Towards an international framework for recommendations of core competencies in nursing and inter-professional informatics: the TIGER competency synthesis project

Ursula HÜBNER[a1], Toria SHAW[b], Johannes THYE[a], Nicole EGBERT[a], Heimar MARIN[c], Marion BALL[d]

[a] *Health Informatics Research Group, University AS, Osnabrück, Germany*
[b] *HIMSS North America, Chicago, USA*
[c] *Federal University of Sao Paulo, Brazil*
[d] *IBM Research, USA*

Abstract. Informatics competencies of the health care workforce must meet the requirements of inter-professional process and outcome oriented provision of care. In order to help nursing education transform accordingly, the TIGER Initiative deployed an international survey, with participation from 21 countries, to evaluate and prioritise a broad list of core competencies for nurses in five domains: 1) nursing management, 2) information technology (IT) management in nursing, 3) inter-professional coordination of care, 4) quality management, and 5) clinical nursing. Informatics core competencies were found highly important for all domains. In addition, this project compiled eight national cases studies from Austria, Finland, Germany, Ireland, New Zealand, the Philippines, Portugal, and Switzerland that reflected the country specific perspective. These findings will lead us to an international framework of informatics recommendations.

Keywords. Informatics competencies, nursing, inter-professional care, education

1. Introduction

Inter-professional, interconnected care processes and measurable health outcomes are shaping health care today in a way that seemed impossible just a decade ago. This change of practice must be reflected by the recognition of new informatics competencies in benefit of the interdisciplinary health care workforce. IT support of inter-professional care, quality development, and process management overlay more basic approaches of utilising health IT. Nurses, often working as process managers, have a long history of overseeing the patient trajectory and nursing informatics has always taken this into account [1].

Due to the paramount importance of education in changing healthcare towards a safety and outcome culture, national and international recommendations in medical and health informatics education were published in the last few years [2-6]. Recently the

[1] Corresponding Author. Prof. Dr. Ursula Hübner, University AS Osnabrück, PO Box 1940, 49009 Osnabrück, Germany; E-mail: u.huebner@hs-osnabrueck.de.

competencies based approach gained increasing attention and led to very detailed and highly granular descriptions [7]. While education is always situated in a local context, recommendations often take a global perspective. The challenge therefore is to arrive at meaningful advice that breaks down the global perspective according to specific needs. The aim of this study was firstly to empirically define a framework of globally accepted core competencies in informatics among various roles nurses can hold and secondly, to match these findings within country specific needs. This study was performed within the TIGER (*Technology Informatics Guiding Education Reform*) Initiative.

2. Materials and Methods

2.1. The TIGER approach

Founded in 2004, the TIGER Initiative emerged as a grass roots effort to allow clinicians to make better use of informatics tools, principles, theories and practices by interweaving theses technologies into practice, education and research for the sake of better outcomes, patient safety and reduced costs [8]. In 2012, the TIGER International Committee was launched to broaden the reach of TIGER activities. TIGER transitioned from a standalone foundation to the Healthcare Information and Management Systems Society (HIMSS) in 2014. Its mission is to empower educators as change agents for paving the way towards greater awareness, acceptance and better design and use of health IT [9]. These activities embrace the informatics competency synthesis project, which included an international survey and national case studies.

2.2 The international informatics core competencies survey

The informatics core competencies survey was based on an online questionnaire initially developed to capture informatics competencies in Austria, Germany, and Switzerland [10]. It was iteratively designed with a focus on international literature [2-6, 9] and was further refined in two workshops. Due to its broad and global perspective, the survey was deployed without changes after a pre-test was conducted with representative from various countries within the TIGER international community. The survey was composed of 24 core competencies in clinical informatics, which had to be rated based on their relevance to five roles nurses can hold: 1) clinical nursing (e.g. care planning), 2) nursing management (e.g. ward or hospital management), 3) quality management (e.g. organisational development), 4) IT management in nursing (e.g. introduction of new IT systems) and 5) inter-professional coordination of care (e.g. case management). The 24 core competencies embraced 10 technological items (e.g. eHealth, telematics and telehealth), 2 legal and ethical items (e.g. data protection, ethics and IT), 11 IT related management items (e.g. project management, change management) and finally biostatistics/statistics. The relevance of these items had to be rated on a scale from 0% to 100%. A personalised link to the questionnaire was sent to 72 people from 24 countries in the Americas (6 countries), Europe (10 countries), Asia (6 countries), and Australia/Pacific (2 countries). They were either member of or associated with TIGER International Committee. All survey participants are regarded as high profile experts in their countries. The survey was open from 23rd November 2015 to 18th January 2016.

2.2. The national informatics core competencies case studies

The informatics core competencies survey was extended and enhanced by the eight national case studies. Members of the TIGER International Committee, representing 21 countries, were requested to provide a picture of the characteristics in their respective countries. The material was consolidated and presented as cases studies reports. The case studies and survey results were juxtaposed to provide synergistic statements and to identify additional information to further support the project outcomes.

3. Results

3.1. The international informatics core competencies survey

Out of the 72 experts invited for participation, 43 respectively 41 persons responded. They came from 21 countries: Americas (4 countries), Europe (10 countries), Asia (5 countries) and Australia/Pacific (2 countries). Table 1 shows the top six core competencies per domains. Each domain was characterised by one to three lead core competencies with (nearly) the same mean percentage of relevance (in italics Tab. 1) and by a specific profile of core competencies. There was a mixture of genuine IT competencies (e.g. information and communication systems), IT related management competencies (e.g. strategic management and leadership), and legal and ethical issues. The least relevant core competency was biomedical image and signal processing for nearly all roles. For clinical nursing, financial management related to IT was found the least important.

Table 1. Top six core competencies in the five domains (mean percentage of relevance {0…100%})

Role/domain	Top 1	Top 2	Top 3	Top 4	Top 5	Top 6
Clinical nursing [n=41]	*Nursing documentation* (94.4%)	Information knowledge management (82.2%)	Principles of nursing informatics (80.5%)	Data protection and security (80.0%)	Ethics and IT (79.5%)	Information communication systems (75.1%)
Quality management [n=41]	*Quality management* (96.1%)	Process management (86.5%)	Nursing documentation (84.4%)	Information knowledge management (83.2%)	Information communication systems (82.0%)	Principles of nursing informatics (80.2%)
Inter-professional coordination [n=41]	*Data protection and security* (85.9%)	*Information knowledge management* (85.4%)	Nursing documentation (83.4%)	Process management (83.2%)	Information communication systems (81.5%)	Ethics and IT (78.8%)
Nursing management [n=43]	*Nursing documentation* (92.1%)	Principles of management (87.9%)	Strategic management and leadership (86.7%)	Quality management (85.1%)	Human resource management (84.4%)	Change management stakeholder management (84.2%)
IT management [n=41]	*Information communication systems* (89.5%)	*Principles of nursing informatics* (89.5%)	*Data protection and security* (89.0%)	IT risk management (86.8%)	Project-management (86.8%)	Process management AND Information knowledge management (86.1%)

All 24 informatics core competencies were rated above a 50% relevance rate in IT management in nursing, nursing management, and inter-professional coordination of care. In clinical nursing, only two core competencies could not reach the average level of 50% importance and in quality management one did not do so. These included the least important items and additionally biostatistics/statistics in clinical nursing.

3.2. The national informatics core competencies case studies

At this time, case studies from Austria, Finland, Germany, Ireland, New Zealand, Philippines, Portugal, and Switzerland were compiled. The material synthesised from these countries include published recommendations from previously consolidated activities (Ireland, New Zealand), survey data (Austria, Germany, Switzerland), competencies based on academic programs (Finland, Portugal), and research project results (Philippines). Several case studies took relevant international literature into account (Austria, Germany, Ireland, New Zealand, Philippines, Switzerland) and founded their recommendations based on cited literature. Furthermore, Ireland, Philippines and Portugal distinguished between competencies on two to three education levels.

3.3. Synergy between survey data and case studies

All of the core competencies listed in the case studies were also reflected within the survey. However, the case study competencies demonstrated greater detail and better illustrated the impact and meaning of core competencies. For example "Uses strategies to optimize application use after implementation (benefits realization)" and "Participates in budget activities for procurement and maintenance of the system" were listed as activities under the financial management competency in the Philippine case study. Both the survey and case studies showed that not only IT related competencies were recommendable but also competencies rooted in management (such as change management), which were disclosed in seven out of the eight case studies. Only the case studies for Austria, Germany and Switzerland and the survey data could be compared because of utilising the same questionnaire. This comparison yielded commonalities such as data protection and security and nursing documentation, which were found among the three most relevant core competencies in inter-professional coordination of care. There were also differences to highlight such as the number of informatics core competencies rated as 50% and more in the clinical nursing domain. In Austria, Germany and Switzerland the ratio was 12:24 versus 22:24 in the international survey.

4. Discussion

The TIGER informatics competency synthesis project could provide insight into what nurses should know with regard to nursing and inter-professional informatics when they are working in and across the defined domains. Based on this international survey, educators get an idea about the relevance of certain topics and have the chance to think out of the box. In conclusion to the survey, informatics core competencies were found highly important for roles of nurses outside of the confined IT arena, i.e. in providing and coordinating care and across management roles. Likewise, informatics core competencies rated highly relevant did not only embraced technology but also highlighted management issues closely related to IT (such as stakeholder management and process

management). In regard to curricula and course design, the country specific case studies yielded good insight into national priorities. If global and national perspectives match then this study provides good reasons to pursue the recommended approach. If they differ, it provides a good argument to analyse the discrepancy and then decide.

There are limitations with regard to our methodology. Core competencies are abstract in nature and may be understood differently among different groups of people. We tried to avoid this flaw by presenting examples of competencies at a lower level. Another problem arose from the fact that the case studies could not be compared entirely due to different schemes. However, it is remarkable that the terms in the case studies matched the ones in the survey. This is very likely due to the same literature foundation.

5. Conclusion

This project is taking a unique approach as it is the first international effort to identify core informatics competencies for nurses in various roles inclusive of inter-professional coordination of care and quality management. Based on the project findings, the priorities found will guide us towards an international framework of recommendations that will help health care professionals to better meet the requirements of an inter-professional process and outcome-oriented way of providing modern care.

References

[1]   A. Darvish, F. Bahramnezhad, S. Keyhanian and M. Navidhamidi, The Role of Nursing Informatics on Promoting Quality of Health Care and the Need for Appropriate Education, *Glob J Health Sci* **6(6)** (2014), 11-18.

[2]   Global Health Workforce Council (GHWC), Global Academic Curricula Competencies for Health Information Professionals, The AHIMA Foundation, Chicago, 2015. www.ahimafoundation.org.

[3]   Australian Health Informatics Education Council (AHIEC), Health Informatics Scope, Careers and Competencies Version 1.9., Australian Health Informatics Education Council, 2011. www.ahiec.org.au

[4]   C.A. Kulikowski, E.H. Shortliffe, L.M. Currie, P.L. Elkin, L.E. Hunter, T.R. Johnson, I.J. Kalet, L.A. Lenert, M.A. Musen, J.G. Ozbolt, J.W. Smith, P.Z. Tarczy-Hornoch and J.J. Williamson, AMIA Board white paper: definition of biomedical informatics and specification of core competencies for graduate education in the discipline, *J Am Med Inform Assoc* **19(6)** (2012), 931-938.

[5]   J. Mantas, E. Ammenwerth, G. Demiris, A. Hasman, R. Haux, W. Hersh, E. Hovenga, K.C. Lun, H. Marin, F. Martin-Sanchez and G. Wright, Recommendations of the International Medical Informatics Association (IMIA) on Education in Biomedical and Health Informatics, *Methods Inf Med* **49** (2010), 105–120.

[6]   Canada's Health Informatics Association (COACH), Health Informatics Professional Core Competencies v3.0, Canada's Health Informatics Association, National Office, Toronto, 2012.

[7]   HITCOMP – Health IT Competencies. http://hitcomp.siframework.org/

[8]   MJ Ball, JV Douglas et.al., *Nursing Informatics: Where Technology and Caring Meet*, 4th Edition, Springer-Verlag, London, 2011.

[9]   TIGER Initiative, Informatics Competencies for Every Practicing Nurse: Recommendations from the TIGER Collaborative, Chicago: HIMSS, 2015. www.thetigerinitiative.org.

[10] N. Egbert, J. Thye, J. Liebe, G. Schulte, W. Hackl, E. Ammenwerth, U. Hübner. An iterative methodology for developing national recommendations for nursing informatics curricula. *Stud. Health Technol. Inf.* (2016) – in print.