

Unlocking the Value of Nursing Data: An International Opinion Paper on Missed Opportunities and Policy Imperatives

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Abstract. Nurses generate vast amounts of electronic health record data that remain underutilized in practice, research, and policy. This opinion paper highlights the missed opportunities of using nursing data for improving patient outcomes, advancing informatics, guiding financial decision-making, and shaping workforce policy. Furthermore, it points out the failure to integrate nursing data in interoperability frameworks, such as the European Health Data Space and the U.S. Trusted Exchange Framework and Common Agreement. We recommend coordinated actions across all levels of the health ecosystem to integrate nursing data, ensuring its visibility, utility, and impact across health systems.

Keywords. Nursing, Nursing Informatics, Electronic Health Records, Health Information Exchange, Interoperability, Health Policy

1. Introduction

With an estimated 29 million nurses worldwide [1], nurses are the largest profession in the healthcare workforce and generate a vast amount of electronic health record (EHR) data through daily patient interactions in hospitals, outpatient facilities (e.g., nursing homes, skilled nursing facilities), and home care. Yet most of the information that nurses document, i.e., nursing data, remains largely invisible in clinical decision-making, research, and policy development. Over the past five decades, international consensus has emphasized that nursing documentation should follow the phases of the nursing process (assessment, diagnosis, planning, intervention, and evaluation) [2] and that standardized nursing languages (SNLs) are essential to ensure data comparability and interoperability. Studies have shown that the use of SNLs can promote simplified nursing documentation, improve patient outcomes, and generate interoperable nursing data [3-4].

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Despite substantial evidence and sustained advocacy from professional organizations such as the American Nurses Association [5] and the Association for Common European Nursing Diagnoses, Interventions and Outcomes [6], the adoption of standardized nursing languages (SNLs) remains the subject of ongoing debate in several countries, particularly in low- and middle-income settings [7,8]. Persistent barriers, including the high costs of implementation and translation, as well as limited engagement from EHR vendors, have hindered the effective integration of SNLs into EHR and routine nursing practice [9]. The limited implementation of SNLs further hinder health information exchange between healthcare organizations, interoperability, and create barriers for secondary use of nursing data. Consequently, the potential of nursing data to inform patient care and workforce planning is far from being realized. Importantly, the use of SNLs should complement narrative and free-text documentation, which remains essential for capturing the relational and contextual dimensions of nursing care that are difficult to codify.

There are examples from countries that have made an effort to overcome the aforementioned limitations. For instance, in the Netherlands, a large majority of home care nurses are using the Omaha System at the point of care documentation, resulting in standardized nursing data [10]. A study showed promising aspects for including these nursing data into a nationwide database with routinely recorded data from other healthcare professionals in primary care [11]. Another example is an initiative in the U.S. to include hospital-level standardized nursing data in a statewide repository for use in research and clinical practice [12]. In this case, SNLs are not consistently used at the point of care; thus, researchers have leveraged an artificial intelligence (AI)-assisted process to perform the data standardization [13].

2. Objective

The purpose of this paper is to share experts' opinions on how to enhance the use of EHR-nursing data, and why it matters for patient outcomes and the nursing profession itself. This paper builds on an academic exchange between two institutions in the Netherlands and the U.S. to explore the integration of nursing data into a large multidisciplinary data repository. During a one-month visit to an American University, a Dutch researcher participated in site visits and collaborative meetings with nursing and health informatics experts to understand how nursing data are generated, standardized, and integrated within clinical research networks. Reflective dialogues and field observations informed an analysis of the similarities, differences, and opportunities in leveraging nursing data for clinical, research, and policy purposes. The researchers synthesized their perspectives and proposed strategies for advancing the visibility and use of nursing data across health systems. This exchange was not designed as formal qualitative research and therefore did not follow established reporting guidelines.

3. Missed Opportunities

From a nurse's perspective, real-world nursing data offers a rich, real-time view of patient status, care processes, and outcomes. These data can support clinicians in decision-making at the point of care. In addition, nursing data can measure the impact of nursing interventions on patient outcomes. Therefore, the use of nursing data in

dashboards and EHR-predictive models, for example, could help multidisciplinary care teams to improve patient outcomes, quality, and safety of patient care.

From a researcher and informatics standpoint, the limited use of nursing data provides missed opportunities to gain more knowledge about nursing diagnoses, interventions, and outcomes, without adding documentation burden or other research-based activities. In addition, limited use of nursing data in AI models introduces bias and limits model generalizability. Most predictive models rely primarily on physician-entered data, excluding the nuanced observations of nurses. This results in missed opportunities to strengthen the models with important data points about patient care.

In policy, nursing data could measure the contribution of nurses to patient care. More specifically, it could inform managers about the impact of a nursing team with a certain skill mix on patient outcomes, supporting their staffing decisions. In addition, nursing data could support the evaluation of the cost-effectiveness of care, resulting in optimization of the healthcare workforce. Without the visibility of the impact of nursing on patient outcomes, this profession remains undervalued in strategic decision-making.

From a financial perspective, the underutilization of nursing data represents a significant missed opportunity. Nursing care accounts for a large proportion of healthcare expenditures, yet most health systems lack visibility into how specific nursing activities influence costs and outcomes [14]. Standardized nursing data could provide evidence on the cost of interventions or whether specific staffing models prevent costly adverse events. Without these insights, financial decisions are often made without considering the full value of nursing contributions, leading to underinvestment in the workforce and missed opportunities for cost savings. Harnessing nursing data for financial analytics would enable organizations to align staffing, resource allocation, and care models with demonstrable return on investment, ultimately supporting both fiscal sustainability and improved patient outcomes [15].

Collectively, these missed opportunities illustrate that the limited visibility of nursing data is not merely a technical challenge but a structural policy issue. Without consistent inclusion of nursing data in national and international interoperability standards, the full contribution of nursing remains unmeasured, undervalued, and underrepresented in health system analytics. Addressing this gap requires coordinated policy action to embed nursing perspectives and standardized data elements into the core of health information exchange frameworks.

4. Policy and Regulatory Considerations

Global health data initiatives are rapidly advancing to enable the discovery, sharing, and re-use of health information, yet nursing data remains largely absent from these frameworks. This exclusion risks perpetuating the structural invisibility of nursing in health information governance. For example, the European Health Data Space (EHDS), adopted in 2025, establishes mechanisms for data exchange and secondary use across the European Union [16]. However, nursing information for primary use and data exchange appears only in the ‘Discharge Report’, omitting the rich body of data nurses generate daily across healthcare settings. Without explicit inclusion of nursing diagnoses, interventions, and outcomes, the EHDS fails to reflect the full spectrum of patient care.

In the United States, the Office of the National Coordinator for Health Information Technology (ONC)’s Trusted Exchange Framework and Common Agreement (TEFCA) [17] creates a national “on-ramp” for data exchange, anchored in the U.S. Core Data for

Interoperability (USCDI+) [18]. Yet the USCDI+ continues to exclude data elements representing the actual care delivered by nurses at the bedside. As a result, nursing data remain siloed in free text or proprietary formats, invisible to decision-makers and absent from predictive models. Expanding the USCDI+ to incorporate SNLs would provide an essential pathway to correct this imbalance.

Failure to integrate nursing data into these regulatory frameworks has tangible consequences. Policymakers and health leaders lack visibility into the contribution of nursing to outcomes, costs, and workforce planning. This blind spot weakens not only nursing but also the broader health data ecosystem, leading to incomplete quality metrics, biased AI models, and inefficient staffing policies. Nursing leaders included in governance bodies such as EHDS advisory councils and TEFCA Qualified Health Information Network (QHIN) governance must advocate for the inclusion of nursing data to ensure these policies reflect the realities of frontline care.

5. Discussion and Conclusion

Unlocking the value of nursing data requires coordinated actions across all levels of the health ecosystem. Each stakeholder has a distinct responsibility to ensure nursing data is visible, standardized, and actionable. We recommend that:

- Nurses should co-create EHR systems that align with the nursing process and support high-quality documentation. By asking for access to their own data and seeking feedback loops on documentation quality, nurses can strengthen both patient care and data integrity.
- Healthcare organizations must invest in EHRs that embed SNLs and workflows. Contracting with vendors should include requirements for nursing data capture and interoperability. Appointing nursing informatics leaders, such as Chief Nursing Information Officers, ensures nursing perspectives are represented in data governance and digital transformation efforts.
- Vendors must incorporate AI tools to suggest standardized terms or automate routine entries can reduce workload while increasing data quality without burdening frontline staff.
- Researchers should prioritize the secondary use of nursing data in predictive models, comparative effectiveness studies, and workforce analyses. Collaborations across nursing, informatics, and computer science can generate robust evidence of nursing's contributions to outcomes and efficiency.
- Policymakers must expand interoperability frameworks to explicitly include nursing diagnoses, interventions, and outcomes. Nursing representatives should be appointed to advisory boards and governance bodies to ensure that health policies reflect the realities of frontline care.

Excluding nursing data is not a neutral oversight. It actively perpetuates blind spots in patient safety, quality measurement, and workforce policy. Although aligning nursing data infrastructure requires upfront investment, these costs are offset by long-term gains in efficiency, patient outcomes, and system sustainability. At a time of global nursing shortages and escalating healthcare demands, the visibility of nursing contributions is essential. Now is the moment for nurses, organizations, vendors, researchers, and policymakers to act together to unlock the full potential of nursing data.

References

- [1] World Health Organization. Nursing and midwifery [Internet]; c2025 [cited 2025 Oct 15]. Available from: <https://www.who.int/news-room/fact-sheets/detail/nursing-and-midwifery>
- [2] De Groot K, Triemstra M, Paans W, Francke AL. Quality criteria, instruments, and requirements for nursing documentation: A systematic review of systematic reviews. *J Adv Nurs*. 2019 Jul;75(7):1379-1393. doi: 10.1111/jan.13919
- [3] Bertocchi L, Dante A, La Cerra C, Masotta V, Marcotullio A, Jones D, Petrucci C, Lancia L. Impact of standardized nursing terminologies on patient and organizational outcomes: A systematic review and meta-analysis. *J Nurs Scholarsh*. 2023 Nov;55(6):1126-1153. doi: 10.1111/jnu.12894
- [4] Macieira TGR, Chianca TCM, Smith MB, Yao Y, Bian J, Wilkie DJ, Dunn Lopez K, Keenan GM. Secondary use of standardized nursing care data for advancing nursing science and practice: a systematic review. *J Am Med Inform Assoc*. 2019 Nov 1;26(11):1401-1411. doi: 10.1093/jamia/ocz086
- [5] American Nurses Association. Position statement: Inclusion of recognized terminologies supporting nursing practice within electronic health records and other health information technology solutions; c2015 [cited 2025 Oct 15]. Available from: <https://www.nursingworld.org/globalassets/docs/ana/inclusion-of-recognized-terminologies-within-ehrs-and-other-health-information-technology-solutions.pdf>
- [6] Association for Common European Nursing Diagnoses, Interventions and Outcomes (ACENDIO). Position statement: Supporting and advancing EHealth [Internet]; c2017 [cited 2025 Oct 15]. Available from: https://acendio.net/wp-content/uploads/2018/06/ACENDIO-position_statement-1_supporting_and_advancing_nursing_practice_171015.pdf
- [7] Visintini E, Chiappinotto S, Palese A, Saiani L. The use of standardized nursing languages in electronic medical records: an exploratory study on opportunities, limitations, and strategies. *Assist Inferm Ric*. 2024 Jan-Mar;43(1):16-25. Italian. doi: 10.1702/4250.42267
- [8] Ghimire A. A call to action to close the global digital divide in nursing: Clinical nursing information systems and standardized terminologies in low and middle-income countries. *Health Informatics J*. 2026 Jan-Mar;32(1):14604582251406986. doi: 10.1177/14604582251406986
- [9] Cristina Dos Santos F, D'Agostino F, Härkönen M, Nantshev R, Christensen B, Müller-Staub M, De Groot K. Improving the quality of nursing care through standardized nursing languages: Call to action across European countries. *Int J Med Inform*. 2024 Dec;192:105627. doi: 10.1016/j.ijmedinf.2024.105627
- [10] De Groot K, De Veer AJE, Paans W, Francke AL. Use of electronic health records and standardized terminologies: A nationwide survey of nursing staff experiences. *Int J Nurs Stud*. 2020 Apr;104:103523. doi: 10.1016/j.ijnurstu.2020.103523
- [11] Rooden SM van, Groot K de, Francke AL, Bakker DH de, Schoenmakers TM, Verheij RA. Routine health data from home care into NIVEL Primary Care Database: a feasibility study [Internet]; c2017 [cited 2025 Oct 15]. Available from: <https://www.nivel.nl/nl/publicatie/routine-zorggegevens-uit-de-wijkverpleging-nivel-zorgregistraties-een>
- [12] Macieira TGR, Yao Y, Marcelle C, Mena N, Mino MM, Huynh TML, Chiampou C, Garcia AL, Montoya N, Sargent L, Keenan GM. Standardizing nursing data extracted from electronic health records for integration into a statewide clinical data research network. *Int J Med Inform*. 2024 Mar;183:105325. doi: 10.1016/j.ijmedinf.2023.105325
- [13] Macieira TGR, Bjamadottir RI, Salgado PO, Baranwal A, Semenov A, Priola KB, Pestana P, Okafor S, Mena N, Montoya N, Sargent L, Presley A, Yao Y, Keenan GM. Making nursing visible: AI-assisted standardization of electronic health record interventions using generative pre-trained transformer models and retrieval-augmented generation process. *Nurs Outlook*. 2025 Sep-Oct;73(5):102494. doi: 10.1016/j.outlook.2025.102494
- [14] Yakusheva O, Lee KA, Weiss M. The Nursing Human Capital Value Model. *Int J Nurs Stud*. 2024 Dec;160:104890. doi: 10.1016/j.ijnurstu.2024.104890
- [15] Yakusheva O, Weiss M, Mulvey T, Castillo AF, Cámpoli M. A "Re-Imagining the Economic Value of Nursing" Summit: Summary and Recommendations. *J Nurs Adm*. 2025 Sep 1;55(8):465-471. doi: 10.1097/NNA.0000000000001611
- [16] European Health Data Space. Updates [Internet]; c2025 [cited 2025 Oct 15]. Available from: <https://www.european-health-data-space.com/>
- [17] ONC TEFCA Recognized Coordinating Entity. TEFCA – What is the Trusted Exchange Framework and Common Agreement? [Internet]; c2025 [cited 2025 Oct 15]. Available from: <https://rce.sequoiaproject.org/tefca/>
- [18] Office of the National Coordinator for Health Information Technology (ONC). USCDI+ [Internet]; [cited 2025 Oct 15]. Available from: <https://www.healthit.gov/topic/interoperability/uscdi-plus>