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Nursing Informatics Research Priorities for the Future: Recommendations from an International Survey

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Abstract. We present one part of the results of an international survey exploring current and future nursing informatics (NI) research trends. The study was conducted by the International Medical Informatics Association Nursing Informatics Special Interest Group (IMIA-NISIG) Student Working Group. Based on findings from this cross-sectional study, we identified future NI research priorities. We used snowball sampling technique to reach respondents from academia and practice. Data were collected between August and September 2015. Altogether, 373 responses from 44 countries were analyzed. The identified top ten NI trends were big data science, standardized terminologies (clinical evaluation/implementation), education and competencies, clinical decision support, mobile health, usability, patient safety, data exchange and interoperability, patient engagement, and clinical quality measures. Acknowledging these research priorities can enhance successful future development of NI to better support clinicians and promote health internationally.

Keywords. nursing informatics, future trends, big data, standard terminologies, informatics competencies

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1. Introduction

The discipline of nursing informatics (NI) has evolved significantly over the past several decades. NI is often defined as a specialty that integrates nursing, informatics, and computer science to promote health [1]. NI has contributed to a number of achievements and is considered a well-developed practice and research discipline aligned under the broad umbrella term of health informatics. Nevertheless, despite NI advancements associated with care provision, patient engagement, decision support and patient safety, for example, research funding may be hard to acquire [2-3]. For instance, a recent literature review found that 63% (n=17) of the studies included in the review were based on unfunded research or did not report any funding sources for research [3]. An exploration of research needs from both academia and practice are needed to support efficient use of available resources to better support clinicians and promote health.

Exploring important research areas identified by professionals may help in directing future research efforts. We recently conducted an international survey aimed to describe current and future research trends of NI. The study was conducted by the International Medical Informatics Association Nursing Informatics Special Interest Group (IMIA-NISIG) Student Working Group. In this paper we present a subset of the study results: an overview of future NI trends as reflected by the responses of 373 international NI researchers and practitioners.

2. Methods

This study had a cross-sectional survey design with online data collection using Google forms. The questionnaire was developed based on current NI literature [4-5] to explore current and future trends in NI. The questionnaire was iteratively developed, revised and edited by members of the student group. We sought feedback from international NI experts, which included those identified through the IMIA-NISIG leadership or individuals with multiple publications examining informatics trends. Based on the expert recommendations and feedback, we revised the questionnaire until a final version was developed. The online survey version was pilot-tested to assure its adequate functionality before the international distribution.

The IMIA-NISIG Student Working Group members were invited to collaborate in the study. Collaboration involved distributing an invitation letter and link to the survey. Seventeen students from thirteen countries actively participated in distributing the survey through their professional networks. An ethical review was applied from the ethics committee of the University of Turku (Finland) as the study was coordinated from this university. The committee considered the research plan ethically approvable.

The questionnaire was translated into six different languages (Arabic, English, Korean, Portuguese, Spanish and Swedish) by native speaking student working group members with a background in informatics. These translations were then validated by at least two other native speaking NI professionals.

The following inclusion criterion to participate was communicated in the survey invite: any nurse (or other allied health professional) with experience in NI either in practice or academia. We targeted professionals from both academia and practice in order to get a comprehensive picture of current NI research trends and to also explore

research needs identified by clinicians. We used snowball sampling technique to reach as many international respondents as possible.

The questionnaire consisted of twenty-four questions with structured and open-ended response options. Eight of these were demographic questions including: 1) professional background, 2) highest degree received, 3) clinical position, 4) academic position, 5) years of NI experience, 6) NI education, 7) country, and 8) city. The remaining sixteen questions covered the current state and future trends of NI.

This paper focuses on the following question covering future trends of NI: "In your point of view, what should the research focus in NI be over the next 5 to 10 years?". Participants were asked to choose up to 5 options from a checklist of 31 research priorities. The 31 topic priorities in the checklist were informed by current NI literature [4-5] and consultation with various nursing informatics experts. An 'Other' option with narrative text was also available. The full list of priority areas is available upon request. Data were collected between August and September 2015.

3. Results

From a total of 402 respondents, 373 (92.7%) answered the question focusing on identifying NI research priorities over the next 5 to 10 years. These responses were submitted from 44 different countries in Asia, Africa, Australia, Europe, North and Central America, and South America. The vast majority of the respondents were nurses (90.3%) with educational degrees, including Bachelors (28.8%), Masters (39%), PhDs (29.3%) and other (2.9%). The respondents' in clinical positions were divided into staff (31.9%), middle management (25.8%), upper management (16.8%) and other (25.5%), and the respondents in academic positions were students (22.4%), teachers or instructors (16.6%), professors (38.2%) and other (22.8%). About one third of the respondents (34.5%) had received formal education in NI but more than half of the respondents (57%) had not, a further 8.5% of the respondents were identified as current students of NI, professionals with other NI education (e.g. taken NI courses) or education in another informatics field (e.g. medical informatics). Figure 1 presents the distribution of the top 10 research priority areas identified by the respondents.

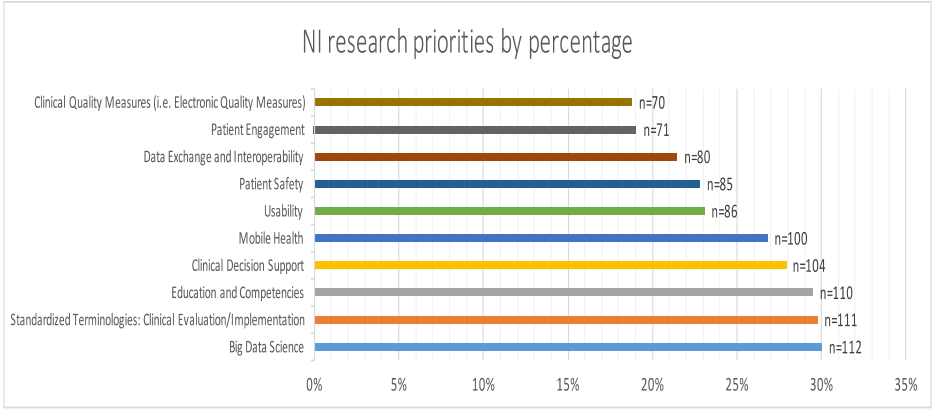

Figure 1. NI research priorities as identified by 373 respondents.

4. Discussion

About one third of the survey responders (30%) indicated 'big data science' as one of the top research priorities for NI in the future. The term 'big data' refers to large, multi-dimensional, often interdisciplinary data sets that may be analyzed using diverse computational techniques to reveal patterns, trends, and associations related to promoting health [6-8]. Big data analytics can enable better comparative effectiveness research, personalized medicine, predictive modeling, and health risk stratification, among other areas [6]. Further development of nursing big data science is therefore critically important. Several key research directions might be considered based on recent literature [6, 8]. First, there is a need to further develop methods to extract and standardize nursing data, such as wide scale use of standard nursing terminologies. Advanced analytic techniques, such as natural language processing that enables automated data capture from free text clinical narratives [9] or data mining techniques that enable pattern recognition [10], should be adapted for nursing data analysis. In addition, comprehensive ways of data harmonization between nursing and other interdisciplinary health data [11] should be developed. The overall vision of this collaboration is to support sharable and comparable nursing data across settings.

Our survey offered two options of priority areas concerning standard terminologies: 'standard terminology content analysis and development' or 'standard terminology clinical evaluation and implementation'. Participants chose the second option (29.8%) almost twice as often as the first option (15.5%), suggesting that significantly more applied terminology research is needed. This might be explained by a well described gap in nursing standard terminology: numerous nursing terminologies exist on national and international levels, but only a few are integrated into real world electronic health record systems [12-13]. Even when integrated, each terminology uses a unique code, and it is not possible to compare data across different terminologies. As a result, the ability of nursing professionals to generate and communicate standard nursing data is limited. Our results underscore the need to focus on making nursing terminologies more relevant in clinical practice and research into making nursing data exchangeable and interoperable. This is consistent with recent reports calling for a critical need in data harmonization and standardization [14].

Another important research priority identified in this survey was developing nursing informatics education and competencies (29.5%). This priority was also one of the central themes discussed by the survey participants in the open-ended question on advancing the discipline. Several other research priority areas identified in this survey were related to patient centeredness issues, such as patient safety (22.8%) or engagement (19%). This might be related to the general health policy trends in many countries supportive of a more personalized and safe healthcare by encouraging the adoption of health information technology, for example the Meaningful Use regulations in the U.S. aimed at improving patient engagement and safety [15].

Some research priorities identified by our study are already reported by current literature. For example, a recent review identified the following emerging themes in NI: decision support tools, interdisciplinary communication, medication administration, nursing terminology, nursing workflow efficiencies, patient engagement, and technology interventions [16]. The generalizability of our results is limited by our sampling technique that only reached certain organizations and a small numbers of participants from certain countries and geographic regions (e.g. we had a high number of responses from the USA but a low number of responses from African countries).

4.1. Conclusions

In this paper we present an overview of future NI trends as reflected by the responses of 373 international NI researchers and practitioners from 44 countries. This study was conducted by the members of IMIA-NISIG Students Working Group. We identified a top ten central priorities list for future NI research, including: big data science, standardized terminologies (clinical evaluation/implementation), education and competencies, clinical decision support, mobile health, usability, patient safety, data exchange and interoperability, patient engagement, and clinical quality measures. Acknowledging these research priorities can enhance successful future development of NI to better support clinicians and promote health internationally.

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