International Evolution of TIGER Informatics Competencies

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Abstract. The TIGER Initiative aims to explain how to equip practicing nurses with informatics competencies. This chapter describes a collaborative effort to identify global informatics requirements in relation to core competencies and to match them with national and regional needs. Recommendations from the TIGER Informatics Competency Synthesis Project, described here, have implications for an international framework of informatics competencies for all types of health care professionals including nurses.

Keywords. Informatics, Competencies, Technology, Education

1. Introduction

The Technology Informatics Guiding Education Reform (TIGER) Initiative is focused on education reform and interprofessional community development. The spirit of TIGER is to maximize the seamless integration of technology and informatics into nursing practice, education and research.

In order to equip every practicing nurse with informatics competencies, TIGER developed recommendations in the areas of basic computer competencies, information literacy and information management. The TIGER International Competency Synthesis Project aims to investigate global informatics requirements in relation to core competencies to match them with national and regional needs [1].

2. History of TIGER

In 2006, TIGER convened a Summit of nursing stakeholders to develop, publish, and commit to an action plan to make healthcare safer, more effective, efficient, patient-centered, timely and equitable. As an outcome of the Summit, topic-focused collaborative teams were formed to advance the action plan. Each team worked on identifying best practices from education and practice, so that this collective body of knowledge could be shared. As a grass roots effort, TIGER built upon and recognized the work of individuals from many organizations, programs, and related initiatives who contributed their expertise in academia, practice, research and government while working towards a common goal [2].

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The TIGER Informatics Competencies Collaborative was formed to develop informatics recommendations for all practicing nurses and graduating nursing students. Following a review of the literature and survey of nursing informatics education, research, and practice groups, the TIGER Nursing Informatics Competencies Model was developed consisting of three parts: 1) Basic Computer Competencies; 2) Information Literacy; and 3) Information Management (including use of an EHR). In 2011, the group published a landmark report titled *Informatics Competencies for Every Practicing Nurse: Recommendations from the TIGER Collaborative* [3]. As part of a changing and dynamic environment, the goal of this original report was to influence stakeholders in order to advance the adoption of informatics competencies through existing education, research, and practice groups. This work synthesized an extensive list of competencies into three components that were realistic for the nearly 3 million practicing nurses in the United States.

2.1. Recommendations for Basic Computer Competencies

Basic Computer Competencies (see Table 1) include the informatics competencies that are foundational for all practicing nurses and graduating nursing students in order to achieve the advanced informatics competencies.

Table 1: Basic Computer Competencies

Hardware	File Management	Using the Web
Software	Utilities	Web Outputs
Networks	Print Management	Electronic Communication
Security	Using the Application	Using e-mail
Law	The Internet	e-mail Management
Operating System	Using the Browser	

2.2. Recommendations for Information Literacy

Information literacy builds on computer literacy, and includes the ability to identify information needed for a specific purpose, locate pertinent information, evaluate the information and apply it correctly. Information literacy competencies (see Table 2) are critical for incorporating evidence into nursing practice. Evaluating the information also involves critical thinking and the ability to determine the validity of the source.

Table 2: Information Literacy Competencies

1.	Knowledge to determine the nature and extent of the information needed
2.	Access needed information effectively and efficiently
3.	Evaluate information and its sources critically and incorporate selected information into his or her knowledge base and value system
4.	Individually or as a member of a group, use information effectively to accomplish a specific purpose
5.	Evaluate outcomes of the use of information

2.3. Recommendations for Information Management Competencies

Information management involves collecting data, processing the data, and presenting and communicating the processed data as information or knowledge. Nurses need

information management competencies (see Table 3) to carry out their fundamental clinical responsibilities in a safe, effective and efficient manner.

Table 3: Information Management Competencies

Using an EHR, the nurse can manage:
1. Demographic/patient information
2. Consents and authorizations
3. Medication administration
4. Planning care
5. Orders/results
6. Care documentation
7. Decision support
8. Notifications
9. Facilitating communications

3. TIGER International Competency Synthesis Project

The informatics competencies conversation has now expanded to include an interprofessional and international focus. The TIGER International Committee has completed the first phase of an innovative competency synthesis project that highlights recommended core international informatics competencies. The TIGER International Competency Synthesis Project aims to investigate global informatics requirements in relation to core competencies to match them with national and regional needs. In 2015 the TIGER International Committee, with representatives from 21 countries, began comprehensive activities to compile recommended core international informatics competencies reflective of many countries, scientific societies, and research projects.

A survey was deployed in November, 2015 to evaluate and prioritize 24 core competencies in clinical informatics, which were rated based on their relevance to five nursing roles:
1. Clinical nursing (e.g. care planning),
2. Nursing management (e.g. ward or hospital management),
3. Quality management (e.g. organizational development),
4. IT management in nursing (e.g. introduction of new IT systems), and
5. Inter-professional coordination of care (e.g. case management).

As an outcome of this effort, TIGER is creating a competency harmonization matrix that outlines shared and country-specific competencies (including the United States) to provide guidance to the TIGER community and the industry at large. The Committee is taking a unique approach with this project as it is the first to collect various competencies across countries to identify global commonalities and differences. This harmonization effort will help determine how the Committee moves forward in the future [1].

Committee members also submitted and compiled case studies from Austria, Finland, Germany, Ireland, New Zealand, Philippines, Portugal, and Switzerland that reflect country-specific competencies based on country requirements, curriculum, and education. All of the core competencies listed in the case studies were also reflected in the survey, but described with greater detail. Several of these case studies are summarized below.

3.1. Case Study: Australian Nursing and Midwifery Federation Informatics Standards

The Australian Nursing and Midwifery Federation (ANMF) has released the national informatics standards for nurses and midwives. These national informatics standards clearly articulate the activities required for all nurses and midwives in practice [4] and encompass the following three domains:

1. Computer Literacy
   Applies knowledge and skills in computer basics for effective use of information and communication technologies
2. Information Literacy
   Uses fundamental knowledge and skills to identify, locate, access, evaluate and apply information
3. Information Management
   Uses knowledge and skills to ensure safe, legal and ethical management of health information for professional practice and lifelong learning, appropriate to context of practice

3.2. Case Study: Healthcare Informatics Society of Ireland

From an Irish perspective, the integration of informatics competencies in nursing and midwifery is in the early stages of development. A significant milestone is the inclusion and future integration of nursing informatics competencies into the nursing and midwifery undergraduate program. Within Ireland, the Health Informatics Training System (HITS), a dedicated healthcare competencies program, was developed by the Irish Computer Society, in partnership with the Health Informatics Society of Ireland - Nurses & Midwives Group (HISINM). It is acknowledged that the range and scope of competencies across healthcare practitioners can differ greatly. The HISINM Group provided the Irish perspective conceptualized at three levels ranging in broad competencies [5].

Competency Level One: Undergraduate and novice practitioners
- Knowledge and understanding of the health, life and behavioral sciences and their applied principles which underpins a competent knowledge base for contemporary nursing and healthcare practice

Competency Level Two: Intermediate
- Concepts of health informatics covering topics ranging from data processing and electronic record keeping to decision-support systems and security

Competency Level Three: Advanced expert practitioner
- Advanced informatics skills focusing on the integration of data, information, knowledge and wisdom to support patients/clients, nurses and other healthcare professionals in their decision making in all roles and settings

Integration of nursing informatics competencies is referenced in the draft undergraduate requirements and standards report published in February 2015, and is now in the final submission phase by the National Nursing Board of Ireland. Existing policy on Nursing and Midwifery Informatics Competencies will be delivered as part of a coordinated national strategy, specifically in line with eHealth Ireland and National Service Plan agendas.

3.3. Case Study: Defining Informatics Competencies in Austria, Germany and Switzerland

There is a wealth of excellent recommendations concerning medical and nursing informatics competencies including the TIGER recommendations. The competencies, however, vary from country to country and from nursing culture to nursing culture [6]. The nursing informatics workgroups in Germany, Austria and Switzerland agreed to compile a consolidated set of recommendations that:

- Complies with the relevant literature,
- Makes use of existing national recommendations of other healthcare professionals, and
- Is based on a comprehensive survey of selected experts in this field from the three countries.

In all, 120 experts were invited to participate and received a link to the questionnaire and by May 2015, 83 experts responded. The results revealed that the following competencies received the overall highest rating:

1. Project Management
2. Quality Assurance and Quality Management
3. Nursing Documentation
4. Process Management
5. Privacy and Data Security

These results demonstrate that the nursing informatics competencies most needed are more generic than specialized. The group will continue specifying the competencies in more detail in the coming months.

3.4. Case Study: Nursing and Health Informatics in Finland

The development of nursing informatics in practice, industry and education has become increasingly relevant as the role of IT has advanced. The main supporting actors in Finland have been the Finnish Nurses Association (FNA) and the National Development Center for Welfare and Health as well as the International Medical Informatics Association Special Interest Group of Nursing Informatics (IMIA-SIGNI).

In 2012, the FNA launched the standards for special competences of nursing informatics specialty certificate. The certification may be awarded to a registered nurse working in nursing informatics that demonstrates the required accreditation via an electronic portfolio. The requirements are consistent with the Clinical Practice Nursing Certification design for nurses working in a designated clinical area [7].

3.5. Case Study: Country Specific Competencies for New Zealand

In 2006, a report on the health informatics capability in New Zealand noted a need for a significant increase in people trained in health informatics [8]. This same report identified the need for greater co-operation between institutions and for increased awareness of the domain in the health and IT communities. Health Informatics New Zealand, as the independent national health informatics organization, established an education working group, comprising academics from all interested New Zealand universities. Based on the 2006 report and International Medical Informatics Association (IMIA) guidelines, a list of required competencies was developed [9].

Core competences identified were: Health domain knowledge, social/ethics/legal aspects of health IT, basic computer science, basic data management, basic health IS/IT management, clinical information systems and health informatics concepts [10]. It is these competencies that are now being considered in relation to the TIGER Initiative for synthesizing international nursing informatics competencies.

3.6. Case Study: Nursing Informatics Core Competencies for Portugal

Upon admission to a nursing program, all Portuguese students have a basic set of computer competencies developed during high school that overlap with the TIGER Informatics Competencies recommendations. However, during graduate programs, nurses are further prepared to achieve Information Literacy Competencies and Information Management Competencies.

From the analysis of multiple resources, Nursing Informatics Core Competencies have been identified related to Portugal's needs. The following Information Literacy Competencies are necessary and fundamental for EHR use for nurses in Portugal [11]:

- Determine the nature and extent of the information needed;
- Access needed information effectively and efficiently;
- Evaluate information and its sources critically and incorporate selected information into his or her knowledge base and value system;
- Individually or as a member of a group, use information effectively to accomplish a specific purpose; and
- Evaluate outcomes of information usage.

3.7. Case Study Summary

The TIGER International Competency Synthesis Project has deployed a mixed methods approach to investigate global informatics requirements [12]. These requirements leverage regional and national-specific core competencies by using a global survey and country specific case studies. All of the core competencies listed in the case studies are also reflected within the survey. Survey results include opinions from 21 countries; North and South America (four countries), Europe (10 countries), Asia (five countries) and Australia/Pacific (two countries). An average of two in-country experts rated the relevance of 24 informatics core competencies within five domains in nursing. Table 4 shows the top six competencies per domain.

Table 4. Top six core competencies in the five domains

Role/ domain	Top 1	Top 2	Top 3	Top 4	Top 5	Top 6
Clinical nursing	Nursing documentation	Information knowledge management	Principles of nursing informatics	Data protection and security	Ethics and IT	Information communication systems
Quality management	Quality management	Process management	Nursing documentation	Information knowledge management	Information communication systems	Principles of nursing informatics
Inter-professional coordination	Data protection and security	Information knowledge management	Nursing documentation	Process management	Information communication systems	Ethics and IT
Nursing Management	Nursing documentation	Principles of management	Strategic management and leadership	Quality management	Human resource management	Change management. stakeholder management

Role/domain	Top 1	Top 2	Top 3	Top 4	Top 5	Top 6
IT Management	Information communication systems	Principles of nursing informatics	Data protection and security	IT risk management	Project management	Process management AND information knowledge management

4. Conclusion

The TIGER initiative represents a grass roots effort that brings together experts from around the world to explore informatics-related issues and concerns. There is much to gain when multiple ideas, perspectives and innovations are shared in the spirit of collaboration. The TIGER International Competency Synthesis Project is but one example of such an effort. Recommendations from this work will be widely disseminated to initiate a global discussion with implications for implementation of an international framework that will help health care professionals achieve the informatics competencies of the modern age.

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