



2023

NURSING KNOWLEDGE: BIG DATA SCIENCE

CONFERENCE PROCEEDINGS

JUNE 7-9, 2023

Supported by



SCHOOL OF NURSING

UNIVERSITY OF MINNESOTA

Driven to DiscoverSM

Co-Supported by



HIMSSTM

THE
University of Vermont
HEALTH NETWORK



College of Nursing
UNIVERSITY of FLORIDA



The Center for
**SCHOOL
HEALTH**
Innovation & Quality

VANDERBILT



School of Nursing

VA



U.S. Department
of Veterans Affairs

TABLE OF CONTENTS

Introduction	3
Steering Committee	5
2022-2023 Workgroups and Leaders	6
Workgroup Annual Reports and Alignment with the NKBDS Initiative's Vision, Mission and the 5-Year Strategic Plan	8
Summary of Past Year's Accomplishments	8
Synergy across workgroups inside and outside the NKBDS	11
Impact on Individuals, Families, Communities, and Populations	12
Engagement with the NKBDS Framework Core Concepts	13
Addressing the 5-Year Strategic Plan Goals	15
NKBDS Workgroup Action Plans for 2023-2024	17
List of Workgroup Members	22
Workgroup Presentations/Publications/Products	24
Nursing Terminologies and/or Standards Applications to Improve Clinical Practice: Abstracts Accepted for Oral Presentations	27

Complete Conference Information

The conference agenda, action plans from this year and previous years, abstracts and presentations are available at z.umn.edu/bigdata. For all the resources and products from the Nursing Knowledge Big Data Science Initiative and related content, visit the eRepository at nursingbigdata.org.

Save the Date

2024 Nursing Knowledge: Big Data Science Conference, June 5-7, 2024, in Minneapolis, MN.

The pre-conference work on "Looking at the Crystal Ball — The Power of Partnership," across Public Health and Nursing Informatics 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 90PH0005/01-00, 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.

Introduction

The 11th annual Nursing Knowledge: Big Data Science (NKBDS) Conference welcomed national experts to discuss the value of nursing and the ways informatics can help foster improvements in nursing practice, research, education, and leadership. The conference, held June 7-9 at McNamara Alumni Center, University of Minnesota, Minneapolis, MN, USA, discussed the expansion of collaborations among informaticians, nurse leaders, and executives.

The June 7 Pre-conference was comprised of five tracks. “Looking at the Crystal Ball — The Power of Partnerships across Public Health and Nursing Informatics” was led by Sripriya Rajamani, MBBS, PhD, MPH, FAMIA, and Robin Austin, PhD, DNP, DC, RN-BC, FAMIA, FNAP. The track focused on how numerous health information technology (HIT) tools are being implemented across organizations, driven by patient needs, market pressures, and regulatory requirements. Experts from the fields of public health and nursing informatics shared HIT case studies and showcased the power of partnerships in informatics in advancing public health.

Track 2, “Knowledge Modeling and Encoding,” was led by Bonnie L. Westra, PhD, RN, FAAN, FACMI, and Susan A. Matney, PhD, RNC-OB, FAAN, FACMI, FHIMSS. The track examined the process of developing a knowledge model, and the appropriate method for encoding it, using LOINC and SNOMED-CT to support interoperability. An example from a recently developed knowledge model, Hospital-Associated Venous Thromboembolism Prevention, which was used to deliver didactic content, as well as exercises applying the content for knowledge modeling and encoding gave clarity and impact to the process of using the model.

Three additional tracks were presented. Connie White Delaney, PhD, RN, FAAN, FACMI, FNAP, and Lisiane Pruinelli, PhD, RN, FAMIA,



led “Nursing Terminologies and/or Standards Applications to Improve Clinical Practice.” This track provided a succinct background on nursing terminologies/standards and their current applications in real-world settings. From the NKBDS Conference inaugural call for abstracts, four abstracts were selected through peer-review for oral presentations (see abstracts beginning on page [27](#)). Experts from the United States, Canada, Italy, and Brazil provided use cases for a better understanding of the potential of using nursing terminologies/standards for applications to improve patient care.

Basic FHIR concepts, their strengths and limitations, were the focus of track, “FHIR Safe — A Hands-on Approach to FHIR Concepts and Fundamentals,” lead by Laura Heermann Langford, PhD, RN, FAMIA. FHIR has evolved from a standard in trial use to a requirement under U.S. federal rules as an API for patient access to their data in EHR systems as well as their claims data in payer systems. Examples of applications using the SMART on FHIR platform were shared. After the initial overview of FHIR, the attendees were guided through online tools to examine HL7 FHIR Resources (the basic building blocks of FHIR) and build common FHIR Profiles (implementation guides for specific use cases).



The fifth track, “Mind the Gap: Current Landscape, Bridges, and Roadmaps to Integrate Technology from Academia to Practice,” was co-led by Marisa L. Wilson, DNCs, MHSc, RN-BC, CPHIMS, FAMIA, FAAN; Rebecca Freeman, PhD, RN, FAAN, FNAP; Dorcas Kunkel, DNP, RN/PHN, CNE, CPHIMS, CDIP; and Brenda Kulhanek, PhD, MSN, RN-BC, NPD-BC, NE-BC. The track leaders provided a review of the state of academic education,

postgraduate novice-to-expert frameworks, AACN Essentials and related competencies, and new approaches to education. Examples include case-based studies, the integration of technology components in every class and every Essentials domain, as well as a landscape of job descriptions, clinical ladders, residency programs, etc. The roles of faculty and NPDs/Clinical Educators and the layout of future planning and potential approaches to address the gap were discussed.

The conference opened with Olga Yakusheva, PhD, MSE, University of Michigan School of Nursing delivering the keynote, “The Age of Big Data in Healthcare: Demonstrating the Value of Nursing to Patient Outcomes.” Yakusheva pioneered the development of a new method for outcomes-based clinician performance productivity measurement using electronic medical records. With this work, she was able to measure, for the first time, the value-added contributions of individual nurses to patient outcomes. Yakusheva is currently working to uncover traits and success strategies of highly effective nurses, including education, experience, and expertise, as well as a more granular analysis

of nurse staffing, optimizing nurse-patient assignments at the patient level. A panel moderated by Catherine Ivory, PhD, RN, FNAP, FAAN, discussed “Capturing and Leveraging the Value of Nursing” with panelists Kathy Chappell, PhD, RN, FNAP, FAAN, from ANAE; Whende Carroll, MSN, RN-BC, FHIMSS, from HIMSS; and Elizabeth Swanson, PhD, RN, from The University of Iowa College of Nursing.



On the final day of the conference, Robyn Begley, DNP, RN, NEA-BC, FAAN, American Organization for Nursing Leadership CEO and American Hospital Association CNO, delivered the keynote, "Nurse Executives, Big Data, and Leading Healthcare Transformation." Begley addressed the current health care environment and workforce issues. A nurse executive panel, moderated by Dean Connie White Delaney, PhD, RN, FAAN, FACMI, FNAP, included Begley, Essentia's CNE Rhonda Kazik, DNP, RN, CENP, and Mayo Clinic's CNO Ryannon Frederick, MS, RN. The nurse executives discussed how they are utilizing nurse informaticists and data/information/knowledge to show the value of nursing. Additional topics included care delivery models, workforce challenges, and the need to forge new partnerships.

The conference provided workgroups the opportunity to meet in person, building on their virtual yearlong work. After reporting their achievements over the last year, they created action plans 2023-24. Reports and action plans are discussed in the following pages.

The 2024 Nursing Knowledge: Big Data Science Conference will be held June 5-7 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

Rebecca Freeman, PhD, RN, FAAN, FNAP, Vice President of Health Informatics for the University of Vermont Health Network, VT

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

MEMBERS:

Whende M. Carroll, MSN, RN-BC, FHIMSS, Clinical Informatics Advisor, HIMSS; Founder, Nurse Evolution; Lecturer, University of Washington–Tacoma, School of Nursing and Healthcare Leadership

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

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

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

Susan Matney, PhD, RNC-OB, FAAN, FACMI, FHIMSS, FAMIA, FHL7, 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-BC, FHIMSS, FAAN, Former Clinical Informatics Advisor, HIMSS, San Marcos, CA

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

2022-2023 WORKGROUPS AND LEADERS

Context of Care/Nursing Value

Co-leaders:

Amber Olson,
DNP, RN-BC

Liz Swanson,
PhD, RN

PURPOSE

To examine and measure the value of nursing within its context of care and supporting the tenets of health equity. Therefore, the intent is to maximize the development and dissemination of measurable and comparable nursing terms critical to the context of care and the value of nursing.

Data Science and Clinical Analytics

Co-leaders:

Lisiane Pruinelli,
PhD, RN, FAMIA

Steven G. Johnson,
PhD, 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

Co-leaders:

Ruth Wetta,
PhD, MPH, RN

Robin Austin,
PhD, DNP, DC, RN-BC, FAMIA,
FNAP (Outgoing)

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.

Education

Co-leaders:

Dorcas E. Kunkel
DNP, RN, PHN, CNE, CPHIMS,
CDP

Marisa L. Wilson
DNSc, MHSc, RN-BC., CPHIMS,
FAMIA, FIAHSI, FAAN

Mary Jane Rivard
DNP, RN-BC (Incoming)

PURPOSE

To provide faculty with the knowledge, skills, and attitudes (KSAs) to educate nurses at all levels of practice to participate in and lead in the healthcare digital evolution. This includes the importance of the single nurse identifier, the Future of Nursing expectations, and the AACN Essentials for both entries to practice and advanced nurses.

Knowledge Modeling and Encoding

Co-leaders:

Stephanie Hartleben,
MSN, MHA, RN-BC

Kay Lytle,
DNP, RN-BC, NEA-BC, CPHIMS,
ACHIP, FHIMSS, FAMIA

Tess (Theresa) Settergren,
MHA, MA, RN-BC

PURPOSE

To 1) derive nursing knowledge models from EHR documentation and “best evidence”, 2) map the core, essential concepts, and values to data standards for interoperability, documenting heuristics, 3) submit requests for new LOINC® terms and SNOMED CT® concepts where gaps exist and, 4) disseminate the deliverables for replicability.

Mobile Health for Nursing

Co-leaders:

Tami H. Wyatt,
PhD, RN, ANEF, FAAN

Melissa C.S. Breth,
DNP, RN-BC, CPHIMS
(Outgoing)

Whende Carroll,
MSN, RN-BC, FHIMSS
(Incoming)

PURPOSE

To explore the use of mobile health (mHealth) data by nurses including both nursing-generated data and patient-generated data. Identify and support activities and resources to address unmet needs and create opportunities to utilize mHealth data within nursing workflows.

Policy and Advocacy

Co-leaders:

Brenda Kulhanek,
PhD, DNP, RN-BC,
NPD-BC, FAAN

Whende Carroll,
MSN, RN-BC, FHIMSS
(Outgoing)

PURPOSE

To elevate the voice and visibility of each workgroup’s nurse-led Big Data initiatives, including leading policy and advocacy recommendations to support the dissemination of workgroup’s leading-edge collateral and work products.

Transforming Documentation

Co-leaders:

Bonnie Adrian,
PhD, RN-BC

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

PURPOSE

To 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.

WORKGROUP ANNUAL REPORTS AND ALIGNMENT WITH THE NKBDS INITIATIVE'S VISION, MISSION AND THE 5-YEAR STRATEGIC PLAN

During the past year, some workgroups merged, and others became inactive, reflecting a better alignment between workgroups purposes and NKBDS Initiative's strategic goals.

The following summaries of the work accomplished in the past year include references to the NKBDS Initiative Vision and Mission as well as the 5-Year Strategic Plan, both of which can be found on the initiative's website: z.umn.edu/bigdata.

With the merger of the **Context of Care** and **Nursing Value** workgroups last year, this workgroup's focus was on membership and defining mutual pursuits with the objective of solidifying a plan during the conference.

The **Data Science and Clinical Analytics** workgroup prioritized publishing the 2021 Year in Review (Wieben et. Al, 2023). The aim was to perform a review of the implementation of data science-driven applications focused on structural or outcome-related nurse-sensitive indicators in the literature in 2021. Results showed that very few studies (11) reported on the implementation of data science-driven applications focused on structural- or outcome-related nurse-sensitive indicators. This gap in the sharing of implementation strategies needs to be addressed in order for these systems to be successfully adopted in healthcare settings. This work supports the use of informatics in nursing and provides evidence on the use of data science to support individuals, families, communities, and populations.

The workgroup has centered on the Real-World Project to develop Data Science infrastructure and educational resources for nurses. During this past year, the move from the Medical Information Mart for Intensive Care (MIMIC) environment to the NIH All of Us Research Program occurred. This provides access to a national cohort of almost one million participants, including electronic health records data, self-reported surveys, devices-generated data (e.g., Fitbit), and genomics. The All of Us program provides more data science

capabilities, such as incorporating Observational Medical Outcomes Partnership (OMOP) data models, and has more disparate data types (i.e., survey, genetic data). As a result, the All of Us project focusing on nursing-sensitive data elements, such as pain and pressure ulcers, was created. The project has facilitated training, enabled members to access the Workbench workspace, and move the project forward.

Another key aspect of the **Data Science and Clinical Analytics** workgroup is to build educational resources around data science, which is aligned with the overall workgroup purpose and activities. The workgroup focused on conducting OMOP model training for members, conducted national database training on the All of Us Workbench and how to build cohorts and datasets, reviewed the Data Science Roadmap for members, and worked together with members in learning the All of Us environment. The Year in Review project educated members on assessing data science information in papers more easily and is creating the foundation for the next steps in creating a more standardized data literacy that can be shared with everyone.

Some challenges were raised by workgroup members, including a need for learning how to use All of Us in the future when researchers are non-data scientists. Nursing schools that are not part of major academic health centers may not have access to All of Us, and the workgroup is considering how to facilitate that process. Similarly, international members cannot have access as US-based documentation is required to become a research user of the All of Us data. The workgroup points to the lack of nursing representation, as researchers and as nursing-specific projects with limited nursing-specific data, in the All of Us Workbench.

Moreover, the **Determinants of Health** workgroup developed an updated purpose statement that better aligns with the NKBDS Initiative's mission and Future of Nursing 2020-2030 report. The workgroup developed a common purpose and

adopted the National Academy of Medicine's (2014) Uses for Determinants of Health and conceptual and operational definitions for Health Disparities, Health Equity, and Social Determinants of Health. Additional topics discussed included incorporating systems thinking framework in planning for DoH strategy, developing a strategy on evidence-based literature, and leveraging standard codes to promote interoperability of DoH data across tools, settings, and populations. Presentations from workgroup members were provided at meetings.

The **Determinants of Health** workgroup designed the foundation for a major project which will begin in the upcoming year. The project focuses on exploring, documenting, and developing recommendations for the curation of interventions for social needs data captured via standard tools and stored in the electronic health record (EHR). The project will use the National Library of Medicine Value Set Authority Center (NLM VSAC) for SDoH and the Patient-Centered Outcomes Research Institute (PCORI) Social Needs Interventions to Improve Health Outcomes: Review and Evidence Map. To date, there are no context-specific, evidence-based recommendations for the use of interventions that supports the NLM VSAC for SDoH. The workgroup is proposing to build a crosswalk between the PCORI Social Needs Interventions to Improve Health Outcomes: Review and Evidence Map and the NLM VSAC for Social Determinants of Health. Anticipated results and implications from this project include:

1. Improve use of standard codes to document care delivery versus text-based documentation of interventions.
2. Promote evidence-based practice when intervening to ameliorate the influence of social needs.
3. Increased understanding of interventions that produce optimal outcomes (behavioral outcomes, health outcomes, utilization), the sequence, timing, and cadence of interventions that produce optimal outcomes (behavioral outcomes, health outcomes, utilization).



4. Reduce variability (e.g., interpretation) in the use of standard codes for social interventions.

This project is aligned with the initiative's mission toward leveraging informatics and data to redefine and magnify the value of nursing in all settings. Specifically, the project will focus on enhancing the use of standard codes in practice settings to allow more powerful analytics on data reflecting nursing care delivery. Further, the project reflects the purpose of the **Determinants of Health** workgroup by enhancing the use of standard codes to understand the impact of social interventions on outcomes of patient populations. Finally, it supports the Future of Nursing 2020-2030 Report Recommendation 6: "All public and private health care systems should incorporate nursing expertise in designing, generating, analyzing, and applying data to support initiatives focused on social determinants of health and health equity using diverse digital platforms, artificial intelligence, and other innovative technologies."

The **Education** workgroup produced two manuscripts, five posters, six podium presentations, and two of four webinars were completed for this reporting time period. Each manuscript, poster, presentation, and webinar

were developed to provide the background, assessments, and interventions for faculty to use and elevate the competency of their students. Each of these activities included the NKBDS information, Unique Nurse Identified, the Future of Nursing report, and the AACN Essentials as appropriate to the topic.

The **Knowledge Modeling and Encoding** workgroup managed four major projects in 2022-2023. The Venous Thrombo-Embolism Prevention (VTE) project included validation of the knowledge model through a survey of clinical subject matter experts. The survey results enabled refinement of the model and informed more accurate mapping of the elements to LOINC® and SNOMED CT® for interoperability. A journal article describing the process and results has been submitted. The Fall Prevention Knowledge model project focused on fall risk-standardized assessment tool interoperability. This process included working with copyright owners and tool developers to facilitate LOINC copyright permission and then creating the submission spreadsheets required for inclusion in LOINC. The Head-to-Toe Assessment project included collaboration with the Transforming Documentation workgroup to prepare for revisions of the nursing assessment content that currently exists in LOINC and SNOMED CT. The Pain Assessment Model Revision project reviewed the content that had been submitted to LOINC and SNOMED CT, added definitions where needed, revised observations to align with Fast Health Interoperability Resources (the newer HL7 messaging specification), and revised answer lists to ensure semantic consistency. Two additional standardized pain assessment scales were submitted to LOINC. Three new LOINC assessment terms were requested to replace the precoordinated terms in LOINC. The new terms are more generic and reusable because they are not pain-specific and therefore align with FHIR. This project team collaborated with LOINC to refine heuristics for standardized assessment scale submissions, and developing a process for the reuse of observation terms that maintains the integrity and meaning of standardized assessment scales.

The **Knowledge Modeling and Encoding** projects align directly with the NKBDS mission. Mapping nursing documentation to LOINC and SNOMED CT enables massive data extractions that can be used to validate current practice and generate new nursing insights and knowledge. Results of this effort will benefit individuals, families, and population health and healthcare delivery. Mapping nursing documentation core content to interoperable terminologies leverages informatics knowledge in a way that data and information can be used to decrease documentation burden as well as to define and magnify nursing value.

The **Mobile Health for Nursing** workgroup continued to identify the roles of nurses in mHealth development through a scoping review of the literature, inquiring through the industry, searching on the internet, and directly surveying nurses. The workgroup advocates for the inclusion of nurse informaticists in mHealth development in support of the value of nursing and promote health and healthcare in the use of mobile health. Related to the Future of Nursing Report, the workgroup advocates for an increase of nursing informatics expertise in the area of mobile health. Two papers are in progress, both of which advocate for nurses, and specifically nurse informaticists, while creating and integrating technologies (mobile health) into current health systems to promote interoperability, data access, and to promote patient access to data.

The **Policy and Advocacy** workgroup continuously disseminates the unique nurse identifier (UNI), a number that every licensed nurse in the United States possesses. When integrated into healthcare infrastructures that intersect with nursing, data can be obtained that provides insights into the work and value of nursing. The primary focus of the workgroup has been the dissemination of knowledge and understanding the purpose, potential, and presence of the UNI. Dissemination of the unique nurse identifier has occurred through publications, posters, presentations, meetings, and targeted outreach. Specifically, members of the Policy and Advocacy workgroup have presented the UNI to a HIMSS CNO/CNIO

roundtable and a New York HIMSS meeting. In addition to four journal publications, a letter to the editor was published in Nursing Outlook for clarification in response to an earlier article published in 2023 about national nurse identifier systems. The workgroup has also developed an advocacy toolkit that is designed to assist other workgroups in their efforts to disseminate their work products. **The Policy and Advocacy** work has been updated and resides in the Nursing Knowledge eRepository.

The **Transforming Documentation** workgroup's purpose and outputs focus on ways to decrease the clinical and administrative documentation burden on nurses/clinicians to enhance efficiency, effectiveness and well-being, as well as on the intentional reuse of EHR data to support evidence-based, personalized care and optimize healthcare teams' communication across the care continuum. The workgroup's purpose includes the goal of elevating the role and value of nursing through the application of informatics practices and principles.

SYNERGY ACROSS WORKGROUPS INSIDE AND OUTSIDE THE NKBDs

Several workgroups have collaborated with other workgroups, institutions, organizations, or resources, to foster their activities and achieve their goals. The **Determinants of Health** workgroup collaborated with several organizations and special interest groups, including the Gravity Project Community Meetings to support the development and use of standard codes in electronic health records, the Gravity Project FHIR Implementation Guide Workgroup calls, the HL7 FHIR SDOH Implementation Connectathons, the Center for Disease Control and Prevention's (CDC) Social Determinants of Health (SDOH) Public Health Use Case Workgroup for Chronic Disease Prevention, the HIMSS Electronic Health Record

Association, and Social Determinants of Health and Health Equity Task Force Meetings.

The **Education** workgroup has collaborated with the American Association of Colleges of Nursing (AACN), the American Nursing Informatics Association (ANIA), the Health Information Management Systems Society (HIMSS) Nursing Informatics Interest group, (HIMSS SIG), the HIMSS TIGER International Task Force, the International Medical Informatics Association (IMIA NI SIG), the Summer Institute in Nursing Informatics (SINI), and the Sigma (Sigma Theta Tau). The workgroup's membership, comprised of faculty and educators from a variety of academic and healthcare organizations, are passionate about uplifting informatics and information technology best practices competency of faculty who can then transfer that to their students. Each of these workgroups contains members who are not members of another organization and others who are members of several organizations. Together, their goals are to 1) work towards collaboration and not duplication among groups, 2) ensure coverage of all topics and work, and 3) work towards inclusivity of members who may influence this work.



The **Knowledge Modeling and Encoding** workgroup VTE project team collaborated with the Alliance for Nursing Informatics (ANI) to request survey participation with the goal of having a broad nursing representation to validate the knowledge model. The Fall Prevention Model project team worked with both LOINC staff and standardized assessment scale developers to submit the scales for LOINC inclusion and refine the heuristics for those specialized submissions. The Head-to-Toe Assessment team shared previously mapped (to LOINC and SNOMED CT) nursing assessment content with the Transforming Documentation workgroup to inform their process and decrease rework. The Pain Assessment Model team collaborated with LOINC staff to revise the standardized assessment scale submission process and with selected clinical experts to further define assessment questions/observations and the answers/values for mapping to LOINC and SNOMED CT and for new term requests.

The **Policy and Advocacy** workgroup assisted the **Knowledge Modeling and Encoding** workgroup in their data collection efforts and to encode the unique nurse identifier as a LOINC code. Additionally, the **Policy and Advocacy** workgroup has been working with the American Nursing Association (ANA) to further refine the future path for nursing data collection, based on a nursing identifier. Four proof of concept efforts related to the unique nurse identifier are in process, all of which are designed to assist with dissemination of the value of the unique nurse identifier.

The **Transforming Documentation** workgroup continued outreach and partnership with collaborative partners, including healthcare systems, EHR vendors, and clinical content partners communities. They explored and expanded cross-workgroup participation (e.g., **Encoding & Modeling, Context of Care, Nursing Value, Determinants of Health, Education, and Policy and**

Advocacy) to expand the value and vision for burden reduction efforts. The workgroup leveraged subject matter expertise, and from their previous work with the Within Defined Limits documentation, re-evaluated and considered the impact of the in-progress Head to Toe Assessment task force.

IMPACT ON INDIVIDUALS, FAMILIES, COMMUNITIES, AND POPULATIONS

All workgroups reported that their activities have impacted individuals, which is outstanding. For example, using All of Us data, the **Data Science and Clinical Analytics** workgroup has had an impact on its individual members who have been exposed to that process and created skills/knowledge on the use of All of Us data for research. The Year in Review project has helped workgroup members to understand data concepts better, and with the dissemination, it's expected to impact the overall community of nurses and other disciplines on the use of data science. The **Mobile Health for Nursing** workgroup's presentations bring awareness to individuals, primarily nurses, to increase interest and activities in mobile health development.

Workgroups that had an impact on all four groups (individuals, families, communities, and populations) are **Determinants of Health, Knowledge Modeling and Encoding, and Transforming Documentation**.



For example, the **Determinants of Health** workgroup's efforts and interaction with these groups promotes an appreciation of current developments in the DoH space.

The materials developed by the **Education** workgroup highlight how informatics and information technology are used to support and elevate individuals, families, communities, and populations, while faculty and educators focus on developing, educating, and supporting nurses who work with those same target individuals and groups.

Communities and populations have been impacted by the work performed by the **Data Science and Clinical Analytics, Determinants of Health, Knowledge Modeling and Encoding, Policy and Advocacy, and Transforming Documentation** workgroups. The work of the **Policy and Advocacy** workgroup, at this point, impacts individuals, communities, and populations. The creation of a field for the unique nurse identifier within Epic software impacts both the Epic community, the healthcare community, and ultimately individuals and populations, as nursing data is collected and analyzed to positively affect patient and caregiver, nurse, and population outcomes. The addition of the nurse identifier as a LOINC code adds another avenue for standardized data collection. Similarly, the **Transforming Documentation** workgroup's work applies to patients by standardizing and harmonizing content of the Adult Head-to-Toe admission assessment for the medical surgical unit. This will generate EHR data supportive of population health research and enhance care delivery quality and workforce well-being when burden reduction principles are applied.

ENGAGEMENT WITH THE NKBDS FRAMEWORK CORE CONCEPTS

The NKBDS Initiative's core concepts—informatics, data, and nursing—are operationalized by the initiative's workgroups to strategically lead efforts



on policy, analytics, leadership, innovation, standards, education, and practice. These concepts and interconnections generate and enable nursing insights and evidence to support care recipients, including individuals, families, communities, and populations, in and across all settings.

The main projects developed by the **Data Science and Clinical Analytics** workgroup and the Year in Review and the Real-World data projects, incorporate leadership and innovation to lead such efforts. In addition, analytics and standards are part of the process for data science projects. To achieve that, the workgroup incorporates education and clinical practice knowledge to direct actions and decision-making. The **Determinants of Health** workgroup has incorporated innovation in conducting food security studies in the PCORI report. Descriptive statistics of interventions suggested by the literature were mapped to 126 codes contained within the NLM food security VSAC, emphasizing the data aspect of their work. Data and information standards application is the main purpose of the **Knowledge Modeling and Encoding** workgroup as well. Development of the information and knowledge models and mapping the core (important) content to terminologies for semantic interoperability are at the heart of all activities. Education for the workgroup is a key aspect, including LOINC and SNOMED CT

training, understanding FHIR, and preparing content for implementation. The VTE team has submitted a journal article to inform nursing and informatics experts about the model validation and refinement process. Nursing content mapping and the challenges of mapping to SNOMED CT patient-centered concepts was presented at the SNOMED International 2022 Expo. Similarly, the **Transforming Documentation** workgroup expanded the functional success of the Admission History standardization and Minimum Data Set to the Adult Head-to-Toe Admission Assessment. Engaged and leveraged workgroup participants have had recent burden reduction success using the workgroup's guiding principles and governance tenets.

The **Education** workgroup's strategies provided to faculty highlight how each of those concepts is fundamental to developing capable and competent nurses at all levels of practice who can use information technology and informatics processes to improve health and participate in and lead the digital evolution. The "other" category relates to how informatics and information technology education aligns with competency expectations of accrediting and licensure bodies. To examine nursing practice, the **Mobile Health for Nursing** workgroup, demonstrating professional leadership, conducted, and reported literature searches, industry inquiries, internet searches, and survey administration. Leadership has been a core concept across most of the workgroups. The **Policy and Advocacy** workgroup has also demonstrated leadership and advocacy with a variety of stakeholders as it disseminated communications and education about the unique nurse identifier policy position throughout the year.

To achieve the scope and reach of the workgroups' goals over the years, several resources and tools were used. The **Data Science and Clinical Analytics** workgroup started to use the NIH All of Us Workbench resources, as it's freely and publicly available and provides several free resources for training. The user-friendly All of Us workbench helped more members engage and accomplish several steps to move the work

forward. They also used the Healthcare Data Science Roadmap concepts to deliver training to members. Several training sessions were delivered, and recordings are available upon request within the workgroup Dropbox folder, which can be used for new members or other people interested in learning more about data science concepts. The **Determinants of Health** workgroup adopted the Patient-Centered Outcomes Research Institute (PCORI) Social Needs Interventions to Improve Health Outcomes. Any study listing food security assistance, as well as other domains (102) and studies specifically focused on food security (16), were adopted. The **Education** workgroup used PubMed and other evidence-based sources of literature. These tools were the source of evidence for education gaps and methods to address the published gaps. The workgroup will be using social media as dissemination tools, including the NKBDS eRepository, YouTube, LinkedIn, Twitter, and Facebook. The **Education** workgroup is positioned to provide information, tools, and resources through multiple channels, and have these materials uploaded into the AACN Toolkit. The **Knowledge Modeling and Encoding** workgroup used several informatics resources, including the Office of the National Coordinator for Health Information Technology Interoperability Standards Advisory report and the United States Core Data for Interoperability set of data classes and standard code sets. In addition, LOINC and SNOMED educational content and heuristics were employed to map the nursing content correctly. The **Mobile Health for Nursing** workgroup used literature databases. The **Policy and Advocacy** workgroup utilized multiple informatics-focused professional organizations and publications including the resources and advocacy of the Alliance for Nursing Informatics. The **Transforming Documentation** workgroup included multiple health systems data, with EHR content and vendor community partners. This content was necessary to initiate cross-comparison efforts for data harmonization and standardization approaches.



ADDRESSING THE 5-YEAR STRATEGIC PLAN GOALS

The NKBDS Initiative's Strategic Plan goals encompass a year-round set of activities distributed among workgroups and foster nursing evidence-based informatics. They are aligned with the unique nurse identifier, the Future of Nursing Report, and the AACN Essentials. Over the year, workgroups have worked to align their activities with the initiative's strategic goals.

Several of the workgroups focused on the Future of Nursing in various aspects of their work. The **Data Science and Clinical Analytics** workgroup performed activities aligned with the Future of Nursing Report goal of reinforcing data infrastructure that adds to the value of how nurses implement research and critical thinking, based on the data. They use standards and reinforced the need for a deeper understanding of how to incorporate standards into research. These all support and provide additional resources to educate nurses at any level and in any environment. As seven of nine of the recommendations in the report (recommendations 1, 2, 4, 5, 6, 7, 9) mention social determinants of health and/or health equity, the **Determinants of Health** workgroup's project will impact: 1) the interoperability and use of determinants of health (DoH) data at the point of care, 2) the exchange of

DoH data across settings, and 3) populations and practitioners within health care and in the community. Increasing interoperability will enhance the use of standard codes, increase the usability of DoH from a Big Data perspective, and enable the measurement of nursing's value to health care outcomes. Within each of the **Education** workgroup's presentations, posters, and webinars, the Future of Nursing, as well as the unique nurse identifier and the

AACN Essentials, are included as appropriate. A roadmap for the Future of Nursing needs to be strengthened, particularly in Recommendation 6. Members of the **Education** workgroup are also working towards gathering information from other NKBDS workgroups to include in **Education** materials. Regarding the Future of Nursing Report, the **Mobile Health for Nursing** workgroup advocates for an increase in nursing informatics in the area of mobile health. They have two papers in progress and both advocate for nurses and specifically nurse informaticists while creating and integrating technologies (mobile health) into current health systems to promote interoperability, data access, and to promote patient access to data.

The year one goal for the **Policy and Advocacy** workgroup was to increase awareness of the unique nurse identifier (UNI) by increasing engagement in multiple forms of outreach. Since 2019, members of the workgroup have delivered 15 publications or presentations. Major institutions and vendors impacted during the first year of the strategic plan, including the Regenstrief Institute with the addition of a new LOINC code for the UNI, a new field for the UNI in EPIC's software, interaction with the American Academy of Nursing

and its member constituency through publication and clarification of the purpose of the UNI, collaboration with the ANA regarding the purpose and use of the UNI, and ongoing work with CMS and other government entities with future plans for using the UNI.

The **Knowledge Modeling and Encoding** workgroup's four project teams focused on the development of information and knowledge models and the refinement of nursing documentation content to enable mapping to interoperable terminologies. The overall purpose of interoperable data and information reinforces clinical system infrastructure to enable the use and reuse of data and information to generate knowledge.

Workgroups went beyond the broad focus on the NKBDS Initiative's strategic goals to foster informatics knowledge and engagement. The **Context of Care/Nursing Value** workgroup has discussed how to determine the relationship between the elements of value, compassion, engagement, caring, patient satisfaction, and connectedness to the context of care. They plan to address this by mapping nursing terms that represent compassion/caring, engagement, and connectedness, and examining the professional nurses' value of the work they provide. They plan to develop user stories in selected patient care situations like maternal health, substance

abuse, pain, and long COVID. They will then test user stories in selected patient care situations like maternal health, substance abuse, pain, and long COVID.

The **Education** workgroup also had additional goals, including: 1) ensuring that faculty and educators are aware of a gap in their own competency, 2) demonstrating how this impacts the newly licensed nurse's ability to function in a technology-rich environment, and 3) developing a Novice to Expert pathway that highlights the need for academia, operations, and vendors all collaborate. The group has focused on goals 1 and 2 and has just started to disseminate goal 3. There will be more about this in the upcoming year.

NKBDS WORKGROUP ACTION PLANS FOR 2023-2024

Workgroups review past year's goals and achievements to guide them in planning for the upcoming year. As a result, each workgroup develops an action plan. Below is a summary of the 2023-2024 action plans.

CONTEXT OF CARE/NURSING VALUE

The workgroup will focus its new activities on developing updates to existing products. These updates will continue to enable the workgroup to operationalize the essential elements that are comparable and shareable. In addition, other conceptual models related to the context of care and nursing value will be examined. The revisions will be examined with the following assumptions in mind. The products need to reflect health equity, the science of nursing, and be patient-centered. The discrete activities for the workgroup are listed below:

1. The workgroup will review and update the Nursing Value Model (NVM) to incorporate health equity content.
2. The workgroup will review and update the Nursing Data Dictionary to incorporate health equity terms and definitions. In addition, attempts will be made to define terms of the dictionary that are not already defined.
3. The workgroup will continue the crosswalk work between the Nursing Value Model and the conceptual work developed by Dr. Cathy Schwartz, a member of the team.
4. Upon completion of the work by Drs. Olga Yakusheva and Mary Ann Weiss (American Nurses' Foundation grant), the workgroup will conduct a comparison of elements across the Nursing Value Model and the model generated by their work.

The core content areas the workgroup plans to engage in to accomplish this work are the context of care, health equity, nursing value, nurses' perception of value, the patient experience, and the patient's story. In addition, these content areas will

incorporate the concepts of analytics, leadership, practice, and standards. The workgroup expresses they are fortunate to have gained new members to the workgroup who are currently employed in practice settings or in leadership roles in practice. Several new resources will be used this year within the workgroup. Dr. Cathy Schwartz has developed a conceptual model of Nursing Value, health equity content will be used, and resources related to the patient's perspective or patient story will be used. In addition, after updating the Nursing Value Model, the plan is to forward the "new" model to the Modeling and Encoding Workgroup.

The workgroup has started to develop user stories in the content areas of COVID-19 and stroke. These user stories, in addition to other practice area foci, will be continued. The workgroup will prioritize its actions on health equity with the intent of ensuring that the relevant content of Social Determinants of Health are elements incorporated into the products developed or revised. This work aligns with the NKBDS Strategic Plan, and will specifically focus on defining and mapping nursing terms that represent the elements of quality care across the care continuum; and determining and measuring the relationships between quality of care outcomes and the context of care across the care continuum.

DATA SCIENCE AND CLINICAL ANALYTICS

The workgroup will produce a Nursing Data Literacy Framework to explain key concepts about



data science relevant to nurses. This supports the mission to generate and enable nursing insights and evidence using informatics. The work will enable nurses and nurse leaders to better leverage data science and informatics for projects that improve the health of individual patients and potentially whole populations. To achieve that goal, the workgroup will provide data science and analytic experiences, training sessions, and materials to deliver the Data Literacy Framework. The workgroup will be using the All of Us research data repository to inform the development of the Data Literacy Framework as well as support the real-world data project.

Within these activities, the workgroup expects to provide examples and standards for incorporating the Unique Nurse Identifier into the OMOP Nursing Data examples. The Nursing Data Science Roadmap will be further disseminated in support of building academic practice partnerships (Future of Nursing Report) as well as disseminate the Nursing Data Literacy Framework to help educate nurses to use data and data science (AACN Essentials).

DETERMINANTS OF HEALTH

With the Phase 1 food security project, and evidence-to-code mapping project tested and finalized, the workgroup plans to publish the methodology, submit the proposal for human subjects' research approval and repeat the Phase 1 analysis of homelessness and housing security. The workgroup will continue developing methodology for Phase 2, an evidence-to-code mapping project to elicit guidance from practitioners in the field using a modified RAND/UCLA Appropriateness Method. Finally, the workgroup will submit an abstract to the AMIA Annual Symposium 2023 workshop. The workgroup will identify and review all studies listed in the PCORI report related to housing/homelessness, utilities, and transportation to document, synthesize, and analyze potential standard code mappings.

Additionally, the workgroup is seeking a new co-chair.

EDUCATION

The workgroup has added a new co-chair, Mary Jane Rivard DNP, RN-BC, to contribute her expertise to the workgroup and to increase coverage of the activities that have been in demand. The workgroup co-leaders are considering a new name to better reflect the overall mission and vision of the work as well as the novice-to-expert model and the collaborative networks that must be formed from academia, operations, vendors, and entrepreneurs that are the foundation of this work.

In the upcoming year, the workgroup is planning the following key activities:

1. Expand the reach of its products using technologies such as a YouTube channel, presentations, webinars, podcasts, in-person and virtual conferences and meetings, and other modalities to amplify the messages of the workgroup.
2. Expand Publications
 - a. Author a white paper about the best practice for informatics education.
 - b. Author a white paper about best practices for faculty onboarding of newly licensed nurses and ongoing professional development.
 - c. Develop targeted training for Super Users, etc.
3. Expand dissemination activities for nurse faculty and practicing nurses outside of informatics-focused meetings and conferences to expand the message.
4. Validate the self-assessment tool and other relevant competency assessment ideas for faculty and educators.
5. Expand the organized vetted reference list of resources and place them in the NKBDS eRepository.

The workgroup oversees incorporating all the NKBDS's Initiative's core concepts into the educational materials. In addition, the members of this workgroup will collaborate with the leaders of the other workgroups to incorporate these

concepts into materials as they emerge. Other concepts to be incorporated will encompass the development of internal and external academic practice, industry, and nurse-led or focused entrepreneurial efforts.

The new informatics and/or data resources the workgroup plans to use are: 1) best evidence to support data literacy amongst faculty and operations, 2) databases and dashboards to track Workgroup activities, and 3) LinkedIn, Twitter, and YouTube to showcase/amplify all NKBDS workgroup resources. In addition, the workgroup will target education on Generative AI, Data literacy, Messaging for Stakeholders, and Healthcare Leadership development. They will also develop REDCap surveys to collect data on abstract submissions, including translation and amplification steps.

To address the NKBDS Initiative's strategic plan goals, the workgroup will:

1. Develop a new Subgroup to address messaging.
2. Evolve the case study Subgroup to address topics such as translation and dissemination.
3. Keep the faculty self-assessment validation Subgroup. Have the Subgroup develop a Project Plan with goals, objectives, tasks, and timelines.
4. Task the eRepository Subgroup to develop and implement a strategy to organize materials that will be put into the Repository in coordination with eRepository executive leadership.
5. Incorporate the Integrated Multi-Modal Framework into a Subgroup to ensure the continuation of the validation, translation, and dissemination of the framework for faculty to use for incorporating/monitoring/evaluating competencies in undergraduate

nursing education. This will primarily be the responsibility of the developers of the Multi-Modal model: Drs. Chito Belchez, Brenda Kulhanek, Dorcas Kunkel, and Mari Tietze.

6. Ensure that Recommendation 6 of the Future of Nursing 2020-2030 and the 2021 AACN Essentials are included in the appropriate materials developed.

KNOWLEDGE MODELING AND ENCODING

New activities include adding a sub-workgroup to focus on heuristics revision and creation. The Pain and Falls sub-workgroups will continue their line of work, and the third sub-workgroup (Head-to-Toe Assessment) will be paused until the Transforming Documentation workgroup finishes its work. The workgroup also looks forward to working with a vendor partner to implement the pain model into their foundational content for user dissemination. This assists in the workgroup's efforts to move the content "into the wild."



For the workgroup to reliably provide shareable and comparable data for facilities to use in their documentation, a solid heuristic is needed. This allows the workgroup to reproduce work quickly, as the rules are already in place and allows others to contribute using defined rules. In addition,

the work of the Falls and Pain sub-workgroups to map documentation content to SNOMED CT and LOINC continues the workgroup's vision of providing nursing documentation that meets national requirements for interoperability. Interoperability impacts individuals, families, communities, and populations, as it helps share unique patient data for consistency of care and enables research opportunities both locally and nationally to impact larger groups.

To accomplish this work, the workgroup plans to focus on three core concepts: innovation, standards, and education. Innovation will be achieved by using a vendor partner to implement one of the workgroup models for the first time in clinical practice. This meets the innovation concept as a new, forward-thinking way to provide standardized documentation content mapped to standardized languages to the nursing profession. The guiding principles come from the interoperability standards set by national organizations. This alignment provides a backbone to lay the workgroup efforts. As it cannot be expected that the work will grow without the education of others, one of the workgroup's core missions is education. Their quarterly meetings are geared not toward sub-workgroup report-outs but toward the education of their members. They seek to create future leaders of this work through the use of this education.

To align with the NKBDS Initiative's strategic plan goals, the workgroup uses an identified standardized terminology code for the unique nurse identifier. The group will continue to create knowledge models and map them to national standards using standardized terminology for use in EHRs and other content vendor content, addressing the Future of Nursing Report goals. They will continue to work with the EHRs and content vendors to discuss how to implement such models and codes to achieve this vision. Regarding the AACN Essentials, they will continue to use the Education workgroup to provide content to educate bedside nurses and nurse educators at all levels about the importance of standardized data mapped to standardized

terminologies through the use of knowledge models. They will also continue to educate the workgroup about the importance of this and expand the knowledge of scale/screen developers on the importance of mapping their proprietary content to LOINC and/or SNOMED CT as applicable.

MOBILE HEALTH FOR NURSING (NEW NAME: "DIGITAL HEALTH AND INNOVATION")

The workgroup has a new name "Digital Health and Innovation" moving forward. Mobile Health for Nursing is retired as per the 2023 NKBDS conference time.

The key new activities are:

1. Creating recommendations to help nurses innovate in digital health and technology.
2. Develop guiding principles for creators to integrate unique nurse identifiers in digital health.
3. Create Digital Health and Innovation forum to bring individuals together to share knowledge and disseminate materials and resources.
4. These efforts all generate and enable nursing insights and evidence to support individuals and communities — and subsequently families and populations, in the promotion of health and the delivery of health care.

These new efforts will all impact individuals and communities, and subsequently families and populations, in the promotion of health and the delivery of health care through digital health and technology. The workgroup will promote core concepts, such as innovation and standards, through creating a community, providing resources, and sharing guidelines, especially guiding principles for creators to integrate nurse identifiers in digital health.

As a new resource, the workgroup will incorporate and/or adopt the Policy and Advocacy workgroup's recommendations for integrating unique nurse identifiers, various innovation models, and an online forum.

POLICY AND ADVOCACY

The workgroup is seeking a new co-leader to join the leadership team as they begin work on the following activities for the upcoming year:

1. Identify groups of stakeholders with specific communication needs for communication/education and collaboration regarding the NCSBN ID.
2. Collaborate with the Education workgroup to deliver enhanced communication to schools of nursing about the unique nurse identifier provided through the NCSBN.
 - a. Education for future licensed nurses about NCSBN ID
 - b. Graduate schools' opportunities for eNotify
3. Develop case studies, examples, and testimonials/videos of how systems are currently using NCSBN ID to supplement current materials and resources.
4. Expand outreach about the value of the NCSBN ID to primary care, home care, and other care settings.
5. New focus on collaboration with ANA and AAN for future NCSBN ID and other nurse identifier efforts to support the alignment of goals and efforts.

The work of the Policy and Advocacy workgroup impacts individuals, communities, and populations. The creation of a field for the unique nurse identifier within vendor software impacts both the vendor community, the healthcare community, and ultimately individuals and populations as nursing data is collected and analyzed to positively affect patient and caregiver, nurse, and population outcomes. The addition of the nurse identifier as a LOINC code adds an expanded avenue for standardized data collection by population and community. The workgroup will be leading the effort to communicate to additional stakeholders the concepts and potential of the NCSBN ID through education, presentations, publications, and additional interactions during the coming year. The efforts to increase awareness

of the NCSBN ID as the optimal unique nurse identifier for providing insight into the work of nurses through data collection will continue and expand to new stakeholders including CMS, other government entities, and additional software vendors. In addition, the workgroup will collaborate with the Education workgroup to provide additional means of communication and education about the NCSBN ID. The work of socializing the NCSBN ID will support the goals of the Future of Nursing report by expanding opportunities to collect and analyze nursing data using a standardized approach. Finally, the workgroup will support the work of the AACN essentials by providing the means to analyze nursing data as informatics competencies become better integrated throughout academia and practice.

The workgroup will also communicate and collaborate with informatics resources including the AAN through the technology expert panel, through contact with new vendors and stakeholders, through publications in additional journals, and through contacts with newly identified stakeholder organizations.

TRANSFORMING DOCUMENTATION

The new activities for the workgroup are to continue to advance current work toward the construction of minimum data set for head-to-toe physical nursing assessment of adult patients in general medical/surgical acute care hospital units. The workgroup will also prepare a white paper directed to vendors and regulatory communities on future directions for meaningful inpatient nursing care plans.

WORKGROUP MEMBERS

Context of Care/Nursing Value

Alicemary Adams
Kari Ballou
Laura Block
Whende Carroll
Barbara Caspers
Kenrick Cato
Beverly Christie
Greg Clancy
Fabio D'Agostino
Connie Delaney
Patricia Dunlap
Julia Focht
Amy Garcia
Sandy Grimm
Linda Groah
Karen Hampton
Justine Hanrahan
Robert Harrity
Andrew Hehr
Catherine Ivory
Pamela Johnson
Janice Kelly
Dorcas Kunkel
Katy Lemke
Christopher Looby
Karen Lopez
Meagan Mangus
Martin Michalowski
Laura Mickelson
Amber Olson
Suhyun Park
Lana Pasek
Belle Pearson
Jana Pownell
Lisiane Pruinelli
Cathy Schwartz
Heather Shirk
Marisa Sileo
Liz Sloss
Kimberly Stanislo
Elizabeth Swanson
Samuel Theesfeld
Joanne Thompson
Cheryl Wagner
Roxanne Wilson
Joe Zillmer

Data Science and Clinical Analytics

Bonnie Adrian
Brady Alasker
Susan Alexander
Samar Ali
Bader Alreshidi
Angela Badillo
Sophia Brown
Kenrick Cato
Cynthia Coviak
Chris Cruz
Fabio D'Agostino
Robert Davila
Ana Clara de Brito Cruz
Brian Douthit
Aissa Feldmann
Thomash Hollingsworth Forbes, III
Grace Gao
Lovely Geevarghese
Dwayne Hoelscher
Marty Illies
Alvin Jeffery
Steve Johnson
Terri Kapetanovic
Mikyoung Lee
Heidi L. Lindroth
Gregg T. Maloy
Margaret Mullen-Fortino
Aline Nomura
Michael O'Malley
Jung In Park
Suhyun Park
Michelle Pogatchnik
Jana Pownell
Lisiane Pruinelli
Anita Reger
Jethrone Role
Mary Anne Schultz
Tess Settergren
Marisa Sileo
Maxim Topaz
Pankaj Vyas
Ann Wieben
Dana Womack
Regina Wysocki

Determinants of Health

Noriko Abe
Tucker Annis
Robin R. Austin
Carly Beck
Sue Bell
Dana Bensinger
Heidi Berg
Christina Biovana-Tellez
Laura Block
Kathy Bobay
Vera Borkowski
Joyce Brettner
Christine Broadus
Terry Bryant
Rachel Childs
Robert Davila
Sarah DeSilvey
Linda Dietrich
Nancy Dutton
Maureen Dziadosz
Aissa Feldmann
Katie Feldner
Catherine Ferris
Amy Garcia
Mina Ghale
Cindy Golubisky
Ramya Govindarajan
Nicholas Guenzel
Coleen Hart
Laura Heermann
Sharon Hewner
Rachel Hodges
Lynda Hoeksema
Jeana Marie Holt
Mary Hook
Susan C. Hull
Ratachada Jantraporn
Madeleine Kerr
Rebecca Kohler
Brenda Kulhanek
Dorcas Kunkel
Malin Lalich
Karen Lane
Regan Luken
Meagan Mangus
Christie Martin
Erin D. Maughan
Donna Mayo
Kathleen McGrow
Karen A. Monsen
Lisa Moon
Ethan Mooney

Laura Munro
Susan Nokleby
Theresa Noonan
Ann O'Brien
Amber Oliver
Amber Olson
Lynn Perrine
Dawn Petroskas
Marti Rheault
Heather Shirk
Angela Smith
Kim Stanislo
Joanne Thompson
Vicky Tiase
Cyndalynn Tilley
Gwen Verchota
Prudence Vincent
Ruth Wetta
Maurice Whipple
Marisa Wilson

Education

Chito Belchez
Connie Bishop
Christina Bivona-Tellez
Juliana Brixey
Heather Carter-Templeton
Cathy Fant
Tracia Forman
Rebecca Freeman
Toni Hebda
Nancy Husson
Brenda Kulhanek
Dorcas Kunkel
Susan McBride
Susan Newbold
Barbara Pinekenstein
Andrea Plotsky
Leyla Pordeli
Mary Jane Rivard
Mari Tietze
Marie Vanderkooi
Marisa L. Wilson

Knowledge Modeling and Encoding

Mischa Adams
Samira Ali
Lisa Anderson
Rita Baroni
Erin Borland
Rachel Buchleiter

Jessica Cronin
Jodi Erpelding
Brenda Goodman
Stephanie Hartleben
Liz Harvey
Laura Heermann
Maria Hendrickson
Heather Herdman
Mary Hook
Luke Jobman
Steve Johnson
Mikyoung Lee
Michelle Leverette
Kay S. Lytle
Susan Matney
Natany Oberfrank
Lynn Perrine
Tess Settergren
Christine Spisla
Rachel Tharp
Asta Thoroddsen
Cyndalynn Tilley
Irina Tokareva
Catherine Turner
Elizabeth Umberfield
Carisa Voightman
Jessica Weaver
Bonnie L. Westra
Luann Whittenburg
Randy Woodward
Joe Zillmer

Mobile Health for Nursing

Natalya Alekhina
Caitlin Bakker
Melissa C. S. Breth
Whende M. Carroll
Grace Gao
Lisa Janeway
Catharine Karow
Mikyoung Lee
Christie Martin
Sarah Ponsonnet
Ron Ramirez
Vicky Tiase
Tami H. Wyatt

Policy and Advocacy

Kelly Aldrich
Susan Alexander
Marianne Baernholdt
Nancy Beale
Dana Bensinger
Whende Carroll
Brenda Kulhanek
Karen Dunn Lopez
Judy Murphy
Robertta Pawlak
Nur Rajwany
Joyce Sensmeier
Stephanie Stanislo

Transforming Documentation

Cheryl Abbott
Bonnie Adrian
Jessica Alexander
LeAnn Arnold
Michele Berg
Constance Berner
Amy Both
David Boyd
Chad Carroll
Terri DeClerk
Jennifer Edmiston
Meredith Farrell
Becky Fox
Susan Grossman
Cheryl Hager
Stephanie Hartleben
Janice Kelly
Michelle Martins
Samantha McCullough
Jennifer Messel
Ann Miller
Judy Murphy
Natalie Peleg
Toni Phillips
Falissa Prout
Teresa Saxon
Samantha Schmidt
Theresa (Tess) Settergren
Tiffany Shields Tettamanti
Kari Straub
Hai Ta
Johnston Thayer
Debra Vollmer
Terri Wilson

WORKGROUP PRESENTATIONS/ PUBLICATIONS/PRODUCTS

Context of Care/Nursing Value

- Karen Dunn Lopez, Nanle J. Gusen, Fabio D'Agostino. Searching for evidence of nursing caring interventions in the electronic health record. Conference Proceedings of the 14th ACENDIO Conference, March 16-18, Rome, Italy.

Data Science and Clinical Analytics

Publications:

- Wieben, A., Walden, R., Alreshidi, B. G., Brown, S., Cato, K., Coviak, C., Cruz, C., D'Agostino, F., Douthit, B., Forbes, T., Gao, G., Johnson, S. G., Lee, M., Mullen-Fortino, M., Park, J. I., Park, S., Pruinelli, L., Reger, A., Role, J., Sileo, M., ... Jeffery, A. D. (2023). Data Science Implementation Trends in Nursing Practice: A Review of the 2021 Literature. *Applied clinical informatics*, 10.1055/a-2088-2893. Advance online publication. <https://doi.org/10.1055/a-2088-2893>.
- McAllister, E., Clack, K., Davis, T., & Lee, M. A. (2023). Exploring the vulnerabilities of Texas counties with the highest COVID-19 mortality rates. *Texas Public Health Association Journal*, 75(1), 34-38.
- Schultz, M. A. (2023, May 4). Telehealth and Remote Patient Monitoring Innovations in Nursing Practice: State of the Science. *OJIN: Online Journal of Issues in Nursing*, 28(2). 10.3912/OJIN.Vol28No02ST01.

Presentations:

- Schultz, M. A. ChatGPT, Med-Palm and Bard: Try 'Em On For Size! Webinar, ALSN (Association of Leadership Science in Nursing), June 07, 2023
- Lee, M. A. Mullen-Fortino, M., Brown, S., & Pruinelli, L. Facilitators and challenges in nursing data science. 14th Acendio Conference 2023, Rome, Italy, March 2023.
- Johnson, S., Pruinelli, L., Cato, K., & Weber, P. Toward a Solid Foundation for Nurse Relevant AI and Machine Learning. 2023 ACENDIO Conference, Rome, Italy, March 2023.
- Lee, M. A., & Chung, M. COVID-19 impacts on health care access and health promotion issues

in Korean-Americans: A longitudinal study. Sigma Theta Tau International 33rd International Nursing Research Congress. Edinburg, Scotland, July 2022.

- Pruinelli, L. "Continuum Education and Impact on Patient Safety Indicators", Presentation to Professors and Students of the Research and Studies Group on Nursing, Education and Technology, UFRGS, Porto Alegre, Brazil, October 24, 2022.
- Pruinelli, L. "How Information Technology is Informed/Inform the Nursing Process", 3° International Symposium of the Nursing Process and 10° Symposium of the Nursing Process at the Hospital of Clinicas of Porto Alegre, Porto Alegre, Brazil, October 22, 2022. *Round Table*
- Pruinelli, L. "Nursing Informatics: Present and Future Perspectives", 3° International Symposium of the Nursing Process and 10° Symposium of the Nursing Process at the Hospital of Clinicas of Porto Alegre, Porto Alegre, Brazil, October 21, 2022.
- Pruinelli, L. "Big Data and Data Science Applied to Health Research". Presentation to Professors and Students from the Graduate Program of the School of Nursing, UFRGS, Porto Alegre, Brazil (October 19, 2022). *Invited*.
- Pruinelli, L. "Artificial Intelligence and Nursing: The Key Role of Nurse Leaders," HIMSS CNO-CNIO Vendor Roundtable HIMSS. (September 7, 2022). *Invited*.
- Pruinelli, L. Special Topic (15h/1 credit). Title: Big Data and Data Science. Graduate Program in Cardiology, UFRGS, Porto Alegre, Brazil, 33 multi professional students.
- Pruinelli, L. Guest Lecture, Artificial Intelligence and Nursing: Challenges and Opportunities, Georgetown University, 6 participants

Determinants of Health

- Austin, RC, Hewner, S., Wetta, RE. Examining Implications and Use of Social Determinants of Health Data presented at the proceedings of the AMIA Annual Symposium on November 5, 2022, Washington, DC.

- Wetta, R.E., Borkowski, V., Childs, R., Feldner, K.D. Mapping evidence to standard social intervention codes to support clinical practice. Presented at the proceedings of the Nursing Knowledge Big Data Science Conference June 7, 2023.
- Hewner, S., Smith, E., Sullivan, S.S. (2023). CIC 2022: Identifying high need primary care patients using nursing knowledge and machine learning methods. *Appl Clin Inform*. <https://doi.org/10.1055/a-2048-7343>
- Wilson, M.L., and Freeman, R. (2023). *Are nurses able to lead in the digital evolution? Developing an informatics competent and capable nursing workforce*. [Webinar 1 of 4]. HIMSS.
- Kulhanek, B., Belchez, C., Tietze, M., & Kunkel, D. (2023). *Are nurses able to lead in the digital evolution? Developing informatics competent nursing faculty and students*. [Webinar 2 of 4]. HIMSS

Education

Publications

- Kunkel, D. E., Tietze, M. F., Wilson, M. L., Fant, C.T., Rivard, M. J., Belchez, C. A., Forman, T. M., & Husson, N. M. (in press, 2023). Creating case studies for digital health and technology competency in nursing. *Nurse Educator*. DOI: 10.1097/NNE.0000000000001458
- Freeman, R., & Wilson, M.L. (2023). Starting at the top: Developing an informatics -competent and capable nursing workforce. *Nursing Management*. DOI:10.1097/nmg.0000000000000016

Presentations

- Belchez, C., Kunkel, D., & Kulhanek, B. (2023, May 12). *Multimodal faculty guide in integration of informatics and clinical judgment in learning activities* [Poster presentation, Video recorded]. 2023 American Nursing Informatics Association Annual Conference, Louisville, KY.
- Carter-Templeton, H. (2023, May 10). Creating academic opportunities for facilitating cross-disciplinary collaborations focused on emerging technologies for the clinical setting [Poster presentation]. 2023 American Nursing Informatics Association Annual Conference, Louisville, KY.
- Kulhanek, B., Belchez, C., Kunkel, D. & Tietze, M. (2023, April 27-29). *Rethinking the infusion of informatics into nursing practice* [Poster presentation]. HIMSS23, Chicago, IL.
- Wilson, M.L., Freeman, R., Kunkel, D., & Kulhanek, B. (2023, April 17). *Developing a workforce who thrive in a technology rich environment: A crucial conversation* [Conference panel session]. HIMSS23, Chicago, IL.
- Kunkel, D., Kulhanek, B., Wilson, M., & Freeman, R. (2022, Dec. 2). *Using a case study approach to facilitate seamless integration of Domain 8* [Conference presentation]. American Association of Colleges of Nursing, Transform 2022 Conference, Chicago, IL.
- Kunkel, D., Forman, T., Rivard, M. J., Husson, N., Belchez, C., & Tietze, M. (2022, July 14). *Transforming nursing and workforce education to meet the need for highly skilled digital health and technology competent, satisfied nursing professionals* [Virtual conference presentation, Video recording]. The 31st Summer Institute in Nursing Informatics, Baltimore, MD.
- Wilson, M.L. (2022, July 15). *Fire Side Chat: Building a solid informatics platform* [Conference presentation, virtual]. The 31st Summer Institute in Nursing Informatics, Baltimore, MD.
- Wilson, M.L. & Kulhanek, B. (2022, July 14) *Precision medicine and patient needs* [Virtual conference presentation, Video recording]. The 31st Summer Institute in Nursing Informatics, Baltimore, MD.
- Kulhanek, B., Wilson, M., Kunkel, D, & Freeman, R. (2022, July 14). *Embracing health care complexity through informatics innovations*. [Poster presentation]. The 31st Summer Institute in Nursing Informatics, Baltimore, MD. Received viewer's choice award.
- Kunkel, D., Kulhanek, B., & Wilson, M. (2022, June 8). *Nursing knowledge big data requires radical educational transformation- let's build it* [Panel discussion]. 2022 Nursing Knowledge: Big Data Science Conference, Minneapolis, MN.

Knowledge Modeling and Encoding

- “Mapping For Better or For Worse”; SNOMED International Expo 2022 (9-29-2022), Lisbon, Portugal; Presenter (online session) Tess Settergren, MHA, MA, RN-BC
- “Knowledge Modeling and Encoding”, NKBDs Pre-conference 2023 (Planned 7-8-2023); Bonnie L. Westra, PhD, RN, FAAN, FACMI & Susan A. Matney, PhD, RNC-OB, FAAN, FACMI, FHIMSS; Minneapolis, MN.
- Heuristics LOINC Standardized Assessment Scale Submissions (revised); Tess Settergren, MHA, MA, RN-BC; Unpublished.

Mobile Health for Nursing

Publications

- Lee, J., & Lee, M. A. (2022). Validation and usability study of the framework for a user needs-centered mHealth app selection. *International Journal of Medical Informatics*, 167, 104877. <https://doi.org/10.1016/j.ijmedinf.2022.104877>
- Bakker, C.J., Wyatt, T.H., Breth M.C.S., Gao, G., Janeway, L., Lee, M.A., Martin, C.M., & Tiase, V.L. (2023). Nurse roles in mHealth development: A scoping review. [Manuscript submitted for publication].

Presentations

- Bakker, C. J., Wyatt, T. H., Breth, M. C. S., Gao, G., Janeway, L., Lee, M. A., Martin, C. L., & Tiase, V. L. (2023, April 28). Roles of nurses in mHealth development [Conference presentation]. 2023 Doswell Health Informatics Conference. Dallas, TX.
- Wyatt, T. H. & Breth, M. C. S. (2022, December 13) Nurse Informaticists: Their Roles in Mobile Health Development [Webinar]. Greater Illinois Chapter of HIMSS.
- Lee, M. A., Song, M. Tyner, T. E., Davis, M.C. R., Reid, A., & Bessette, H. C. (2022, April 28). Usability and impacts of wearables for cardiometabolic health promotion [Conference presentation]. American Nursing Informatics Association 2022 Annual Conference, Hollywood, FL.

Policy and Advocacy

Publications

- Kulhanek, B., Carroll, W., Sensmeier, J., Rajwany, N., Bensinger, D., Aldrich, K., & Alexander, S. (2023). Letter to the Editor Regarding: Chan, G. K., Cummins, M. R., Taylor, C. S., Rambur, B., Auerbach, D. I., Meadows-Oliver, M., ... & Pittman, P. P. (2023). An overview and policy implications of national nurse identifier systems: A call for unity and integration. *Nursing Outlook*, 101892.
- Beale, N. J., & Rajwany, N. (2022). Implementation of a unique nurse identifier. *Nursing Management*, 53(1), 6–9.
- HIMSS 2022 (March) NI Symposium Poster: Integration of the NCSBN ID into Academic Workflow. The Nursing Knowledge: Big Data Science Policy and Advocacy Workgroup.
- Carroll, W. M. (2022). Targeted Efforts Towards Advancing Adoption of a Unique Nurse Identifier. *Online Journal of Nursing Informatics*, 26(1).
- Park, S. (2022). Expanding My Perspective on Nursing Regulation Through NCSBN Regulatory Scholars Program. *Leader to Leader*, Fall 2022, www.ncsbn.org

Transforming Documentation

Presentations

- Bonnie Adrian, Nursing Documentation Burden Reduction, Colorado HIMSS, Virtual Event, November 3, 2022.
- David Boyd, Balancing Documentation Efficiency with the Need for Discrete Data, Epic Annual User Group Meeting, Verona, WI, August 23, 2022.

NURSING TERMINOLOGIES AND/OR STANDARDS APPLICATIONS TO IMPROVE CLINICAL PRACTICE ABSTRACTS ACCEPTED FOR ORAL PRESENTATIONS

Abstract 1:

"Innovations to Adopt Documentation Standards while Evaluating the Impact on Burden"

Authors:

- Gillian Strudwick RN, PhD, Centre for Addiction and Mental Health, Toronto, ON, Canada
- Sonia Pagliaroli RN, MSc, Oracle Health, Toronto, ON, Canada
- Jessica Kemp MHI, Centre for Addiction and Mental Health, Toronto, ON, Canada

Learning Objectives:

1. Outline the current state of electronic documentation-related burden.
2. Describe approaches for improving EHR systems, guided by clinical experiences.
3. Design a strategy that focuses on enabling an effective interdisciplinary lens for strengthening informatics initiatives with a focus on EHR use and documentation burden.

Problem: Health systems throughout North America are in the midst of a human resources crisis, largely impacted by factors such as increasing job demands and burnout.¹ Nursing and health disciplines have reported increasing rates of EHR-related burnout and challenges with EHR systems.² Terminology standards and best practices have been introduced to help guide documentation design to support interoperability and variability.³ Despite this, there is a lack of information about documentation usage patterns and the ways in which these groups can be better supported. As a result, reducing the impact of EHR use and documentation burden has become a key priority as part of the organization's engagement strategy.

Solution: This presentation will share a multifaceted approach to addressing the documentation burden in nursing and other health disciplines and the Clinician Engagement Strategy used to tailor informatics solutions. Key EHR challenges, areas for improvement, and a ranked list of EHR-based solutions deemed relevant and feasible by nursing staff will be presented. The current clinical engagement strategy will be

highlighted and can be used by attendees to address clinician burnout through the reduction of excessive documentation and inefficiencies in the EHR. Strategies are aligned to national standards and across 4 domains – leveraging existing and new digital health structures, developing an interdisciplinary SWAT team, using EHR system data, and enhancing education, communication, and informatics strategies.

Impact on Clinical Practice: Improvements to EHR systems can reduce the amount of time clinicians spend on documentation or other tasks in the EHR, therefore reducing symptoms of EHR-related burnout. This allows for the allocation of more time dedicated to clinical tasks and time with patients. Resolving EHR burden can contribute to decreased rates of burnout and improve employee retention by supporting the needs of the healthcare workforce. Engaging nurses and other health disciplines in informatics initiatives also provides an opportunity for clinicians to take on valuable leadership roles in digital health which can foster a sense of personal accomplishment.

References:

1. Ghahramani, Sulmaz et al. "A Systematic Review and Meta-Analysis of Burnout Among Healthcare Workers During COVID-19." *Frontiers in psychiatry* vol. 12 758849. 10 Nov. 2021, doi:10.3389/fpsyt.2021.758849
2. Strudwick, Gillian et al. "Identifying and adapting interventions to reduce documentation burden and improve nurses' efficiency in using electronic health record systems (The IDEA Study): protocol for a mixed methods study." *BMC Nursing* vol. 21,1 213. 4 Aug. 2022, doi:10.1186/s12912-022-00989-w
3. White, Peggy, Lynn M. Nagle, and Kathryn J. Hannah. "Canadian Health Outcomes for Better Information and Care: Making the Value of Nursing Visible through the Use of Standardized Data." *Nursing and Informatics for the 21st Century—Embracing a Digital World*, 3rd Edition, Book 3. Productivity Press, 2022. 17-38.

Abstract 2:

Mapping Evidence to Standard Social Intervention Codes to Support Clinical Practice

Authors:

- Ruth E. Wetta, RN, PhD, MPH, MSN, Oracle Cerner, Kansas City, Missouri and University of Kansas School of Nursing, Kansas City, Kansas
- Vera Borkowski, MSN, APRN, FNP-C, Vanderbilt University School of Nursing PhD Student, Nashville, Tennessee
- Rachel Childs, RN, MS, MA, PMHNP, University of Utah College of Nursing PhD Student, Salt Lake City, Utah
- Katie Delaine Feldner, MSN, RN, CNN, University of Utah College of Nursing PhD Student, Salt Lake City, Utah

Learning objectives:

4. Verbalize the uses of PCORI Social Needs Intervention Report.
5. Describe how codes are used in EHRs related to the NLM SDoH value set.
6. Verbalize evidence-based interventions performed/documented in clinical practice and subsequently mapped to the NLM SDoH value set and SNOMED codes.

Problem: Evidence-based guidelines are recommended to improve practice (Guerra-Farfan et al.), yet there are no context-specific, evidence-based recommendations for the use of social interventions. The National Library of Medicine (NLM) has published a value set for Social Determinants of Health (SDoH). Similarly, in 2021, the Patient-Centered Outcomes Research Institute (PCORI) performed a systematic literature review assessing the impact of social interventions on behavioral outcomes, health outcomes, and utilization. (Viswanathan et al). This project aims to develop recommendations for mappings for NLM SDoH intervention codes for food insecurity.

Methods/Solution: Original studies in the PCORI Social Needs Interventions report were reviewed. Narrative study text describing social interventions was transferred into an Excel spreadsheet and categorized by domain,

subdomain, intervener, activity, SNOMED CT code, NLM Intervention description, and text from the study articulating intervention(s). The narrative text was deconstructed to individual activities and NLM SDoH codes were mapped to interventions and their SNOMED code. Codes were analyzed using descriptive statistics first by food insecurity only and then by food insecurity plus additional domains to describe applicable codes, their frequency of use, and intervention.

Results/Implications: To date, 124 unique codes have been mapped from the 73 studies in the PCORI report. Although interventions were performed by a variety of disciplines the most frequently listed were healthcare team members (17.6%), community health workers (11.9%), and dietician or SNAP educator (8.2%). However, the intervener was not described in nearly 29.0% of the identified interventions. Exploration of the 16 studies addressing food security only revealed that 9 of 41 (60%) codes represented the majority of mapped codes. Anticipated results of this project include: (1) improved use of standard codes to document care delivery versus text-based documentation of interventions, and (2) evidence-based support to guide use and consistent documentation of social interventions.

References

1. Guerra-Farfan, Ernesto, et al. "Clinical Practice Guidelines: The Good, the Bad, and the Ugly." Injury (2022). Print.
2. Viswanathan M., et al. "Social Needs Interventions to Improve Health Outcomes: Review and Evidence Map. Prepared by RTI under Contract No. IDIQ-TO#13-RTIEVIDENCEMAPAMPTESP and Contract No. MSA-MDB-ENG-05-26-2020, August 2021, updated December 2022.

Abstract 3:

Predictive Power of Nursing Generated Data on Patient Outcomes: A retrospective study

Authors:

- Antonello Cocchieri, PhD, MsN, RN, Assistant Professor, Cattolica University, Rome, Italy
- Fabio D'Agostino, PhD, MsN, RN, Associate Professor, Saint Camillus International University of Health Science, Rome, Italy

Learning objectives:

1. Understand how standard nursing languages have potential in predictive models.
2. Discuss nursing diagnoses on hospital admission that are independent predictors of length of stay and patient transfers to the intensive care unit.
3. Discuss how standard nursing languages can be used as a proxy for nursing complexity.

Problem: Hospital length of stay (LOS) is used as a metric for the quality of care and hospital performance (Lingsma et al.). Prolonged LOS, especially if it occurs after surgery, can be dangerous and increase the risk of both morbidity and mortality (Elsamna et al.). In addition, a prolonged LOS can lead to inefficient use of healthcare resources (Caminiti et al.). Patient transfers to the intensive care unit (PTs-ICU) are common occurrences in hospital settings. PTs-ICU are typically carried out for postoperative complications, or when a patient's care becomes more complex (Vourc'h and Asehnoune). PTs-ICU is also considered as a health outcome and a potentially hazardous aspect of hospital care that can compromise patient safety and carry inherent risks (Manataki et al.). Currently several data are available in electronic health records (EHRs) and are used for predictive models for hospital outcomes (Ng and Tan; Wu et al.). However, very few models have incorporated data related to nursing care although it is known that such data can influence these outcomes and can be also readily available within 24 h from patient admission (Sanson et al.). So far, no study has investigated the relationship between nursing care as recorded by using a standard nursing language (SNL) and PTs-ICU. The aim of this study was to develop a model by using patient information captured in the EHR to predict LOS

and PTs-ICU and to test if nursing-generated data systematically collected on patient admission with the use of SNLs such as nursing diagnoses (NDs) are independent predictors of those outcomes.

Methods/Solution: All surgical inpatients consecutively admitted to an Italian university hospital across one solar year were included in a retrospective study. Data were collected from the hospital EHRs including hospital discharge register data and nursing data such as NDs recorded within 24h of hospital admission. The number of NDs identified for each patient during the first 24h was used as an index of nursing complexity. In order to identify the predictors of LOS and PTs-ICU, six models of regression analysis and six models of logistic regression analysis were performed, respectively. The following variables were used as independent variables: NDs, All Patient Refined Diagnosis Related Groups weight (APR-DRGsw), the level of comorbidity (Charlson Comorbidity Index), modality of hospital admission, age, and gender.

Results: A total of 5022 surgical inpatients were enrolled. The mean patient age was 60.2 (SD 15.2) years, and 51.6% were female. In all six models, all variables were statistically significant predictors ($p < 0.001$) of LOS and PT-ICUs, respectively (Tables 1 and 2). In relation to LOS, compared with the base model, the last model with the addition of NDs increased the explained variance by 21.9% to 28.2%. In relation to PTs-ICU the addition of NDs increased the explained variance by 47.9% to 51.5%.

Discussion and Conclusion: NDs systematically collected on patient admission showed to be an independent predictor of LOS and PTs-ICU. To our knowledge, this is the first study to test the relationship between SNLs and PTs-ICU. Previous studies have shown that NDs have predictive power on LOS in different healthcare settings (D'Agostino et al.; Sanson et al.; Zeffiro et al.). However, this study is the first to investigate this relationship across different surgical specialties over the course of a solar year. Results of this study corroborate the impact of using SNLs to predict healthcare outcomes. Additionally, NDs collected on admission can serve as a useful measure of the complexity of nursing care required and can be used to generate predictions

about healthcare outcomes within 24 h of hospital admission. This can help healthcare providers tailor care to prevent negative outcomes, using data that nurses routinely collect in real-time.

References

1. Caminiti, C. et al. "Reducing Unnecessary Hospital Days to Improve Quality of Care through Physician Accountability: A Cluster Randomised Trial." *BMC Health Services Research*, vol. 13, 2013, p. 14, doi:10.1186/1472-6963-13-14.
2. D'Agostino, F. et al. "Nursing Diagnoses as Predictors of Hospital Length of Stay: A Prospective Observational Study." *Journal of Nursing Scholarship*, vol. 51, no. 1, 2019, pp. 96-105, doi:10.1111/jnu.12444.
3. Elsamna, S. T. et al. "Factors Contributing to Extended Hospital Length of Stay in Emergency General Surgery(Dagger)." *Journal of Investigative Surgery*, vol. 34, no. 12, 2021, pp. 1399-1406, doi: 10.1080/08941939.2020.1805829.
4. Lingsma, H. F., et al. "Evaluation of hospital outcomes: the relation between length-of-stay, readmission, and mortality in a large international administrative database." *BMC health services research* 18.1 (2018): 1-10.
5. Manataki, A. et al. "A Workflow-Driven Formal Methods Approach to the Generation of Structured Checklists for Intrahospital Patient Transfers." *IEEE Journal of Biomedical and Health Information*, vol. 21, no. 4, 2017, pp. 1156-1162, doi:10.1109/JBHI.2016.2579881.

Table 1. Stepwise regression models to predict length of stay (N = 5022).

MODEL	VARIABLES	UNSTANDARDIZED COEFFICIENTS		BETA	SIGN.	MODEL SUMMARY	
		β (95% IC)	STD. ERROR			R	ADJUSTED R ²
# 1	APR-DRG _{sw}	2.530 (2.398-2.662)	0.067	0.468	<.001	0.468	0.219
# 2	APR-DRG _{sw}	2.319 (2.187-2.451)	0.067	0.429	<.001	0.504	0.254
	NDs	0.433 (0.379-0.488)	0.028	0.193	<.001		
# 3	APR-DRG _{sw}	2.248 (2.118-2.379)	0.067	0.416	<.001	0.524	0.274
	NDs	0.366 (0.311-0.422)	0.028	0.163	<.001		
	UAdmission (ED)	3.560 (2.964-4.156)	0.304	0.145	<.001		
# 4	APR-DRG _{sw}	2.207 (2.076-2.338)	0.067	0.408	<.001	0.529	0.279
	NDs	0.361 (0.306-0.417)	0.028	0.161	<.001		
	UAdmission (ED)	3.829 (3.228-4.429)	0.306	0.156	<.001		
	CCI	0.353 (0.237-0.469)	0.059	0.073	<.001		
# 5	APR-DRG _{sw}	2.184 (2.053-2.315)	0.067	0.404	<.001	0.530	0.281
	NDs	0.347 (0.291-0.402)	0.028	0.154	<.001		
	UAdmission (ED)	3.908 (3.307-4.510)	0.307	0.159	<.001		
	CCI	0.336 (0.220-0.453)	0.059	0.069	<.001		
	Age	0.028 (0.013-0.044)	0.008	0.044	<.001		
# 6	APR-DRG _{sw}	2.162 (2.030-2.295)	0.068	0.400	<.001	0.531	0.282
	NDs	0.345 (0.290-0.401)	0.028	0.153	<.001		
	UAdmission (ED)	3.863 (3.260-4.446)	0.307	0.157	<.001		
	CCI	0.334 (0.218-0.451)	0.059	0.069	<.001		
	Age	0.026 (0.011-0.042)	0.008	0.041	<.001		
	Gender	-0.584 (-0.112- -0.126)	0.241	-0.030	<.001		

APR-DRG_{sw} = All Patient Refined Diagnostic Related Groups weight. CCI = Charlson comorbidity index. NDs = Nursing Diagnoses. UAdmission (ED) = Urgent Admission Emergency Department.

6. Ng, R. and K. B. Tan. "Implementing an Individual-Centric Discharge Process across Singapore Public Hospitals." *International Journal of Environmental Research and Public Health*, vol. 18, no. 16, 2021, doi:10.3390/ijerph18168700.
7. Sanson, G. et al. "Impact of Nursing Diagnoses on Patient and Organisational Outcomes: A Systematic Literature Review." *Journal of Clinical Nursing*, vol. 26, no. 23-24, 2017, pp. 3764-3783, doi:10.1111/jocn.13717.
8. Vourc'h, M. and K. Asehnoune. "Postoperative Admission in Surgical Icu, Less Is More?" *Anaesth Crit Care Pain Med*, vol. 38, no. 3, 2019, pp. 217-219, doi:10.1016/j.accpm.2019.03.006.
9. Wu, C. X. et al. "Effect of a Real-Time Risk Score on 30-Day Readmission Reduction in Singapore." *Applied Clinical Informatics*, vol. 12, no. 2, 2021, pp. 372-382, doi:10.1055/s-0041-1726422.
10. Zeffiro, V. et al. "Predictive Factors of a Prolonged Length of Stay in a Community Nursing- Led Unit: A Retrospective Cohort Study." *Journal of Clinical Nursing*, vol. 29, no. 23-24, 2020, pp. 4685-4696, doi:10.1111/jocn.15509

Table 2. Logistic regression models to predict patient transfers to the intensive care unit (N=5022).

MODEL	VARIABLES	B (SE)	WALD	O.R. (95% C.I.)	SIGN.
# 1	APR-DRGsw	1.368 (0.042)	1081.261	3.929 (3.621-4.263)	<.001
# 2	APR-DRGsw	1.318 (0.042)	998.730	3.734 (3.441-4.052)	0.000
	Age	0.030 (0.003)	92.024	1.031 (1.025-1.037)	<.001
# 3	Gender	-0.492 (.087)	31.715	0.611 (0.515-0.725)	<.001
	APR-DRGsw	1.292 (0.042)	956.313	3.639 (3.353-3.949)	<.001
	Age	0.030 (0.003)	87.932	1.030 (1.024-1.037)	<.001
# 4	Gender	-0.492 (0.088)	31.191	0.611 (0.514-0.727)	<.001
	CCI	-0.111 (0.020)	30.092	0.895 (0.860-0.931)	<.001
	APR-DRGsw	1.321 (0.043)	954.187	3.746 (3.445-4.074)	<.001
	Age	0.032 (0.003)	98.430	1.033 (1.026-1.039)	<.001
# 5	Gender	-0.510 (0.089)	33.175	0.600 (0.505-0.714)	<.001
	NDs	0.040 (0.009)	18.623	1.041 (1.022-1.060)	<.001
	CCI	-0.109 (0.020)	28.950	0.897 (0.862-0.933)	<.001
	APR-DRGsw	1.292 (0.043)	911.270	3.642 (3.349-3.961)	<.001
	Age	0.031 (0.003)	88.486	1.031 (1.025-1.038)	<.001
# 6	Gender	-0.511 (0.089)	33.061	0.600 (0.504-0.714)	<.001
	UAdmission (ED)	-0.542 (0.114)	22.809	0.581 (0.465-0.726)	<.001
	NDs	0.051 (0.010)	27.479	1.052 (1.032-1.072)	<.001
	CCI	-0.126 (0.021)	37.128	0.881 (0.846-0.918)	<.001
	APR-DRGsw	1.317 (0.044)	897.199	3.731 (3.423-4.066)	<.001
	Age	0.030 (0.003)	81.886	1.030 (1.024-1.037)	<.001

APR-DRGsw = All Patient Refined Diagnostic Related Groups weight. CCI = Charlson comorbidity index. NDs = Nursing Diagnoses. UAdmission (ED) = Urgent Admission Emergency Department.

Abstract 4:

Implementation of a Standardized Nursing Language System as a Care Coordination Tool in Private Primary Healthcare Service in Brazil: A work in progress

Authors:

- Sabine Azevedo, RN, Ms. Federal University of Health Sciences of Porto Alegre, Rio Grande do Sul, Brazil
- Vanessa Cardoso, RN, Ms, Unimed Vale do Taquari e Rio Pardo, Rio Grande do Sul, Brazil
- Ana Amélia Antunes Lima, RN, PhD, Federal University of Health Sciences of Porto Alegre, Rio Grande do Sul, Brazil
- Graciele Linch, RN, PhD, Federal University of Health Sciences of Porto Alegre, Rio Grande do Sul, Brazil
- Emiliane Nogueira de Souza, RN, PhD. Federal University of Health Sciences of Porto Alegre, Rio Grande do Sul, Brazil

Learning objectives:

1. Present the context of primary health care offered by health insurance in Brazil.
2. Highlight the nurse's role in coordinating care in primary health care services.
3. Identify the possibilities of data analysis with the use of a standardized nursing language system in electronic medical records and why this is important.

Problem: Encouraged by the national health agency in Brazil, private health operators are starting to structure and offer primary health care services to their customer base. Nurses have been protagonists in this structuring and, together with a multidisciplinary team, operate the services, whose main expected results are improved health status, reduced hospitalizations, patient satisfaction, improved access to care, and cost savings. In this context, nurses need ways to measure the impact of their actions as those responsible for coordinating care. This is a process that involves ensuring that patients receive comprehensive and coordinated care across different healthcare settings. In primary health,

care coordination involves working collaboratively with patients, their families, and other healthcare providers to develop and implement a patient-centered care plan that addresses their individual needs and preferences. Nurses play a critical role in care coordination in primary healthcare settings: assessing patients' needs, establishing care plans, facilitating communication, providing education, and monitoring patient progress. Therefore, it is necessary that direct and indirect care actions are standardized in electronic medical records. However, the implementation process of a standard nursing language system is complex and faces several barriers in the Brazilian context.

Solution: In the first primary health service offered by a healthcare insurer from Southern Brazil, the nurse's record in electronic medical records is structured according to the acronym SOAP (subjective data, objective data, assessment, and prescription), in which the ICNP (International Classification for Nursing Practice) is standardized language system is being implemented to record nursing diagnosis and interventions. The standardized language system ICNP can be a useful tool for assessing the impact of nursing actions as a protagonist in the coordination of care in private primary health care services in Brazil. The ICNP provides a standardized way for nurses to document patient care, which can help ensure consistency in care delivery and facilitate data collection for quality improvement purposes. The ICNP includes a set of standardized outcome indicators that can be used to assess the effectiveness of nursing interventions and their impact on patient outcomes. These indicators can be used to measure progress toward goals, identify areas for improvement, and evaluate the overall effectiveness of care. The ICNP can be used to develop individualized care plans for patients, based on their specific needs and goals. By using standardized nursing diagnoses, interventions, and outcomes, nurses can ensure that care plans are evidence-based and consistent across different care settings. The ICNP can be used to analyze data on nursing interventions and outcomes, helping to identify trends, patterns, and areas for improvement. This can inform

quality improvement initiatives and promote the delivery of high-quality, patient-centered care.

Impact clinical practice: Nurses can measure the impact of their actions on primary health services in several ways, among which are highlighted: patient outcomes - such as improved health status, reduced hospitalizations, and patient satisfaction, quality indicators - can include measures such as adherence to clinical guidelines, patient safety, and healthcare-associated infections. Performance metrics - such as patient wait times, appointment adherence rates, and patient engagement to measure the impact of their actions on primary health services. Patient feedback — nurses can gather feedback from patients through surveys, focus groups, or other means to understand how their actions are impacting patients' experiences and identify areas for improvement. Data Analytics - to identify trends and patterns in patient outcomes, quality indicators, and performance metrics to help inform quality improvement initiatives and refine nursing interventions.

A standardized nursing language system in medical records can serve as a care coordination tool to improve communication - it helps in eliminating confusion and misunderstanding and provides a common language for nurses to communicate and document care plans. Increased accuracy: ensures that the information documented in the patient's medical records is accurate and comprehensive. Enhanced continuity of care: a standardized nursing language can help ensure that all nursing professionals are on the same page regarding the patient's care needs, even as the patient moves from one care setting to another. Standardized nursing

language systems make it easier to extract data from electronic medical records for research purposes. This can lead to a better understanding of nursing care processes and patient outcomes, which can inform evidence-based nursing practice and organizational decisions. This is particularly important when patients receive care from multiple healthcare providers or when patients transition between healthcare settings. A dataset could be collected that includes information about patient characteristics, the nursing intervention provided, and the outcomes (health status, hospitalizations, visit the emergency department, patient satisfaction, access to care, and cost). Data analytics from nursing records that has a standardized language system of health primary services enable nurses to provide more personalized, efficient, and effective care to their patients, aligned with expected results. This can enable healthcare organizations to extract meaningful insights from the data and identify trends and patterns that can inform care delivery and decision-making.





UNIVERSITY OF MINNESOTA
SCHOOL OF NURSING

5-140 Weaver Densford Hall
308 Harvard Street S.E.
Minneapolis, MN 55455
www.nursing.umn.edu

**2024 Nursing Knowledge Big Data Science Conference,
June 5-7, 2024, in Minneapolis, MN.**