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Advancing Nursing Informatics in the Next Decade: Recommendations from an International Survey

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Abstract. In the summer of 2015, the International Medical Informatics Association Nursing Informatics Special Interest Group (IMIA NISIG) Student Working Group developed and distributed an international survey of current and future trends in nursing informatics. The survey was developed based on current literature on nursing informatics trends and translated into six languages. Respondents were from 31 different countries in Asia, Africa, North and Central America, South America, Europe, and Australia. This paper presents the results of responses to the survey question: "What should be done (at a country or organizational level) to advance nursing informatics in the next 5-10 years?" (n responders=272). Using thematic qualitative analysis, responses were grouped into five key themes: 1) Education and training; 2) Research; 3) Practice; 4) Visibility; and 5) Collaboration and integration. We also provide actionable recommendations for advancing nursing informatics in the next decade.

Keywords. Nursing informatics, future trends, big data science, standard terminologies, informatics competencies

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1. Introduction

Nursing Informatics (NI) integrates nursing, informatics and computer sciences to promote human health. To date, some significant achievements by NI pioneers include development of several standard terminologies [1] and implementation of effective interventions to improve patient outcomes [2]. However, there are many areas for future development, for example, creating and integrating NI education into nursing curricula; a challenge remaining in many countries [3]. There are also several significant barriers that hinder the implementation and meaningful use of nursing information systems, such as clinical decision support systems [4].

Recurring questions around NI priorities for the future have been raised by in recent discussions within the International Medical Informatics Association – Nursing Informatics (IMIA-NI) Student Working Group. To address these questions, our student group created and distributed an international survey of current and future NI trends in the summer of 2015. This paper presents the thematic analysis of recommendations on the advancement of NI as reflected by responses of 272 international NI researchers and practitioners.

2. Methods

Survey creation and distribution: This cross-sectional survey explored current and future trends in NI. The survey was disseminated electronically and responses were collected using Google Forms. Questionnaire development was iterative and informed by current NI literature [5-6]. The final questionnaire was translated into six languages (Arabic, English, Korean, Portuguese, Spanish and Swedish). Each translation was conducted by a nurse with a background in informatics and who spoke the native language. Translations were validated by at least two other native speaking NI professionals and revised until a final version was generated. Qualitative responses from the various translated versions of the survey were translated to English. Translations of survey responses were conducted by the same nurses who translated the original survey questions; each translated response was validated for accuracy by one or two additional native language speakers who were also fluent in English. The study received a supportive ethical statement from the University of Turku, where it was coordinated. Data were collected between August and September 2015. Any nurse (or other allied health professional) with experience in NI (clinical or academic) was eligible to participate. We used snowball sampling to reach as many international respondents as possible. The questionnaire consisted of twenty-four questions and both structured and open-ended response options. There were eight demographic questions (professional background; highest degree received; clinical or academic role; years of NI experience; country and city) and sixteen questions on the current state of nursing informatics. This paper focuses on qualitative responses to the question: "*What should be done (at a country or organizational level) to advance NI in the next 5-10 years?*"

Qualitative thematic analysis: Narrative responses were independently analyzed by two authors experienced with qualitative data analysis (CR, MT). To analyze the responses, we used thematic analysis: a qualitative descriptive approach for identifying, analyzing and reporting themes within data [7]. Each response was first independently examined by two authors and one or more themes for each response were suggested in a spreadsheet. After an initial categorization of all responses, the authors discussed the

themes that emerged and consolidated a list of five major themes. Each author went back and examined each of the responses in relation to the broader themes identified. The themes for each response were merged and the two authors achieved consensus on the themes for each response [7]. The results were shared with two other members of the student group for validation.

3. Results

Out of 402 total survey participants, 272 (67.7%) responded to the question regarding recommendations on the advancement of NI. Responders were from 31 different countries in Asia, Africa, North and Central America, South America, Europe, and Australia. The majority of respondents were nurses (87.8%) with Bachelors (28.25%), Masters (39.75%), and PhD (28.75%) degrees. Clinical roles ranged from staff (33%), middle management (25.8%), upper management (16.4%), or other (24.8%). Those identifying with academic roles included students (22.9%), teachers/instructors (16.9%), and professors (36.4%). The 57.8% of respondents did not receive formal education in NI, 32.9% received formal NI education, and 9.3% were current students or received education in another informatics field.

4. Discussion

Five key themes were identified among the narrative responses: 1) Education and training; 2) Research; 3) Practice; 4) Visibility; and 5) Collaboration and Integration.

1) Education and Training: Specific details of respondent recommendations centered on training and specialized NI education. For instance, a prevalent sub-theme related to the need to develop and deliver specialized informatics education across various nursing roles (e.g., from students to leadership), and making available advanced NI education for those who wish to pursue NI specialization. Incorporating NI as a mandatory component of nursing education and training was another salient sub-theme. Specifically, aiming for the inclusion of informatics as required learning in undergraduate nursing curriculums, for staff nurses, and for nurses in leadership and administrative roles, were noted as important goals to target in the near future. This theme aligns with recent literature reports identifying the critical need in integration of NI education into nursing curricula and practice internationally [8].

2) Research: In general, several respondents explained the rationale for more research in NI, e.g., "Continue conducting research showing the impact of NI on improving patient care via improved decision making by nurses." Additionally, even in countries where NI funding seemed to be more available, participants felt that NI specific funding opportunities should be increased (for instance by the National Institute of Nursing Research in the U.S.).

3) Practice: Interestingly, participants from countries with either low or high health information systems adoption rates indicated that better and more prevalent nursing systems are critically needed. Several participants suggested making those systems obligatory for nursing documentation and reporting, similar to what was done for physicians in the U.S. under the Meaningful Use regulations [9]. Another practice sub-theme was a recommendation on an increased support for professional roles such as Chief Nursing Information Officers (CNIO) or other types of field informatics

specialists: "*Every organization should include the position of CNIO*". Another frequent theme was the creation of more nursing specific information systems. Finally, several participants recommended improving systems' usability, for example, "*Enhancing nursing information systems usability and better understanding of the use of structured vs. unstructured documentation by demonstrating the impact on patient outcomes.*"

4) Visibility: Responses highlighted the need for increased awareness of what NI is, its relevance in health systems and the representation of NI at leadership, organizational, and policy levels. The suggestion to "*Demand a seat at the table when decisions are being made related to health information technology at all levels*", reflected a common sentiment across responses. To improve the visibility of NI and its representation, respondents mentioned the need to demystify NI within nursing and across other disciplines. Clearly linking nursing specific data in electronic health records to health outcomes and improved decision-making was identified as another key strategy for improving the visibility of NI and establishing its centrality as part of nursing work.

5) Collaboration and Integration: The need for integration of NI as part of the larger informatics and health fields included two key sub-themes: i) the need for integration of all health disciplines as key components of information systems; and ii) multi-disciplinary collaboration in the strategic planning, development, implementation, and evolution of the various health informatics disciplines. Respondents suggested maximizing impact of health informatics as a whole by establishing a common voice: e.g., "*Develop…informatics initiatives that demonstrate a united front across a broad range of nursing and non-nursing organizations.*" Finally, combining resources at the international level, among various nursing organizations, between research and practice, and integrating this collaborative and multidisciplinary approach into nursing education, was identified as key strategy.

Table 1. Summary of recommendations based on thematically grouped survey responses.

Topic	Recommendations
Education and training	Integrate NI contents into all levels of nursing curricula.
	Provide continuous, practice-relevant NI education opportunities to practicing nurses and other interdisciplinary stakeholders.
	Prepare more nurses with NI background to enrich the current teaching workforce.
Research	Create more funding opportunities for NI research (at a government and other levels).
	Existing research funding institutions (e.g., the National Institute of Nursing Research-NINR- in the U.S.) should allocate NI specific funds.
Practice	Make nursing information systems a requirement for all the nurses to improve patient outcomes.
	Increase support for roles such as Chief Nursing Information Officers or other types of field informatics specialists at organizational/country levels.
	Create better, more nursing specific and usable information systems.
Nursing informatics visibility	Increase awareness of NI relevance in health systems, and the representation of NI at leadership, organizational, and policy levels.
	Create clear linkages between nursing data and health outcomes and improved decision-making by nurses in the current information systems.
Collaboration and integration	Create tangible strategies for integration of all health disciplines as key components of health information systems.
	Increase multi-disciplinary collaboration to advance development, implementation, and evolution of the various health informatics disciplines.
	Combine resources at the international level, among various nursing organizations, between research and practice, and integrate collaborative and multidisciplinary approaches as foundations in NI education.

Limitations: Our study has several limitations. First, the generalizability of our survey results is limited due to small numbers of participants from certain geographic regions (e.g. from African countries). The snowball sampling approach was also limited by the reach of our respective networks and only reached certain organizations and practitioners while others were not included.

5. Conclusions

This study describes one of the largest international surveys on the future trends in NI with respondents from 31 countries. Other previous studies have surveyed nursing informatics at an international level [10-11]. However, previous studies have focused on solely research priorities; this survey includes inquiry about NI practice. Our qualitative analysis revealed five central areas of recommendation for advancing NI research and practice in the next 5-10 years: 1) Education and training; 2) Research; 3) Practice; 4) Visibility; and 5) Collaboration and integration. The recommendations identified in this study point to actionable steps needed to move NI forward in practice and address the NI research priorities identified in other recent studies [10]. More insights from the survey can be found here [12] and other upcoming publications.

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