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An Iterative Methodology for Developing National Recommendations for Nursing Informatics Curricula

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Abstract. The increasing importance of IT in nursing requires educational measures to support its meaningful application. However, many countries do not yet have national recommendations for nursing informatics competencies. We thus developed an iterative triple methodology to yield validated and country specific recommendations for informatics core competencies in nursing. We identified relevant competencies from national sources (step 1), matched and enriched these with input from the international literature (step 2) and fed the resulting 24 core competencies into a survey (120 invited experts from which 87 responded) and two focus group sessions with a total of 48 experts (steps 3a/3b). The subsequent focus group sessions confirmed and expanded the findings. As a result, we were able to define role specific informatics core competencies for three countries.

Keywords. Nursing, informatics competencies, education, recommendations

1. Introduction

The increasing adoption of health IT (HIT), i.e. the availability of HIT systems on nearly every clinical unit and in every office, requires all health care professionals to exploit these instruments and methods to the best of their knowledge and to enhance their competencies accordingly. In nursing, advanced competencies in utilising electronic tools for documentation, management and cooperation across settings, telemedicine and for ambient assisted living gain more and more importance to cope with the day-to-day challenges [1]. Despite a general awareness of these needs, the situation in nursing education in health IT skills varies from country to county [2]. The TIGER (Technology Informatics Guiding Education Reform) Initiative is an example to explicitly address these deficiencies [3].

International recommendations for core competencies often are very generic and do not always fit the specific needs in a particular country or region. In this light, there is the need to develop a methodology that makes use of the wealth of international recommendations and that breaks them down to the particular context in a country. This study aims at proposing such methodology for developing national recommenda-

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tions and at implementing this methodology for developing recommendations in nursing informatics for Austria, Germany and Switzerland.

2. Materials and Methods

We conducted a triple iterative approach starting with national health informatics recommendations and/or expert opinions, matching and enriching them with topics in the international literature and finally validating them in expert surveys and/or focus group discussions.

Step 1: As there were no recommendations for nursing informatics available in either of the included countries (Austria, Germany, Switzerland), we drew on the results of a competency based approach in informatics for the education of physicians [4] and internal papers for continuing education in medicine, which contained twelve informatics core competencies. Fourteen nursing informatics (NI) experts who were members of the NI working group of the German Association for Medical Informatics, Biometry and Epidemiology (GMDS) were then asked to comment on the terminology and content of these competencies. The activities of the first step yielded D0 consisting of 15 hypothetical core competencies, with three complemented competencies from the NI experts in italics (Tab. 1).

Table 1. Core competencies for nurses derived from recommendations for physicians and expert comments

D0: Informatics core competencies for nurses (new items in italics)	
1. Principles of nursing informatics	2. Applied computer science
3. Data protection and security	4. Nursing documentation
5. ICT systems relevant to nursing	6. Telematics and eHealth
7. Information management in research	8. Information management in teaching
9. Decision support	10. Image and biosignal processing
11. Quality assurance and management	12. Biostatistics
13. Project and process management	*14. Resource planning and logistics*
	15. Information and knowledge management in patient care

Step 2: In step 2, D0 was enriched by items from the literature. The literature review was performed by two persons and included the Global Academic Curricula Competencies for Health Information Professionals [5], the Health Informatics Scope, Careers and Competencies from Australia [6], the AMIA Board white paper [7], the Recommendations of the International Medical Informatics Association (IMIA) [8], the Informatics Professional Core Competencies from Canada [9] and the Recommendations from the TIGER Collaborative [3]. Thirty-eight core competencies could be identified, which were then matched with the core competencies in D0. Duplicates were removed (Tab. 2). Almost all core competencies in D0 were found in the literature and new core competencies mainly from the management field could be included.

Step 3: These 24 core competencies were then validated in an online-survey (step 3 a) in the three countries. This survey was conducted in cooperation with the Austrian and Swiss Nursing Informatics Working Groups. In accordance with the literature, roles or activity domains of nurses were defined in which informatics competencies were potentially relevant. These roles embraced nursing management (e.g. ward or hospital management), quality management (e.g. organisational development) and IT management in nursing (e.g. introduction of new systems). One hundred twenty experts (64 from Germany, 36 from Austria, 20 from Switzerland) from academia, healthcare

providers and IT vendors were selected for their experience in this field and invited for participation in the survey. The survey was open from 28th April to 22nd May 2015. The invited experts rated the relevance {0...100%} of all 24 core competencies for the three roles/domains.

Table 2. List of 24 informatics core competencies in D1 (NI = Nursing Informatics)

D1: Informatics core competencies for nurses		
Principles of nursing informatics	Information management in education and continuing education	Principles of management
Applied computer science	Decision support systems	Strategic management and leadership
Project management	Image and biosignal processing	Change and stakeholder management
Data protection and security	Quality assurance and management	IT risk management
Nursing documentation	Biostatistics/statistics	Financial management in NI
Information and communication systems for nursing	Resource planning and logistics	Human resource management in NI
eHealth, telematics, telehealth	Assisting technologies	Process management
Information management in research	Ethics and IT	Information and knowledge management in patient care

The results of the online-survey (R0) were presented and discussed in two focus group sessions organised at the GMDS Annual Conference 2015 in Krefeld Germany with participation of 23 German experts and at the European Nursing Informatics - ENI Conference 2015 in Hall Austria with 25 participants from all three countries (step 3 b). Both workshops confirmed the relevance and completeness of the core competencies including sub competencies derived from the literature. Participants of the GMDS focus group session recommended the assignment of these core competencies to application scenarios, e.g. alignment of clinical processes with IT system, and build courses focusing on these scenarios. The ENI focus group session revealed that clinical nursing and inter-professional coordination of care were relevant domains and should be added. To this end, a second online-survey was conducted between 23rd November and 31st December 2015 with the same 120 experts. The questionnaire was identical to the first one with the exception of the two new roles/domains.

All three steps of the methodology were implemented and executed during a period of 14 months beginning in November 2014.

3. Results

In total, 87 from 120 invited experts took part in the first online-survey (role/domain in italics) and 87 respectively 81 in the second survey. The Top 6 core competencies with the highest relevance of the two online-surveys are shown in Table 3. None of the competencies was found in all domains and roles among the top 6 competencies with the highest relevance. But nursing documentation, data protection and security, quality management and project management were rated among the top 6 core competencies in four out of the five roles. In addition, information and knowledge management in patient care and process management were judged highly relevant in three out of the five roles. This shows that there was considerable homogeneity across the roles and domains without loosing their distinct profile.

Table 3. Top 6 core competencies sorted by average relevance in all three countries: result R1

Role/domain	Top 1	Top 2	Top 3	Top 4	Top 5	Top 6
Nursing management [n=87]	Nursing documentation	Process management	Human resource management	Basics of management	Project management	Quality management
IT management [n=87]	Principles of nursing informatics	Data protection and security	Information communication systems	Project management	Applied computer science	eHealth, telematics, telehealth
Quality management [n=87]	Quality management	Process management	Project management	Data protection and security	Nursing documentation	Information knowledge management in patient care
Clinical nursing [n=87]	Nursing documentation	Data protection and security	Information knowledge management patient care	Ethics and IT	Quality management	Information communication systems
Inter-professional coordination of care [n=81]	Nursing documentation	Data protection and security	Process management	Information knowledge management patient care	Quality management	Project management

4. Discussion

The results presented here in a short version constitute the final results (R1) of the proposed triple methodology to develop recommendations. This approach enhanced the validity of its results by applying both quantitative and qualitative methods and by iterating single steps. As a result of this methodology the recommendations are tailored to the country specific needs, they are validated and therefore promise good adoption. It also paved the way towards mechanisms how to make practical use of these results. Measures of relevance may lead to defining scenarios [11] for clustering the core competencies within the respective domains. As these core competencies are compliant with other sources like the HITCOMP database [10] their wealth of detailed competencies can be utilised to break down our highly aggregated core competencies into concrete curricula at various (academic) levels and for continuing education. Our results also lend themselves to be classified in terms of the European Qualification Framework [12, 13]. Due to the focus of this study, the results presented here did not distinguish between the three countries but provided good material to do so and were included into the TIGER (Technology Informatics Guiding Education Reform) international competency synthesis project [14].

5. Conclusion

This study could prove the feasibility of the proposed methodology for developing informatics core competencies, which are literature based and empirically valid. The

findings allow educators to shape NI curricula and courses that aim at a broad application of the competencies as well as those with a focus on a particular role or domain.

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