, access to SDoH data, use of current tools, and barriers. Data Analysis: We are using descriptive statistics to summarize provider demographics and school-based health center factors. We are conducting a thematic analysis, interpreting meaning of participants' experiences gathering SDoH information, and using member checking to verify themes.⁷⁻⁸

Results: By April 2024, we expect to complete data collection and have a description of providers' demographics, school-based health center factors, SDoH data use and social risk screening. We will have self-reported information on tools currently in use and how providers access SDoH and social risk data. We will have information on variability of current practices and what school-based health center providers desire in an informatics resource for SDoH.

Discussion/Next Steps: Using the data gathered from this study, our next step is to use human-centered design to develop a SDoH-based informatics resource for use within school-based health centers to guide providers in conducting further social risk factor screening and social needs assessments. By presenting SDoH in a useful and usable way, increased social risk screening and tailored social needs assessment can be performed, leading to preventative education and treatment to decrease exacerbations,

health inequities and medical expenditures. *The potential clinical implication is our long-term goal to integrate SDoH data into care delivery to promote early, targeted screening and assessment in management of many childhood illnesses, thereby decreasing exacerbations and improving outcomes of existing conditions.* Future studies will evaluate use of the informatics resource with school nurse and social workers to address SDoH in a patient-centered approach. Increased scalability will also include larger geographic areas, additional U.S. states, and partnerships with communities and public health agencies.

Figures on Poster:

Figure 1: Domains of Social Determinants of Health1



Figure 2: Conceptual Framework for an Informatics Dashboard for SDoH information in School-based Health Centers

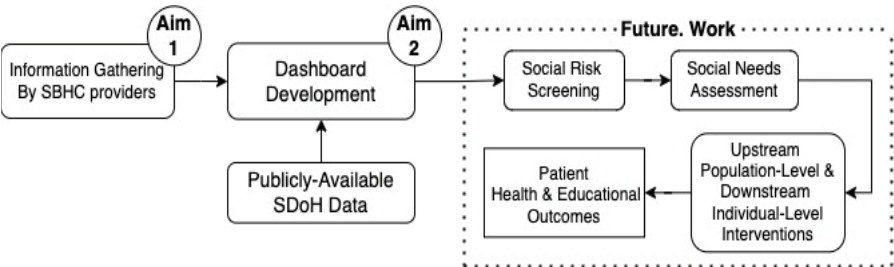


Figure 3: Exploratory Sequential Design

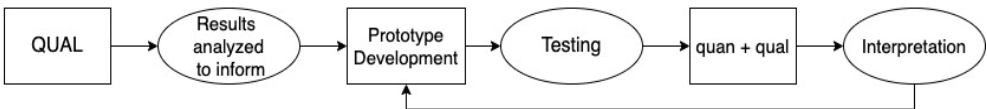


TABLE: PURPOSEFUL SAMPLING INCLUSION CRITERIA

Advanced level providers (nurse practitioners, physicians’ assistants, physicians)

Recent (within 2 years) school-based health center work

Use of electronic health records

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Leveraging AI Driven Data Analytics in Immersive VR: Building Nurse Competencies for Enhanced Patient Health Outcomes

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Learning Objectives:

1. Identify the role of artificial intelligence (AI) driven data analytics generated during immersive virtual reality (VR) simulations to assess nursing competencies.
2. Discuss opportunities to utilize data analytics to improve achievement of nurse competencies over time and strengthen academic-practice partnerships to support the transition to practice.

Introduction: As patient acuity rises and healthcare delivery becomes increasingly complex, nurses face mounting pressure to adapt swiftly. Newly licensed nurses are challenged to navigate the intricate landscape of patient care, compounded with the complexity of patient conditions, technological advancements, and a scarcity of experienced preceptors available to mentor novice nurses^{1,2}. Consequently, many nurses enter practice feeling ill-equipped to handle the diverse array of patient needs, leading to potential gaps in care delivery and compromised patient outcomes^{3,4}. A promising solution for revolutionizing nurse training is merging immersive VR nursing scenarios with AI

to generate data analytics that measure nurse competencies. Through immersion in lifelike virtual scenarios, nurses engage in realistic patient care in which AI algorithms analyze data generated by users' actions to provide personalized learning experiences, enhance feedback mechanisms, and measure competency.

Methods: In collaboration with a VR industry leader, we developed five immersive VR multi-patient scenarios of diverse patients with clinical situations commonly encountered in acute medical-surgical patient care delivery settings. Pre-licensure senior nursing students and newly licensed nurses were recruited to complete the scenarios using an Oculus Quest 2 headset. Participants' actions were analyzed using the frameworks of the American Association of Colleges of Nurses (AACN) Essentials (Table 2), Creighton Competency Evaluation Instrument (CCEI) (Table 3), and Quality and Safety Education for Nurses (QSEN) (Table 4).

Results: Data analytics generated by participants' actions (Table 1) are visually demonstrated as a single encounter for each of five scenarios in Tables 2, 3, 4 by each competency framework.

Discussion: These findings demonstrate the use of AI-driven data analytics for evaluation using competency frameworks, providing a means for measurably improving the clinical competence nurses need to navigate complex patient situations. Future investigation includes using VR-generated data analytics to evaluate progression of competencies from senior student to newly licensed nurse and across nursing practice.

Conclusions: AI-driven data analytics present a paradigm shift in nurse training that extend beyond individual clinical competence development, contributing to improved patient outcomes.

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Table 1

SCENARIO	SAMPLE SIZE
Scenario 1	n = 325
Scenario 2	n = 269
Scenario 3	n = 293
Scenario 4	n = 276
Scenario 5	n = 276

Figure 1: AACN Essential Competencies

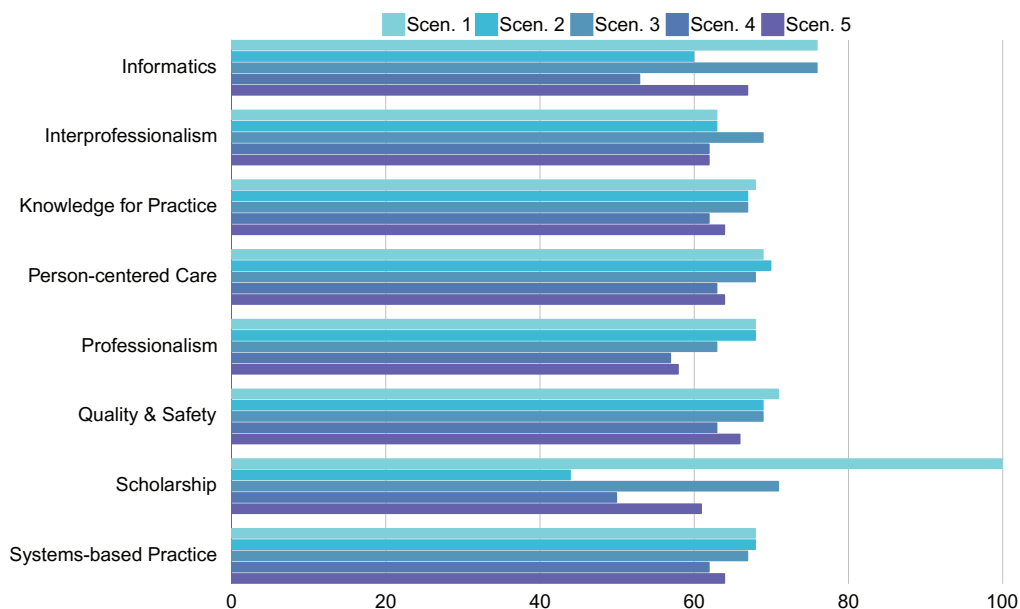


Figure 2: Creighton Competency Evaluation Instrument

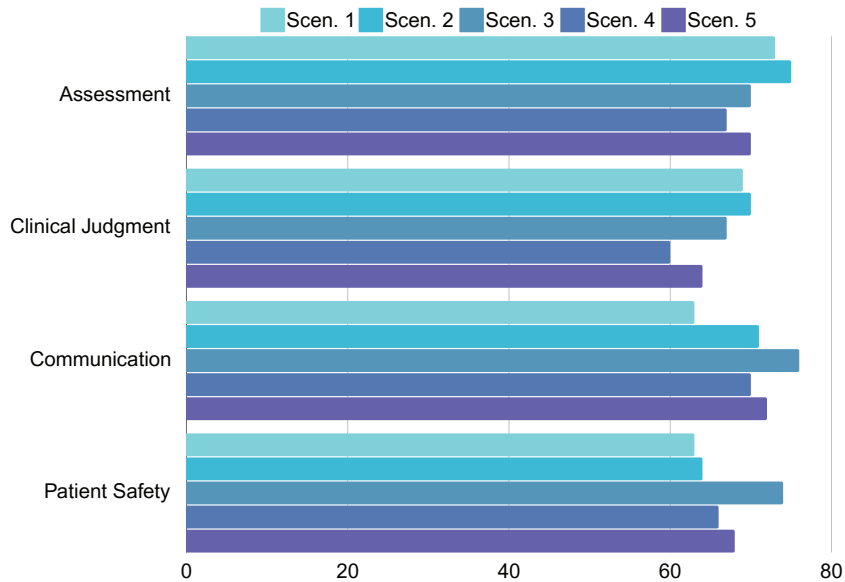
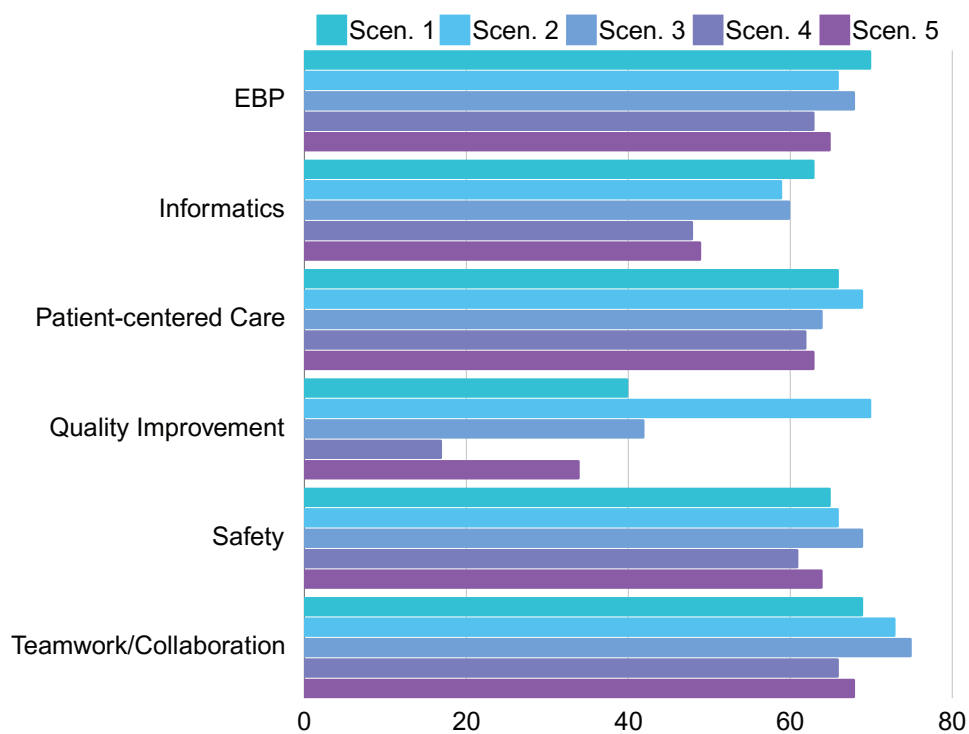


Figure 3: Quality and Safety Education Goals for Nursing (QSEN)



Significance of Data Ethics to Achieving Responsible Artificial Intelligence in Nursing

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Learning Objectives:

To raise awareness among the nursing discipline about the significance of the principles of data ethics, in conjunction with the data-centric artificial intelligence paradigm, to create artificial intelligence technologies responsibly and protect patients and their data from unintentional harm.

Description of Problem: With vast electronic healthcare administrative and clinical data available, the adoption and application of artificial intelligence technology are increasing in the healthcare sector, emerging in nurses' electronic health record workflows. Data fuels these complex, impactful systems.¹⁻³ AI technologies developed using poor-quality, under-representative data have negative consequences, such as giving rise to algorithmic bias, returning nonsensical or inaccurate information to end users, and degraded technology performance in the live production environment for unseen data.

Description of the Solution: The principles of data ethics and two ethical frameworks are introduced to nurses. Furthermore, the role of the data-centric artificial intelligence paradigm in achieving the principles of artificial intelligence-oriented data ethics in nursing is explicated.

Impact on Clinical Practice: Artificial intelligence technologies created using suboptimal datasets have political consequences in high-stakes settings like healthcare, such as exacerbating bias and health disparities and compromising patient safety and privacy.⁴

Discussion and Conclusions: Data is the linchpin for artificial intelligence systems. Achieving high-quality data by leveraging nurses' domain expertise is vital to creating high-performing, effective artificial intelligence technologies that will impact their clinical and administrative workflows. In conclusion, four recommendations are introduced to guide nurses on how they can begin to engage in data ethics and the design and development of ethical nurse-centric artificial intelligence technologies.

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Measuring the Cardiovascular Clock in Pregnancy using Electronic Health Records and Wearable Data

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Learning Objectives:

- Critically assess the methodological advantages and limitations of using secondary data from wearable and electronic health record sources
- Discuss the potential of wearable heart rate data to serve as a non-invasive, ecologically valid measure for monitoring physiological adaptations during pregnancy.
- Reflect on the future research directions for integrating continuous heart rate data from wearable devices as a digital biomarker in pregnancy

Background: Pregnancy involves precisely-timed physiologic adaptations across body systems to support the needs of the developing fetus.¹ Disruptions in the timing of these adaptations could be early warning signs of later adverse pregnancy outcomes. Consumer wearable devices that measure heart rate are increasingly common and could be leveraged to measure the timing of cardiovascular adaptations to pregnancy. The purpose of this study was to describe the magnitude and timing of heart rate (HR) variation across sequential phases of pregnancy using continuous heart rate data before, during and after pregnancy sourced from consumer wearables.

Methods: Longitudinal descriptive study of pregnant individuals (N = 89) using secondary data from the NIH All of Us Research Program.² Heart rate data from Fitbit devices worn for 473 days per person, before, during and after pregnancy.³ Approximately 32 million minute-level heart rate observations, averaged over 24-hour day totaling 29,392 days of heart rate

data. Inclusion: a) pregnancy-related codes in the electronic health record data, and b) at least 60 days of Fitbit data during a pregnancy episode. Exclusion: documented cardiac arrhythmias, miscarriage, and multi-fetal pregnancy.

Results: We quantified and illustrate variation across four chronologically-specific HR phases: first trimester peak, mid-pregnancy slope, timing of late pregnancy peak, and magnitude of postpartum HR recovery.

Discussion: Future research can examine whether variation in the timing, magnitude and rate of change at each phase is related to pregnancy health outcomes. Premature or blunted heart rate changes during pregnancy could represent hyperdynamic cardiac adaptation, cardiac exhaustion or advanced phase shifting of the overall pregnancy clock.¹ Early identification of pathologic variations in the timing of the cardiovascular clock during pregnancy could be important for mitigating cardiovascular complications during pregnancy.

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A journey in creating a reliable transplant data mart and tools from EHR data – An Informatics and Quality partnership

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- Danica Farrington, MPH, RN UCHealth Transplant Center, Aurora, CO

Learning Objectives:

1. Identify 3 specific benefits of a partnership between a partnership of a nurse informatics team and quality nurse team.
2. Identify 2 specific ways stakeholders can be engaged in data integrity work

Introduction: Identifying accurate and consistent sources of transplant data using electronic health records (EHR) is difficult due to differing practices and lack of buy-in, understanding of regulatory outcomes, little data literacy among staff, and EHR challenges. Over the last 2 years, our Transplant Center has formed a dedicated transplant informatics department as well as built a more robust quality team. These teams decided to partner to utilize their combined resources to address these previously immovable barriers.

Description: From July 2022 to June 2024, the Transplant Informatics and Quality partnership addressed the following 4 key areas in order to build a reliable data mart: standardized utilization of EPIC's problem list, the optimization of all EPIC-built TIEIDI forms in alignment with definition and workflow changes, creating innovative EPIC build in instances that EPIC did not offer out-of-the-box solutions, and the incorporation of our documentation auditing process in all Quality PI work.

Methods: Accomplishing these goals requires significant clinical, regulatory, and EHR knowledge, which is the primary rationale to utilize this partnership. Our teams used the following strategies to accomplish our goals:

- Addressing clinical areas, especially those previously underrepresented in engagement efforts

- Newly developed EHR documentation education was created for OR personnel
- Support for utilization of newer technologies for lung storage
- The development of a Transplant Informatics Committee (TIC) involving multidisciplinary staff
- All personnel receive standard onboarding on data literacy concepts and relation to patient safety
- Collaboration between disciplines/Buy-in from key stakeholders
 - Creation of physician informaticist partner
 - Integration of data integrity into center-specific PI model
 - Data accuracy now a standard part of monthly Quality meetings
- Data governance
 - Creation of own governance when gaps in the system's standards were lacking, including:
 - › Documentation workflow approval and auditing processes
 - › Report request, validation, maintenance, and retirement processes

Results: As a result of our partnership, we have seen significant improvements in our 4 key areas:

1. Standard utilization of EPIC's problem list implemented in 3 out of our 4 main organ teams, with our first organ team to adopt reporting 100% compliance up from 30%.
2. Optimization of EPIC-built TIEIDI forms resulting in about 40 hours per month in time gained for the Quality team
3. Innovative and unique EPIC builds including standardized OR module not provided by EPIC and documentation workflows for new technologies
4. Hard-wiring documentation audit processes into all PI work resulting in significant improvements in data integrity

Discussion: We have seen a positive shift in attitude and culture from all transplant personnel, as it relates to all things data and quality. Team members proactively provide their own ideas for improved methods of data collection. Leaders consistently bring up documentation practices and their relation to our clinical and regulatory outcomes at quality meetings. As a result of all of these positive trends, the EHR data mart quality continues to improve and produce more accurate results from general report queries to TIEDI accuracy.

Ensuring data accuracy has been an ongoing challenge in the field of transplant due to a number of previously immovable barriers. A strong quality and informatics partnership can be an invaluable and foundational support to any transplant center, providing resources to address these barriers and ensure a valid and high quality data mart.

Understanding AI Adoption in Academia: Exploring Current Status and Planning for Future Potentials for Teaching and Learning

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Learning Objectives: The purpose of this study is to evaluate and analyze the survey results to determine faculty and student's level of AI and ChatGPT knowledge at Jacksonville University (all colleges) and to answer the following questions:

1. Do faculty and students use Generative AI in teaching and learning?
2. Are students and faculty interested in integrating AI into teaching and learning?

Introduction or Description of the Problem: The integration of Artificial Intelligence (AI) into higher education (HED) has emerged as a transformative force, reshaping pedagogical methods, administrative efficiency, and personalized

learning experiences (George & Wooden, 2023). AI, a rapidly growing field previously relegated to the confines of advanced computer science research, has entered the mainstream consciousness of academic institutions due to the rapid development and deployment of consumer-facing AI platforms known as large language models (LLMs) designed to answer natural language questions, develop computer code, pass professional examinations, compose artistic artifacts such as poetry and graphic arts media, and much more (Makridakis et al., 2023). The significance of AI in this realm is underscored by its potential to address pressing challenges such as access to education, student enrollment and retention, faculty research, and the personalization of learning (George & Wooden, 2023).

This study will assess the landscape of artificial intelligence (AI) adoption at Jacksonville University by both the faculty and students, aiming to comprehensively understand the current status and anticipate future potentials for teaching and learning. By employing a multifaceted approach, the research explores how AI technologies are currently integrated into learning and teaching and identifies emerging trends that shape the intersection of AI and academia. Through an extensive examination of findings, this investigation seeks to provide insights into the dynamics of AI use adoption by collaborating with the Center for Teaching and Learning on training suggestions for educators and students. The findings of this research contribute to a strategic roadmap for harnessing the full potential of AI in education, furthering an informed and proactive view towards technological advancements in the academic domain.

Methods or Description of the Solution: An aggregated descriptive design will summarize the data collected from an electronic survey using Qualtrics. No identifiable information will be collected. The PI and Co-PI will reconfigure the settings in the study to Anonymize Responses. This setting will prevent Qualtrics from collecting, by default, data such as IP addresses and emails.

Results or Impact on Clinical Practice

Results: TBD. Survey results will be collected in April 2024.

The role of AI in higher education (HED) is significant and multifaceted, offering enhancements in personalized learning, administrative efficiency, and academic research. However, as the advancements in generative AI and LLMs have afforded widespread adoption, access, and growth, how HED faculty and students use AI in their practices is worthy of exploration. In this new age of accessible generative AI, how and when faculty use AI, students' reception to AI use, and the outcomes associated with more widespread AI adoption and integration into HED can help inform future policy, practice, and innovation in the age of AI.

Conclusion: This study's findings will provide valuable insights into effective policymaking within the academic sector and the integration of generative AI technology across various colleges and different academic disciplines, addressing different skill sets and student needs from different colleges at graduate and undergraduate levels.

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Development of real-time intervention to promote mental health for police officers

Author:

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Learning Objectives: This randomized clinical trial aims to develop a real-time intervention to improve the mental health of police officers.

Introduction or Description of the Problem:

Police officers are the first responders to various crime such as murder, sexual assault, and due to the nature of their work, they experience stress, burnout and trauma. However, it is difficult to request professional help related to mental health in organizations due to personnel disadvantages, mental health-related stigma, and shift work. Mental health intervention that takes into account the organizational characteristics of police officers is needed. Smartphone interventions can improve health, reduce costs, and save time, and can be used for those who are reluctant to participate in face-to-face interventions. Ecological momentary

intervention (EMI) is a routine, repeated measurement of an individual's current state in time and context, allowing healthcare providers to understand changes in behavior and psychology in real time. The purpose of this study was to evaluate the development of a smartphone-based stress reduction program for police officers using ecological momentary intervention.

Methods or Description of the Solution: This study was a randomized controlled trial and was conducted using a development process that included analysis, design and implementation. The analysis phase included a literature review and a needs assessment through semi-structured interviews (n = 12) were conducted. The initial prototype design and content was developed based on the results of the literature review and the user requirements. In the implementation phase, the heuristics were evaluated by experts (n = 3). Modifications were made to the application after heuristic evaluation. User evaluation of usability was conducted by police officers (n=3).

Results or Impact on Clinical Practice: Through this process, we developed the application to include real-time and actual self-monitoring, displaying meditation videos based on monitoring results, weekly mindfulness reminders, and self-reflection. Additionally, the application adopts a non-code system to solve the hassle and difficulty of installation and use. We developed a system to automatically recommend meditations in the app based on self-monitoring results. This means that individualized interventions are possible by proposing solutions based on each participant's emotion.

Discussion and Conclusions: Real-time intervention was designed for police officers. This intervention can be used to promote individualized among police officers. Additionally, this study can be used as basic data for the development of mental health interventions using smartphones and patient-centered care.

Nursing value through data mapping: Practicing with user stories

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Learning Objectives:

1. Appreciate user stories through the eyes of a novice student researcher
2. Pending Goal: Ultimately contextualize a unique user story within the nurse value conversation, particularly as a way to cross-check EHR (electronic health record) data
3. Pending Goal: Understand where points of bias may occur as contextualized to this story

Introduction: User stories, defined as models used to map nursing process and cognition around a specific aim, are critical tools in supporting the lexicon of nursing value¹⁻³. Furthermore, user stories help to provide 'human' tracking points in understanding what EHR data are useful per value modeling mechanics³. Given the continued call for unique user stories^{1,3}, this exploratory work aims to expand upon the critical nursing value conversation.

Methods: The primary author generated a user story under the guidance of the Nurse Value subcommittee through the Big Data Science Initiative at the University of Minnesota. This user story, which modeled a standard ischemic stroke patient, followed a templated format derived from standard guidelines^{3,4}. Key, evidence-based nursing actions⁵⁻⁷ in the administration of thrombolytic medication were selected and placed in the template. Said nursing actions were then mapped to find initial points of overlap between nurse value models⁸⁻¹⁰ and Nursing Outcome Classifications¹¹(in line with standard

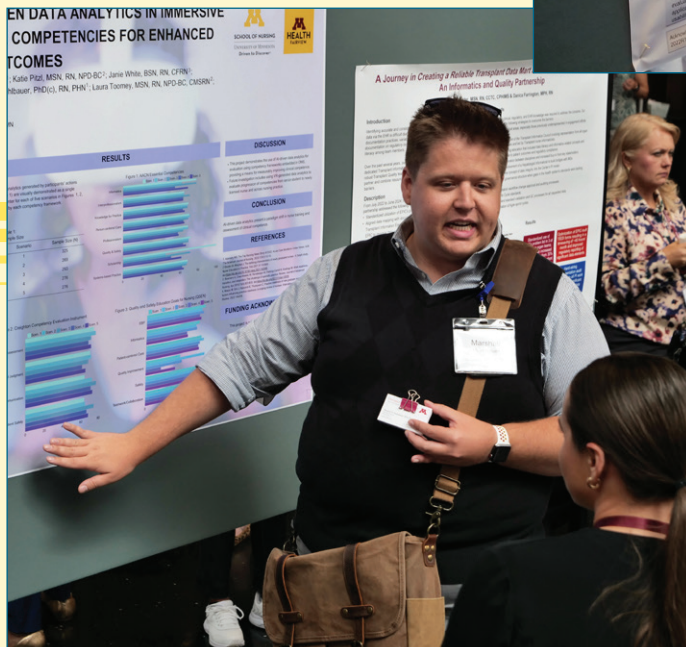
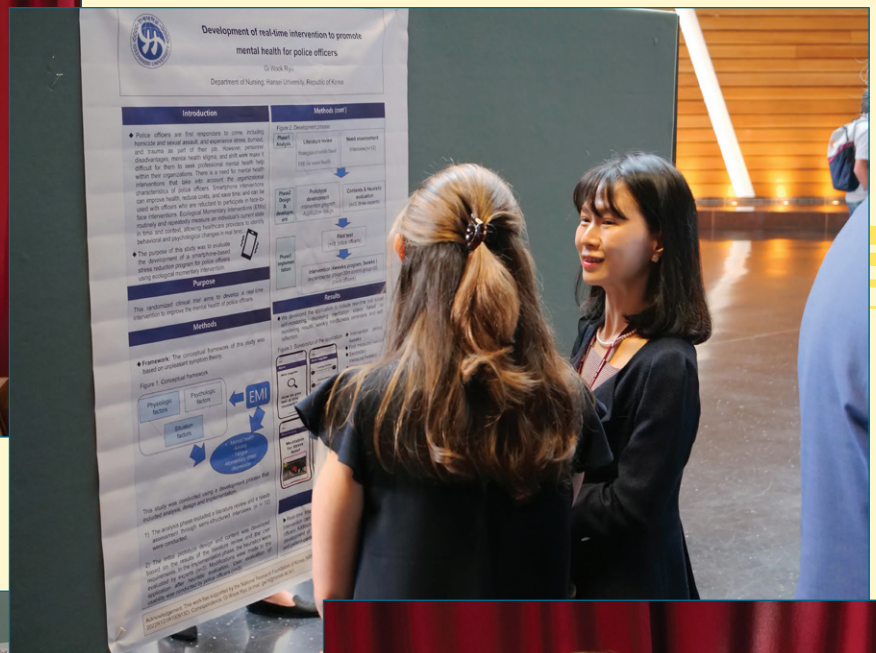
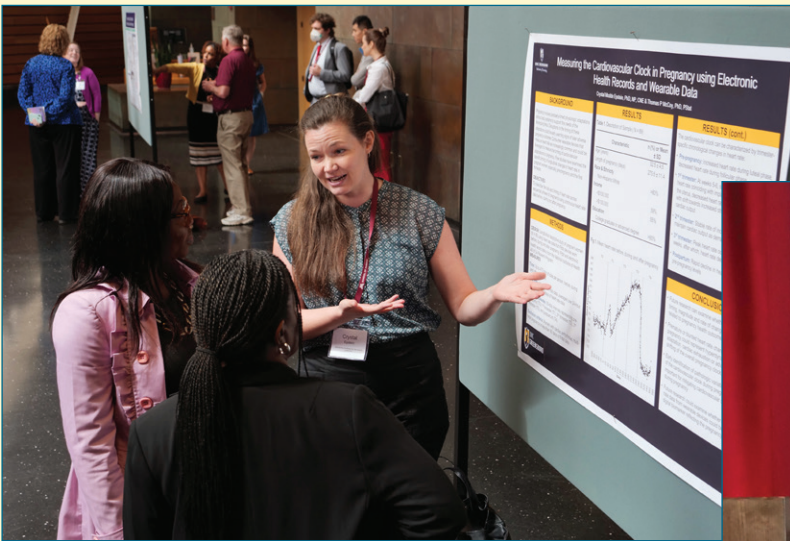
practice^{1,3}). Pending Methods: The user story will be translated into a table more suitable for presentation on a poster. This table will cover 'highlights' from the story while exemplifying the critical thinking of nurses.

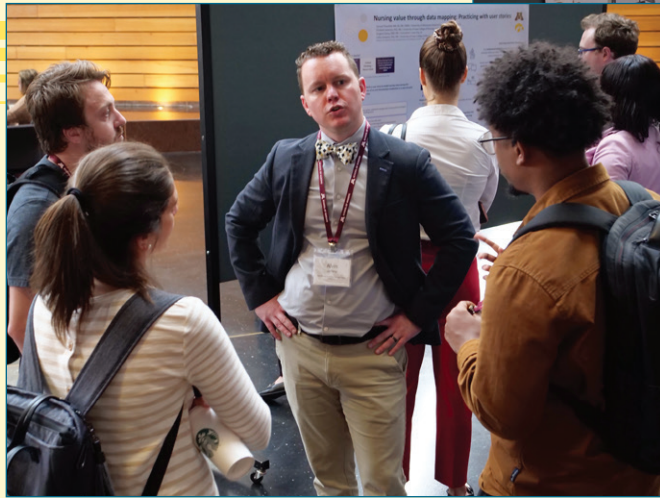
Results: The templated user story subjectively identified twenty elements of nursing practice and/or cognition relevant to the nursing delivery of a thrombolytic medication. Mapping processes^{1,3} to various structures of both the Nurse Value Model¹⁰ & the Schwartz Model⁹ were identified consistently across the user story. Pending Results: The presented 'highlights' table will include a synthesis on nurse critical thinking across different story actions.

Pending Discussion: This work is well primed for conversations that will expand and contextualize nurse value, user story bias, and procedural lessons.

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