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International Priorities for Research in Nursing Informatics for Patient Care

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Abstract

The Nursing Informatics International Research Network (NIIRN) is a group of experts who are collaborating on the development of internationally relevant research programs for nursing informatics. In this paper we outline key findings of a survey exploring international research priorities for nursing informatics. The survey was available online during May-August 2012. Respondents were asked to rate each of 20 listed research topics in terms of respondent's views of its priority for nursing informatics research. 468 completed surveys were received representing respondents from six World Health Organization regions. The two most highly ranked areas of importance for research were development of systems to provide real time feedback to nurses and assessment of the impact of HIT on nursing care and patient outcomes. The lowest ranked research topics were theory development and integrating genomic data into clinical information systems. The identification of these priorities provides a basis for future international collaborative research in the field of nursing informatics.

Keywords:

Nursing informatics, research, health information technology, health informatics, survey.

Introduction

Most countries are vigorously engaged in the process of implementing Health Information Technology (HIT) systems as a way of improving the efficiency, quality and safety of care that patients receive, often supported by significant Government investment (e.g. UK: £12.4 billion, US: $19 billion, Canada: $2.1billion)[1-3]. Although there is a growing evidence base related to the design and evaluation of HIT, it is predominantly focused on medical rather than nursing practice. Internationally, nurses are the largest part of the professional health care workforce, and as such represent a significant potential user group of HIT technology. However to date research on designing HIT systems to support nursing practice, and methods of evaluation of those systems to assess their impact on the work practices of nurses have been limited. The Nursing Informatics International Research Network (NIIRN) is a multidisciplinary group of experts collaborating on the development of internationally relevant research programs for nursing informatics.

As a first stage in the development of the research agenda for the network, we sought input from researchers and practitioners with an interest in nursing informatics regarding their views of key research priorities, in particular to identify areas of importance internationally which would benefit from an international collaborative research approach. There have been previous studies focusing on the identification of research priorities for nursing informatics in the USA [4, 5]. However, there has been little consideration of the research priorities from an international perspective. In this paper we outline the initial findings of an international survey exploring research priorities for nursing informatics.

Materials and Methods

To identify initial priorities for research we carried out a survey of individuals representing research, practice and education in the area of nursing informatics internationally.

Survey Design

The initial draft survey was based on a variety of sources, including previous published surveys of research priorities for nursing informatics [1, 2] and brainstorming by mixed groups of experts. We constructed an initial set of research topic areas based on a previous survey of priorities [4] and an updated list of these original priorities [5]. In January 2012, NIIRN held two teleconference meetings (attended by members of the network from the UK, USA, Canada, Mexico, Australia and Austria), where additional brainstorming of key ideas from an international perspective was carried out. Finally, at a meeting of the National Nursing Strategic Taskforce for Nursing

Informatics (NNIST) in the UK, a similar brainstorming exercise was conducted. The ideas and issues identified by NIIRN and NNIST that were not part of the priorities originally identified in previous surveys were added to the final survey instrument. New items were added only if judged by all network members to be potentially high research priorities for the field of nursing informatics. The new items related to effective ways of training nurses in the use of HIT systems, impact of e-prescribing, assessment of the impact of decision aids for patients on shared decision making and the use of social media in nursing practice.

The survey was developed to be completed online (using the Bristol Online Survey software http://www.survey.bris.ac.uk). Respondents were asked to provide basic demographic data (e.g. country where they work, age, primary area of work). Respondents were then asked to rate each of 20 research topic areas on a 10 point scale to reflect its priority for nursing informatics research, from 1 (low priority) through to 10 (high priority).

Survey Distribution

An email to potential participants inviting them to take part in the survey was sent out via a variety of existing mailing lists, with the permission of the regulator for the site. This included members of: the British Computing Society (BCS) Nursing group; the Royal College of Nursing (RCN) eHealth group (UK); the AMIA Nursing Informatics Working Group; the Alliance for Nursing Informatics (US); the Canadian Nursing Informatics Association; Nursing Informatics Australia; Health Informatics Association of Australia; Royal College of Nursing Australia; the Austrian Medical Informatics and eHealth working group; the International Health Terminology Standards Development Organization Nursing Special Interest Group. In addition, the invitation was distributed via LinkedIn Networks, Twitter and individual contacts from network members. The invitation included a link to the online survey and provided information on the purpose of the survey. The survey was open to both nursing and non-nursing respondents between May and August 2012. Additional responses were also received from participants at a workshop on the work of NIIRN at the NI2012 conference held in Montreal, Canada in June 2012. Ethical approval to carry out the online survey and collect data at the NI2012 workshop was provided by the School of Healthcare Research Ethics committee, University of Leeds, UK and the Human Ethics Research Board, University of Victoria, British Columbia, Canada.

Analysis

Survey data were extracted from the survey database and email addresses of respondents were removed to anonymise data. Descriptive statistics were performed on demographic data. Country data were grouped into regions based on WHO world regions including: Europe, Western Pacific, South East Asia, the Americas, Eastern Mediterranean and Africa [6]. Mean rankings were calculated by region and then the mean of regions was calculated (to prevent a weighting of responses towards the Americas). As noted by others conducting internet based surveys [7], since we did not know the total number of individuals who received the survey, we were not able to calculate a survey response rate.

Results

Survey Response and Demographics

A total of 468 responses were received. Only two responses were received from Africa, both from South Africa. Three responses were received from the Eastern Mediterranean (East Med) region, one each from Iran, Saudi Arabia and Jordan. There were nine responses from South East Asia, 4 from Thailand, 3 from Indonesia and one each from India and Bangladesh. A total of 61 responses were from countries in the Western Pacific, including 42 responses from Australia, 8 from Japan and 5 from the Philippines. The largest number of respondents were from the Americas (n=222) including 181 responses from the United States, 21 responses from Canada and 8 responses from Brazil. There were 171 responses from Europe including 73 from the United Kingdom, 29 from Portugal and 13 from Switzerland. Table 1 shows the number of responses and mean age by region. We provided an option to not state age, yet most of the respondents provided their age (n=435, 93%). The average age of respondents was different across regions with respondents from the Americas, the Western Pacific and Europe older than those from South East Asia and Africa.

Table 2 shows respondents' primary occupations by region. Informatics specialists (n=185; 40%) formed the largest group followed by academics or researchers (n=110; 24%). The types of occupations in the 'other' category included vendor (n=2), regulatory body (n=5), consultant (n=6), and other (n=4). The categories for occupation were mutually exclusive, so it is possible that respondents had more than one role.

Table 1 – Number of Responses and Mean Age by Region

Region	N	Mean Age (SD)	N reporting Age
Europe	171	46.6 (9.9)	161
Western Pacific	61	47.7 (8.9)	60
South East Asia	9	38.1 (10.5)	8
Americas	222	51 (9.9)	201
East Med	3	45.3 (18.8)	3
Africa	2	41.5 (0.7)	2
Total	468	48.6 (10.1)	435

Table 2 – Primary Occupations of Respondents by Region

	Occupation n (%)					
Region	**Nurse**	**Admin**	**Informatics**	**Academ/ Research**	**Other**	**All**
Europe	42 (55)	41 (52)	37 (20)	47 (43)	4 (24)	171 (37)
Western Pacific	6 (8)	16 (20)	27 (15)	9 (8)	3 (18)	61 (13)
South East Asia	3 (4)	1 (1)	0	4 (4)	1	9 (2)
Americas	25 (32)	19 (24)	120 (65)	49 (45)	9 (53)	222 (47)
East Med	0	1 (1)	1 (.5)	1 (1)	0	3 (.6)
Africa	1 (1)	1 (1)	0	0	0	2 (.4)
Total n (%)	77 (16)	79 (17)	185 (40)	110 (24)	17 (4)	468

Table 3 – Mean Scores for Research Topics by Region and Ranked by Overall Highest to Lowest Scores

			Region, Mean priority score (rank for region)					
Rank	**Research Topic Areas**	**Mean of region means** n=468	**Europe** n=171	**Western Pacific** n=61	**South East Asia** n=9	**Americas** n=222	**East Med** n=3	**Africa** n=2
1	The development of electronic information systems that can provide real-time feedback to nurses about their practices/health care delivery to improve safety	8.82	8.76 (3)	8.98 (2)	8.00 (8)	9.02 (2)	8.67 (5)	9.50 (1)
2	Evaluation of the impact of HIT systems for nursing care (e.g. EHR) on outcomes for patients (safer care, better patient outcomes)	8.69	8.86 (1)	9.07 (1)	8.78 (1)	9.08 (1)	8.33 (9)	8.00 (6)
3	The development of decision support systems specific to nursing practice decisions	8.50	8.02 (13)	7.97 (14)	8.00 (8)	8.68 (3)	9.33 (1)	9.00 (2)
4	Investigation of the impact of HIT systems for nursing care (e.g. EHR) on nurses' work practices and workflow	8.49	8.08 (10)	8.84 (3)	8.56 (4)	8.48 (6)	9.00 (3)	8.00 (6)
5	The design and management of nursing information databases for use in patient management, clinical records and research	8.45	8.25 (7)	8.62 (4)	8.44 (5)	8.06 (13)	9.33 (1)	8.00 (6)
6	Effective ways of training nurses in the use of HIT to support new care delivery models	8.41	8.42 (4)	8.34 (9)	8.67 (3)	8.52 (3)	8.00 (13)	8.50 (4)
7	The identification of outcomes associated with the quality of nursing care that are important to patients, which can be used to evaluate the quality of care provided by nurses	8.25	8.78 (2)	8.52 (6)	8.75 (2)	8.59 (4)	8.33 (9)	6.50 (15)
8	Evaluation of the impact of e-prescribing systems on nursing care, medication safety and patient outcomes	8.09	8.17 (8)	8.54 (5)	7.56 (13)	7.63 (18)	8.67 (5)	8.00 (6)
9	The role of patient-held electronic records on participation in their care, and quality of care	8.07	8.03 (12)	8.07 (13)	7.33 (15)	8.17 (9)	8.33 (9)	8.50 (4)
10	Evaluation of the impact of HIT systems for nursing care (e.g. EHR) on outcomes for staff (e.g. less documentation, faster documentation)	8.06	8.14 (9)	8.44 (7)	8.44 (5)	8.35 (7)	6.00 (20)	9.00 (2)
11	Evaluation of the impact of standardized nursing documentation content/meaning on the utility of information for feedback and quality improvement	8.00	8.32 (5)	8.43 (8)	8.11 (7)	8.14 (10)	9.00 (3)	6.00 (19)
12	Identification of users' (nurses, patients, families) health information needs to inform the design of HIT systems	7.94	7.82 (16)	7.92 (16)	8.00 (8)	8.13 (11)	8.33 (9)	7.50 (11)
13	The role of mobile technology (e.g. use of smart phones, tablet devices) in supporting nurses deliver high quality and safe health care	7.82	8.26 (6)	8.33 (10)	7.56 (13)	8.28 (8)	7.00 (16)	7.50 (11)
14	Assessment of if and how decision aids for patients improves shared decision making between patients and nurses	7.82	7.98 (15)	8.16 (11)	7.78 (11)	7.82 (16)	8.67 (5)	6.50 (15)
15	Investigation of how telecommunications technology and telehealth initiatives impact on nursing practice (e.g. in providing care to individuals in remote and rural areas)	7.63	7.82 (16)	7.80 (17)	7.11 (16)	8.08 (12)	7.00 (16)	8.00 (6)
16	The development, validation and formalization of nursing language terms, taxonomies and classifications to support interoperability between HIT systems	7.58	8.06 (11)	8.16 (11)	6.89 (18)	7.85 (15)	7.00 (16)	7.50 (11)
17	The development of more advanced methods for measuring the impact of HIT nurses' work and communication patterns	7.41	7.69 (18)	7.97 (14)	7.11 (16)	7.86 (14)	7.33 (14)	6.50 (15)
18	Investigation of how social media (e.g. Twitter, Facebook) may affect the ways patients interact with health care providers including nurses.	7.38	6.41 (19)	6.98 (19)	7.78 (11)	6.94 (19)	8.67 (5)	7.50 (11)
19	Theory development to support the design of HIT that better meets the information and practice needs of nurses	7.10	8.02 (13)	7.61 (18)	6.63 (19)	7.69 (17)	6.67 (19)	6.00 (19)
20	Integrating genomic data (information specific to the genetic makeup of patients) into the HIT systems used by nurses to inform nursing care	6.20	5.67 (20)	5.74 (20)	6.11 (20)	5.87 (20)	7.33 (14)	6.50 (15)

Priorities for Nursing Informatics Research

Table 3 shows the research topic items ranked in order of overall highest to lowest mean priority scores. Using overall ranking, the five most highly ranked areas of importance for research were: systems that provide real-time feedback to nurses to improve safety; assessment of the impact of HIT on nursing care; decision support systems for nurses; investigation of the impact of systems on workflow; the design and management of nursing information databases. The lowest ranked areas of research importance were theory development and integrating genomic data into clinical information systems.

Overall there was general agreement across the regions on the importance of the 2 highest ranking items (the development of information systems that can provide real-time feedback; evaluation of the impact of HIT systems on patient outcomes) and the two lowest ranking items (theory development and integration of genomic data into clinical information systems). However, there were differences across regions; the most notable being differences in the ranking for the development of decision support systems (overall ranked as 3) which was ranked as 13 by respondents from Europe, 14 by respondents from the Western Pacific and as 3 by respondents from the Americas. The item ranked as 5 overall (the design and management of nursing information databases) was considered to be one of the top ten priorities by respondents from Europe, the Western Pacific, South East Asia, Eastern Mediterranean and Africa (ranked 7, 4, 5, 1 and 6 respectively) but was only ranked as 13 in importance by respondents from the Americas. Another difference noted was in relation to item 8 (the evaluation of e-prescribing systems on nursing care), which was ranked 8th by respondents from Europe, 5th by respondents from the Western Pacific and Eastern Mediterranean and 6th by respondents from Africa but 18th in importance by respondents from the Americas and 13th by respondents from South East Asia.

Discussion

The purpose of this survey was to identify internationally important research priorities for nursing informatics. We found that the most highly ranked research topics across the WHO world regions included the development of systems that provide real-time feedback to nurses to improve safety, the impact of systems on nursing care, decision support systems for nurses, and the impact of systems on workflow. It is noticeable that these priority areas focus on issues of importance to nurses working in clinical practice. Areas that are more removed from practice, such the development of theory to support the design of HIT systems and the use of genomic data, were ranked as being the lowest priority for research.

While others have identified research priorities for nursing informatics at a country specific level [4,5], to our knowledge, this is the first survey that has attempted to identify international priorities for nursing informatics research. In 2008, Bakken and colleagues asserted that while many of the research priorities identified by Brennan et al. were still relevant, the "aspects of context" related to the nursing informatics research agenda had dramatically changed and that evolving contextual factors (e.g., genomic health care, shifting research paradigms, and social technologies) must be addressed when formulating a nursing informatics research agenda [5]. Despite these technological advancements our respondents did not feel that they are high priorities. This is an interesting finding and perhaps reflects the stage of HIT implementation across different international health care systems. A previous international survey of the impact of HIT on nursing practice indicated that the overall approach to HIT adoption was different in US than in other developed countries (England, Scotland, Ireland, Australia, and Finland). For example, in the US, nurses were much more likely to have access to HIT in acute hospital settings. In the non US countries, the focus was much more on population management and nurses were more likely to have access to HIT in primary care settings (where more patients are likely to benefit) [8,9]. This regional difference may also explain variation in importance associated with the introduction of nursing information databases and decision support systems. In the Americas the challenges of nursing information databases could be perceived by respondents as being largely met so decision support is seen as the next step forward, whereas in other regions nurses may be in the process of implementing nursing information databases and are some distance away from being able to implement decision support systems. With an increasing focus internationally on the introduction of HIT systems across all health care settings, it is understandable that the focus of nurses involved in this process will be on how to evaluate such systems and ensure that they provide improvements in patient care. Our results indicate that many of the priorities identified and presented 15 years ago at Medinfo in Seoul, South Korea by Brennan and colleagues are still deemed valid by both US and international respondents.

The sophistication of nursing informatics research has also increased with a move away from descriptive and feasibility studies to more complex multi-method and trial designs that focus on measurement of the impact of technologies on nursing practice and on the quality and safety of care provided by nurses [10,11]. However, despite these advancements, it is apparent from our survey results that internationally there is a need to develop the evidence base further to explore how we can best support nursing practice and improve the quality of care provided to patients. From a research perspective, the lack of importance attached to the development of theory to support the design of HIT to meet the needs of nurses could be a concern. Health informatics draws on a variety of theories from different academic disciplines (e.g. information science, systems theory, implementation science). From the qualitative responses associated with this survey item it was clear our respondents recognized this, and felt that it was more appropriate to ensure existing theories were utilized appropriately to help inform the design and implementation of HIT to help support nursing practice, than develop new theories.

Overall we found that while some areas of research were more highly ranked than others, there is wide agreement that all of the areas of nursing informatics research identified on the survey are of high priority with 19/20 (95%) achieving mean priority scores of greater than 7/10 and with 100% achieving mean priority scores of greater than 6/10. The ranking provides a means for prioritization of research efforts by NIIRN and others, but also affirms that much research is needed within the field of nursing informatics. Given the results of the survey, NIIRN's activities will now be focused on developing a program of work that addresses the research priorities ranked internationally as the most important by our respondents. This includes identifying the current evidence base associated with systems that have been designed to provide real-time feedback to nurses about health care quality such as quality dashboards and scorecards. We will also be exploring and refining the specific research issues within the two top priority areas in more detail, to enable us to develop internationally focused and relevant research studies. NIIRN comprises of international experts across the field of nursing informatics, health informatics, human computer interaction, psychology,

patient safety and health services research. This multi-disciplinary focus will be crucial for future developments in our research program.

This survey has some limitations that deserve consideration. The survey relies on self-reported data and nonprobability sampling methods were employed to recruit participants. The web-based survey and nonprobability sampling method limit the generality and validity of the results [7]. In particular these limitations may have led to a potential bias in the results from countries in Europe and the Americas. Web-based surveys limit respondents to those who have access to the Internet and those with sufficient computer literacy skills and time to complete a survey online. There were also some issues with the description of research topic areas, which could encompass multiple research topic themes within the same statement. Future research will concentrate on refining the highest ranked topic areas. Finally, while some differences in the ranking of priorities were noted by region, these results must be interpreted with caution due to the limited response rates in the following WHO world regions: South East Asia (n=9), Eastern Mediterranean (n=3), and Africa (n=2).

Conclusion

The results of our survey highlight that there is considerable agreement internationally regarding the key priorities for the field of nursing informatics research. The two most highly ranked areas of importance relate to provision of real-time feedback to support nursing practice, and the impact of HIT on nurses' work and patient outcomes. NIIRN will be using these research priorities to develop a research agenda which has international relevance for nursing informatics. As a first step the network is currently in the process of evaluating the evidence base associated with the HIT systems designed to provide provision of real time feedback to nurses on areas of nursing practice and care quality.

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