

Technology Informatics Guiding Educational Reform (TIGER)

TIGER Informatics Competencies Collaborative (TICC) Final Report

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Readers of this document are strongly urged to view the TIGER web site at <http://www.tigersummit.com/> and download the Summary Report for the TIGER Phase II Collaboratives. The Summary Report includes additional information about the TIGER Informatics Competencies Collaborative and provides much information about TIGER and its eight other initiatives.

Introduction

Nurses are expected to provide safe, competent, and compassionate care in an increasingly technical and digital environment. A major theme in this new healthcare environment is the use of information systems and technologies to improve the quality and safety of patient care. Nurses are directly engaged with information systems and technologies as the foundation for evidence-based practice, clinical-decision support tools, and the electronic health record (EHR).

To help practicing nurses be responsive to the changes in their practice environments, a new specialty called Nursing Informatics has emerged over the past 20 years. The most recent 2008 American Nurses Association Nursing Informatics Scope and Standards defines nursing informatics as the integration of nursing science, computer and information science, and cognitive science to manage communication and expand the data, information, knowledge, and wisdom of nursing practice.

Nurses certified in Nursing Informatics are:

- * skilled in the analysis, design, and implementation of information systems that support nursing in a variety of healthcare settings
- * function as translators between nurse clinicians and information technology personnel
- * insure that information systems capture critical nursing information

These specialized nurses add value to an organization by:

- * increasing the accuracy and completeness of nursing documentation
- * improving the nurse's workflow
- * eliminating redundant documentation
- * automating the collection and reuse of nursing data
- * facilitating the analysis of clinical data, including Joint Commission indicators, Core Measures, federal or state mandated data and facility specific data

While Nursing Informatics is a highly specialized field, there are foundational informatics competencies that all practicing nurses and graduating nursing students should possess to meet the standards of providing safe, quality, and competent care.

The Technology Informatics Guiding Education Reform (TIGER) Informatics Competency Collaborative was formed to develop informatics recommendations for all practicing nurses and graduating nursing students. Following an extensive review of the literature and survey of nursing informatics education, research, and practice groups, the TIGER Nursing Informatics Competencies Model consists of three parts, detailed in this document:

- * Basic Computer Competencies
- * Information Literacy
- * Information Management

Approach and Strategy

The TIGER Informatics Competency Collaborative (TICC) did an extensive review of the literature for informatics competencies for practicing nurses and nursing students. TICC also collected informatics competencies for nurses from over 50 healthcare delivery organizations. The results of these efforts are available on the TICC Wiki (<http://tigercompetencies.pbwiki.com>). This resulted in over 1000 individual competency statements. This body of competencies was synthesized to create the three parts of the TIGER Nursing Informatics Competencies Model: Basic Computer Competencies, Information Literacy, and Information Management.

Once we developed the model, we aligned each component with an existing set of competencies maintained by standard development organizations or defacto standards. We found very good fits with the existing standards of the European Computer Driving Licence Foundation, the Health Level 7's electronic health record functional model clinical care components, and the American Library Association information literacy standards respectively. All of these sets of competencies are standards maintained by standard setting bodies or organizations. Finding sets of competencies that are maintained by standard setting bodies allow the TIGER Informatics Competency Collaborative (TICC) to recommend standards that are relevant to nurses and ones that will be sustainable as these bodies evolve the standards as necessary. Of equal or perhaps greater importance, these standard-setting bodies all have put tremendous thought, energy and expertise into there recommended competencies. When those competencies aligned with the informatics competency needs for nurses, we adopted theirs, thus adding strength, rigor, and validity to the TICC recommendations.

Component of the TIGER Nursing Informatics Competencies Model	Standard	Standard-Setting Body
Basic Computer Competencies	European Computer Driving Licence	European Computer Driving Licence Foundation
Information Literacy	Information Literacy Competency Standards	American Library Association
Information Management	Electronic Health Record Functional Model - Clinical Care Components	Health Level Seven (HL7)
	European Computer Driving Licence - Health	European Computer Driving Licence Foundation

Basic Computer Competencies

A “digital native” has grown up with digital technology such as computers, the Internet, mobile phones, and MP3. A “digital immigrant” grew up without digital technology and adopted it later. There are a substantial number of digital immigrants in the nursing workforce who have not mastered basic computer competencies. Many digital natives have gaps in their basic computer competency skill set.

Europeans realized this shortcoming in the workforce across many industries and acted on it. The European Computer Driving Licence (ECDL) Foundation set basic computer competencies in the late 1990s and again in this decade. About seven million Europeans have now taken the ECDL exam and become certified in basic computer competencies.

The ECDL syllabus is effectively a global standard in basic computer competencies. The modules of ECDL basic computer competencies are:

- Module 1: Concepts of Information and Communication Technology (ICT)
- Module 2: Using the Computer and Managing Files
- Module 3: Word Processing
- Module 4: Spreadsheets
- Module 5: Using Databases
- Module 6: Presentation
- Module 7: Web Browsing and Communication

The TIGER Informatics Competency Collaborative (TICC) has adopted the ECDL competencies and is recommending them for all practicing nurses and graduating nursing students.

ECDL certification requires 30+ hours of study and costs more than some institutions may be able to afford. Therefore, we have ranked the relative importance of ECDL syllabus items and recommend the following as a first step to basic computer proficiency for all practicing nurses and graduating nursing students. These are feasible and affordable and will provide basic computer competencies for nurses and allow them to go on to obtain other TICC competencies.

- Module 1: Concepts of Information and Communication Technology (ICT)
- Module 2: Using the Computer and Managing Files
- Module 3, Section 3.1: Word Processing: “Using the application”
- Module 7: Web Browsing and Communication

Recommendation	Timeline for Adoption
All practicing nurses and graduating nursing students gain or demonstrate proficiency in ECDL modules 1, 2 and 7, as well as ECDL Category 3.1	By January 2011
All practicing nurses and graduating nursing students become ECDL certified or hold a substantially equivalent certification.	By January 2013

Resources

European Computer Driving Licence (ECDL) Foundation

<http://ecdl.com>

The ECDL syllabus is maintained and periodically updated by the not-for-profit ECDL Foundation. The ECDL Foundation makes arrangements with entities in various countries to localize the ECDL syllabus. Outside of Europe, ECDL is known as International Computer Driving Licence. ICDL is available in the United States through CSPlacement.

CSPlacement

www.csplacement.com

- Offers CSP Basic, an e-learning course and a certification exam that is substantially equivalent to the TICC recommendation of a first and significant step towards basic computer competency.
- Offers CSP, an e-learning course and a certification exam that is substantially equivalent to the entire ECDL syllabus.

Healthcare Information Management System Society (HIMSS)

www.himss.org

- Has a new certificate called Health Informatics Training System (HITS). The HITS program of e-learning, testing, and certification contains content that is substantially equivalent to the TICC recommendation of a first and significant step towards basic computer competency, as well as other content.

Information Literacy

Information literacy builds on computer literacy. Information literacy is the ability to

- identify information needed for a specific purpose
- locate pertinent information
- evaluate the information
- apply it correctly

Information literacy is critical to incorporating evidence-based practice into nursing practice. The nurse/provider must be able to determine what information is needed. This involves critical thinking and assessment skills. Finding the information is based on the resources available, which can include colleagues, policies, and literature in various formats. Evaluating or appraising the information also involves critical thinking and the ability to determine the validity of the source. The actual implementation of the information results in putting the information into practice or applying the information. The evaluation process is necessary to determine whether the information and its application resulted in improvements. Thus, information literacy competencies are fundamental to nursing and evidence-based practice.

Recommendation	Timeline for Adoption
<p>All practicing nurses and graduating nursing students will have the ability to:</p> <ol style="list-style-type: none"> 1. Determine the nature and extent of the information needed 2. Access needed information effectively and efficiently 3. Evaluate information and its sources critically and incorporates 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 	<p>By January 2011</p>

As some institutions may find these competencies difficult to implement in their entirety immediately, as a first and significant step towards information literacy in nurses, the TICC recommends focusing on the first three competencies for the first year. Once these are achieved by nurses in a particular organization, the other two can be added so that by January 2011, all nurses have all five competencies and incoming nurses demonstrate or are helped to obtain all five.

Resources

American Library Association

The ALA's report "Information Literacy Competency Standards for Higher Education" identifies the competencies recommended above as standards. The report also lists performance indicators and outcomes for each standard. A faculty member or instructor can effectively use this report to create a more detailed syllabus and or lesson plan(s) to implement the TICC information literacy competencies.

<http://www.ala.org/ala/mgrps/divs/acrl/standards/informationliteracycompetency.cfm>

The Information Literacy in Technology

<http://www.ilitassessment.com>

The iLIT test assesses a student's ability to access, evaluate, incorporate, and use information. It is a commercially available test and may be of use in demonstrating proficiency in information literacy.

Information Management

Information management is the underlying principle upon which TICC Clinical Information Management Competencies are built. Information management is a process consisting of 1) collecting data, 2) processing the data, and 3) presenting and communicating the processed data as information or knowledge.

An underlying concept for information management is the data-information-knowledge continuum. Data are discrete, atomic-level symbols, for example, the number 120. Information is data that is grouped or organized or processed in such a way that the data has meaning, for example a blood pressure of 120/80. Knowledge is information transformed or combined to be truly useful in making judgments and decisions. An example of knowledge is that a blood pressure of 120/80 is dangerously hypertensive in a neonate.

Information is managed by nurses in a variety of ways, but more and more the preferred or required method is through information systems. We define an information system as being composed of human and computer elements that work interdependently to process data into information. The most relevant, important, and fundamental information management competencies for nurses are those that relate to the electronic health record system (EHR).

Using an EHR will be the way nurses manage clinical information for the foreseeable future. However, nursing responsibilities are not changing in the shift to increased use of EHRs. For example, nurses are still required to exercise due care in protecting patient privacy. But the manner in which these responsibilities to patients and communities are upheld may be different. Therefore, all practicing nurses and graduating nursing students are therefore strongly encouraged to learn, demonstrate, and use information management competencies to carry out their fundamental clinical responsibilities in an increasingly safe, effective, and efficient manner.

The most rigorous as well as practical work on enumerating the relevant parts of the EHR for clinicians was done by Health Level 7 (HL7) EHR Technical Committee and was published in February 2007 as an approved American National Standard (ANSI) publication is titled “The HL7 EHR System Functional Model, Release 1,” known as ANSI/HL7 EHR, R1-2007.

The direct care component of the HL7 EHR System Functional Model serves as a basis of information management competencies for practicing nurses and graduating nursing students (see Appendix). Although these clinical information management competencies are numerous, they merely make explicit competencies for proficient use of EHR clinical nursing responsibilities that practicing nurses and graduating nursing students are responsible for today in a paper information management environment or a mixed paper and electronic environment.

However, the direct care component of the HL7 EHR System Functional Model is not quite sufficient by itself to cover the information management responsibilities of nurses in the digital era. What is needed in addition is a set of competencies that address the importance of electronic health record and like systems to nurses and the “due care “ that nurses need to take in managing information via these systems. Again, the European Computer Driving Licence Foundation has come up with a set of items that address these concerns, with ECDL-Health.

Here are the ECDL-Health syllabus items

- **Concepts**
Health Information Systems
HIS Types
- **Due Care**
Confidentiality
Access Control
Security
- **User Skills**
Navigation
Decision Support
Output Reports
- **Policy and Procedure**
Principles

These items are complimentary to the HL7 EHRS model items, except for User Skills. The User Skills section overlaps completely with HL7 EHRS model items.

Here are the ECDL-Health syllabus items transformed into TICC competencies:

The nurse will:

- **Concepts**
Verbalize the importance of Health Information Systems to clinical practice
Have knowledge of various types of Health Information Systems and their clinical and administrative uses
- **Due Care**
Assure Confidentiality of protected patient health information when using Health Information Systems under his or her control
Assure Access Control in the use of Health Information Systems under his or her control
Assure the Security of Health Information Systems under his or her control
- **User Skills**
Have the User Skills as outlined in direct care component of the HL7 EHRS model, which includes all of the ECDL-Health User Skills of Navigation, Decision Support, Output Reports and more.

- **Policy and Procedure**

Understand the Principles upon which organizational and professional Health Information System use by healthcare professionals and consumers are based.

Recommendation	Timeline for Adoption
Schools of nursing and healthcare delivery organizations will implement the information competencies listed in Appendix.	By January 2012
Schools of nursing and healthcare delivery organizations will implement the transformed ECDL-Health syllabus items listed above.	By January 2012

Resources

HL7 EHR System Functional Model

<http://www.hl7.org/EHR/>

This ANSI standard can be used by nursing instructors in schools of nursing and healthcare delivery organizations to develop curriculum to impart the recommended information management competencies to all practicing nurses and graduating nursing students.

ICDL-Health Syllabus

<http://www.ecdl.com>

A significant portion of the HL7 EHR System Functional Model is covered by the ECDL-Health Syllabus. The ECDL-Health Syllabus was developed by the ECDL Foundation to extend the foundation of basic computer competency skills that are not industry specific into the healthcare industry.

Digital Patient Record Certification (DPRC)

<http://dprcertification.com>

The DPRC Program was developed with a panel of U.S. informatics subject matter experts and is endorsed by the American Medical Informatics Association. The DPRC web site states that it assesses a healthcare professional's ability to accurately, dependably, and legally manage patient records in a digital environment.

Health Information System Management Society

www.himss.org

The HITS program, sponsored in the United States by the Health Information System Management Society, uses a more international version of the ICDL-Health syllabus.

Both the DPRC and HITS certifications are a substantial first step towards achieving clinical information management competencies for U.S. nurses and graduating nursing students.

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Appendix: Clinical Information Management Competencies

TICC has transformed the Direct Care components of the HL7 EHR System Functional Model into these recommended Clinical Information Management Competencies for nurses:

Using an EHRS, the nurse can:

- Identify and Maintain a Patient Record
- Manage Patient Demographics
- Capture Data and Documentation from External Clinical Sources
- Capture Patient-Originated Data
- Capture Patient Health Data Derived from Administrative and Interact with Financial Data and Documentation
- Produce a Summary Record of Care
- Present Ad Hoc Views of the Health Record
- Manage Patient History
- Manage Patient and Family Preferences
- Manage Patient Advance Directives
- Manage Consents and Authorizations
- Manage Allergy, Intolerance and Adverse Reaction Lists
- Manage Medication Lists
- Manage Problem Lists
- Manage Immunization Lists
- Interact with Guidelines and Protocols for Planning Care
- Manage Patient-Specific Care and Treatment Plans
- Manage Medication Orders as appropriate for her scope of practice
- Manage Non-Medication Patient Care Orders
- Manage Orders for Diagnostic Tests
- Manage Orders for Blood Products and Other Biologics
- Manage Referrals
- Manage Order Sets
- Manage Medication Administration
- Manage Immunization Administration
- Manage Results
- Manage Patient Clinical Measurements
- Manage Clinical Documents and Notes
- Manage Documentation of Clinician Response to Decision Support Prompts
- Generate and Record Patient-Specific Instructions
- Manage Health Information to Provide Decision Support for Standard Assessments
- Manage Health Information to Provide Decision Support for Patient Context- Driven assessments
- Manage Health Information to Provide Decision Support for Identification of Potential Problems and Trends

Manage Health Information to Provide Decision Support for Patient and Family Preferences
 Interact with decision Support for Standard Care Plans, Guidelines, and Protocols
 Interact with decision Support for Context-Sensitive Care Plans, Guidelines, and Protocols
 Manage Health Information to Provide Decision Support Consistent Healthcare Management of Patient Groups or Populations
 Manage Health Information to Provide Decision Support for Research Protocols Relative to Individual Patient Care
 Manage Health Information to Provide Decision Support for Self-Care
 Interact with decision support for Medication and Immunization Ordering as appropriate for her scope of practice
 Interact with decision Support for Drug Interaction Checking
 Interact with decision Support for Patient Specific Dosing and Warnings
 Interact with decision Support for Medication Recommendations
 Interact with decision Support for Medication and Immunization Administration
 Interact with decision Support for Non-Medication Ordering
 Interact with decision Support for Result Interpretation
 Interact with decision Support for Referral Process
 Interact with decision Support for Referral Recommendations
 Interact with decision Support for Safe Blood Administration
 Interact with decision Support for Accurate Specimen Collection
 Interact with decision support that Presents Alerts for Preventive Services and Wellness
 Interact with decision Support for Notifications and Reminders for Preventive Services and Wellness
 Manage Health Information to Provide Decision Support for Epidemiological Investigations of Clinical Health Within a Population.
 Manage Health Information to Provide Decision Support for Notification and Response regarding population health issues
 Manage Health Information to Provide Decision Support for Monitoring Response Notifications Regarding a Specific Patient's Health
 Access Healthcare Guidance
 Interact with Clinical Workflow Tasking
 Interact with Clinical Task Assignment and Routing
 Interact with Clinical Task Linking
 Interact with Clinical Task Tracking
 Facilitate Inter-Provider Communication
 Facilitate Provider -Pharmacy Communication
 Facilitate Communications Between Provider and Patient and/or the Patient Representative
 Facilitate Patient, Family and Care Giver Education
 Facilitate Communication with Medical Devices

This list of competencies came from the Direct Care components of the HL7 EHR System Functional Model. In some cases functional statements were not changed as they can also serve as competencies. For example, the HL7 EHR System Functional Model statement of

“Access Healthcare Guidance” was unchanged, except for the preamble that applies to all Clinical Information Management Competencies, as “Using an EHRS, the nurse can: Access Healthcare Guidance.” An example of a change to the HL7 EHR System Functional Model statements is ‘Communication with Medical Devices’ where “Communication with Medical Devices” was changed to “Facilitate Communication with Medical Devices” to make it a Clinical Information Management Competency.

Acknowledgments

The members of the TIGER Informatics Competency Collaborative (TICC) are too numerous to mention here. They can be viewed on the TIGER web site. All TICC members had some part in the research and deliberations from which this report was drawn.

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