

# Nursing Informatics Research Trends: Findings from an International Survey

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**Abstract.** This follow-up survey on trends in Nursing Informatics (NI) was conducted by the International Medical Informatics Association (IMIA) Student and Emerging Professionals (SEP) group as a cross-sectional study in 2019. There were 455 responses from 24 countries. Based on the findings NI research is evolving rapidly. Current ten most common trends include: clinical quality measures, clinical decision support, big data, artificial intelligence, care coordination, education and competencies, patient safety, mobile health, description of nursing practices and evaluation of patient outcomes. The findings help support the efforts to efficiently use resources in the promotion of health care activities, to support the development of informatics education and to grow NI as a profession.

**Keywords.** Nursing informatics, big data, artificial intelligence, survey, trends

## 1. Introduction

This past decade has been witness to an expansion in the depth and breadth of nursing informatics (NI) research. In practice, there has been an emphasis on the importance of nursing involvement in health technology design and implementation in organizations around the world [1-3]. NI scope and roles are constantly evolving and nurses, leaders and organizations are required to adapt to increasing demands that changes bring as new knowledge emerges and technologies are implemented into practice. There is much effort in nursing education and leadership to strategize how to prepare nursing students and nurses on different levels with the knowledge, skills and tools necessary to provide safe and high-quality patient care in this ever-changing and technology-rich environment [4-5]. Previous research has addressed NI research trends up until 2015 [6-8], but the quickly evolving nature of technology and changing healthcare environment provides the rationale for re-examining the current NI trends internationally.

An exploration of NI trends aids in identifying gaps in the current state of the literature; thus, informing the appropriate allocation of resources to develop the NI profession, and further, refine the body of literature as well as describe NI education needs. This study builds on work from 2015, where the International Medical Informatics Association (IMIA) Nursing Informatics (NI) Student and Emerging Professionals (SEP) group conducted a survey on research trends in NI. The aim of this paper is to describe current trends in NI research as perceived by NI experts internationally in 2019.

## 2. Methods

This study had a cross-sectional design. Data were collected with an updated version of the original questionnaire used in 2015 [6-8]. The questionnaire had 7 demographic questions (including profession, degree, possible degree in NI, position, work experience, experience in NI and country of residence) and 12 open-ended and closed-ended questions about the state of NI. The survey was available in nine languages (Arabic, English, French, Korean, Simplified Mandarin, Traditional Mandarin, Portuguese, Spanish and Swedish).

Snowball sampling was used. The invite to the survey was distributed throughout the NI community through personal contacts, and additional invites were sent by these personal contacts. Here, we report responses to the question “*In your opinion, what are the current research trends in nursing informatics in your country?*” Each respondent was able to select a maximum of five topics from a predefined list of 36 items. Data were

collected online from June to October in 2019. The IRB assessment was done by the ethics committee at the University of Turku (49/2018) in Finland.

### 3. Results

A total of 455 NI experts from 24 countries responded to the question on current research trends in NI. Respondents were from five World Health Organization regions: 31.2% (n=141) reported being from the Region of the Americas, 28.8% (n=130) from the Western Pacific Region, 18.1% (n=82) from the European Region, 14.2% (n=64) from the South-East Asia Region, and the remaining 7.7% (n=35) from the Eastern Mediterranean Region. The majority were registered nurses (90.8%, n=413), while the rest reported their profession as other (e.g. professor, lecturer, informatician, clinical data specialist). Reported highest educational qualification were as follows: 46.8% (n=213) held a master's degree, 25.1% (n=114) a bachelor's degree, 20.7% (n=94) a PhD degree, and 4.6 % (n=21) held a diploma. A total of 39.1% (n=178) of respondents reported to work in a clinical role, 29.9% (n=136) in the academia, 27.0% (n=123) in an administrative role, and 4.6 % (n= 21) in the industrial setting. The respondents mean work experience was 19.1 years (SD 12.0) and their mean experience in informatics was 7.23 years (SD 7.96). Current research trends reported are presented in Table 1.

**Table 1.** Current research trends reported by experts in nursing informatics (n=455). Presented from the most frequently reported to the least frequently reported with counts and percentages.

Order	Topic	n*	%
1	Clinical Quality Measures (i.e. eMeasures)	199	9.65
2	Clinical decision support	181	8.77
3	Big Data	169	8.19
4	Artificial intelligence (AI)	141	6.83
5	Care coordination	116	5.62
6	Education and competencies	102	4.94
7	Patient safety	87	4.22
8	Mobile health	85	4.12
9	Description of nursing practices	82	3.97
10	Evaluation of patient outcomes	74	3.59
11	Data exchange and interoperability	73	3.54
12	Effect of informatics/technology on process of care	72	3.49
13	Implementation of information technology tools in practice	54	2.62
14	Telehealth	52	2.52
15	Development of new information technology tools	50	2.42
16	Handoffs (of any type or setting)	45	2.18
17	Patient engagement	45	2.18
18	Development of predictive models	42	2.04
19	Information system (data entry) burden	39	1.89
20	Patient centered outcomes research	38	1.84
21	Data mining	36	1.75
22	Nursing management decision support	32	1.55
23	Patient privacy	30	1.45
24	Simulations	30	1.45
25	Data science	27	1.31
26	Standardized terminologies: content analysis/development	27	1.31
27	Standardized terminologies: clinical evaluation/implementation	26	1.26
28	Usability	23	1.11

Order	Topic	n*	%
29	Knowledge discovery in databases	18	0.87
30	Nursing informatics theory	16	0.78
31	Sensor technology	15	0.73
32	Genomics	11	0.53
33	Understanding of cost and benefits of health information technology	9	0.44
34	Text mining and natural language processing	7	0.34
35	Visualization	7	0.34
36	Other (virtual reality, blockchain technology, patient as resource)	3	0.15

\* Note: One respondent was able to choose up to 5 trends from the predefined list of 36 items.

#### 4. Discussion

Overall, the results showed that the focus of the top research trends in NI has changed when compared to the findings from a similar survey done in 2015 [6-8]. New emerging research trends focus on artificial intelligence (AI) and care coordination, and only two out of the top five research trends in 2015 overlap with the research trends reported in 2019. These two areas of interest were research on big data and clinical decision support. The biggest change seen was a decrease in NI research prioritization on standardized terminologies, which was one of the most frequently reported areas of interest in 2015. Further, international experts successfully forecasted only six out of ten research trends for the upcoming five years in 2015 [8]. These six trends included big data science, education and competencies, clinical decision support, mobile health, patient safety, and clinical quality measures. However, forecasted trends which did not end up in the top ten trends in 2019 included standardized terminologies, usability, data exchange and interoperability, as well as patient engagement. This indicates a rapidly changing and evolving field.

The results show that the current top 5 research trends in NI research include clinical quality measures, clinical decision support systems, big data research, AI and care coordination. Recently clinicians have raised concerns related to the development and implementation of AI and how innovations such as intelligent robots will impact practice and the nursing profession [9]. These findings reflect a shift in the current years regarding an increased demand for evaluating delivered care [10], an increase in the use of the large amount of data available for research [11], and an increase in discussions around the use of AI in health care [12]. Although, there has been a considerable amount of work on informatics education and competencies for nurses in different roles [13-14], educational programs still fail to adhere to standardized criteria for NI education and the need for educating NI educators [4]. These results signal for a rapid need of inclusion of these technologies in nursing education, preparing the nurses to understand and be ready for a modified health care environment, where not just technologies, but “intelligent” systems are implemented in clinical practice in a fast way.

There is a rapid change in the nursing environment with the implementation of new technologies. For example, the current survey reinforces an emerging trend on AI. A recent workshop discussed AI in the field of nursing from social, ethical and legal points of views. This workshop resulted in many recommendations on what should be the directions for the next years to support nurses in steering the development and adoption of AI technologies in the health care setting and nursing practice [15]. Educational and clinical education on the development, efficacy, and implementation for better explanatory models should be prioritized in the coming years to make sure nurses are

comfortable in using AI technologies. It is also emerging the need of rethinking nursing care in the lenses of this new trend and how to make nurses better users of technology. Future research is systematically needed to stay up to date with evolving trends in NI and to explore the impact of the COVID-19 pandemic on NI education, research and practice.

## 5. Conclusions

Current top five research trends in NI include clinical quality measures, clinical decision support systems, big data research, AI and care coordination. The findings show that top research trends have changed when compared to findings from 2015 and that NI research is evolving rapidly. This puts pressure on NI education on all levels. The nursing profession would be well advised to continue and advance these topics in curriculums and clinical practice, and ensuring nurses are knowledgeable about these technologies and their use.

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