

Nurse Leadership and Informatics Competencies: Shaping Transformation of Professional Practice

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Abstract. Nurse leaders must demonstrate capacities and develop specific informatics competencies in order to provide meaningful leadership and support ongoing transformation of the healthcare system. Concurrently, staff informatics competencies must be planned and fostered to support critical principles of transformation and patient safety in practice, advance evidence-informed practice, and enable nursing to flourish in complex digital environments across the healthcare continuum. In addition to nurse leader competencies, two key aspects of leadership and informatics competencies will be addressed in this chapter – namely, the transformation of health care and preparation of the nursing workforce.

Keywords. Leadership, digital competencies, professional practice, education, transformation

1. Introduction

Leadership and the technological revolution in today's dynamic healthcare sector are focal discussion topics both in the scientific and popular literature. Calls for development of informatics competencies among nurse leaders, while not new, are increasingly vocal and compelling [1-7]. Such demands are triggered by a variety of drivers including shifting population demographics, increasing burdens of chronic disease, spiraling health care costs, scarce resources, major shortages in qualified healthcare professionals, consumer demands for improved quality, transparency and self control, calls for person-centric integrated models of care, supported by the ubiquity of technology [7-11]. National reports call for significant reforms of existing healthcare infrastructure and leadership practices with tangible recommendations involving technology for the future [12-14]. In sum, this development exposes the need for leaders that don't simply react to suggested IT-solutions, but understand information management, digital trends, and future practice implications and are able to capitalize on opportunities in a digital era.

This chapter will highlight the skills required by nurse leaders such as Chief Nurse Executives (CNEs), Vice Presidents of Care services and other senior leadership personnel, to support authentic healthcare transformation, advance nursing roles in digital environments, and ensure workforce digital competence to provide professional, evidence-informed care in complex, connected health environments.

2. Leadership as a Characteristic of Nurse Executives

The 2010 Institute of Medicine & Robert Wood Johnson Foundation report [12] proposed a comprehensive map for the future of nursing in the United States with new roles to transform healthcare along three aspects - *leadership, education, and practice*. With broad and discipline-specific transformation as core principles, this report declared that nurses are essential to help shape and lead the future of a dynamic, integrated, patient-centric health care system. In response to the centrality of nursing in healthcare, new types of nursing roles are emerging to support leadership and transformation, including Chief Nursing Informatics Officers and Nursing Informatics Executives [12]. These innovative leadership roles are considered essential to effectively support transformational activities and enable new models of care in clinical practice with appropriate technology solutions [9-11]. Likewise, other international organizations, including the National Health Services (NHS), Organisation for Economic Co-operation and Development (OECD), Academy of Canadian Executive Nurses (ACEN), Norwegian Nurses Organization, and the Swedish Society of Nursing are highlighting that greater adoption of digital solutions requires nursing informatics competency among nursing leadership to leverage technological solutions that can support contemporary nursing practice, and advocacy for future optimization of nursing in technological environments [13-17]. Further, advocacy of nursing within key priorities includes but is not limited to data quality, evaluation metrics, data science/big data, eSafety, and strategic advocacy for clinical information system design, deployment and procurement aligned to meet patient and nursing needs [18-22].

Leadership, as both a professional descriptor and a commodity in practice, reflects skillful synthesis of a) capacities of the individual in the job, e.g., knowledge, skills, experiences, b) the frame of the role, e.g., purpose, perspective and position, and c) the agenda of the job, e.g., strategic and operating goals, care quality, resource utilization, and policy [5]. Clear expectations regarding nurse executive leadership and nursing informatics competencies are essential to move beyond simply 'being aware' of informatics while delegating responsibility to other specialists to create discrete learning opportunities targeting nurse executive preparation enabling effective practice of informatics knowledge and skills across executive environments [2-4, 9-11, 23].

While informatics specialists can be available for deep expertise, nurse executives require a "broad, working knowledge of IT to safeguard patient care outcomes" [3]. In his 2013 study of CNE competencies in nursing informatics, Simpson found that senior nurse executives experienced a competency gap in "awareness of societal and technological trends, issues, and developments as they relate to nursing" [3, p.6], resulting in self reports that most CNEs felt unable to effectively represent nursing needs in the technology discussion and evaluation processes dominated by physicians or other stakeholders. Further, nurse executives reported that their roles were relegated simply to review software functionality [3], and that nurse leaders may not even be invited to report nurse specific perspectives when assessing potential functionality [11].

Five common competency domains for nurse executives were identified by American Organization of Nurse Executives (AONE) [18]. Figure 1 illustrates the domains of communication and relationship management; knowledge of the health care environment; leadership; professionalism; business skills and principles. Within these domains, explicit competency statements are provided which support the broad skills required to effectively provide nursing leadership. These recently updated Nurse Executive Competencies [18] provide a robust example of explicit expectations around

informatics competency. Development of these competency elements is critical to resolve some of the frustration historically encountered by nurse leaders.



Figure 1 AONE Nurse Executive Competency Model (2015, p.2), copyright 2015, by the American Organization of Nurse Executives (AONE). All rights reserved.

Under Business Skills, AONE includes a subsection of Information Management and Technology, with seven key competency elements (Table 1).

Table 1 Business Skills excerpt, AONE Nurse Executive Competencies (2015, p. 10), copyright 2015, by the American Organization of Nurse Executives (AONE). All rights reserved.

INFORMATION MANAGEMENT AND TECHNOLOGY
Use technology to support improvement of clinical and financial performance
Collaborate to prioritize for the establishment of information technology resources
Participate in evaluation of enabling technology in practice settings
Use data management systems for decision making
Identify technological trends, issues and new developments as they apply to patient care
Demonstrate skills in assessing data integrity and quality
Provide leadership for the adoption and implementation of information systems

The following informatics competencies are recommended to extend the AONE list:

- Actively challenge boundaries within, across and outside the traditional care settings, to enable personalized, coordinated, and connected health care
- Foster nursing practice that maintains client advocacy in connected healthcare and empowers clients to effectively use the tools of connected health for supported self management to achieve desired health outcomes
- Identify data sources and data types that inform data driven clinical decisions that leverage clinical intelligence and practice-based evidence
- Demonstrate the ability to identify, filter, and use information to support strategic organizational and profession-specific decision making

- Balance the use of technology with the humanistic perspective of nursing practice
- Demonstrate effective change management skills to resolve resistance to change and further support digital enablement and clinical practice alike.

3. Transformation of professional practice environments

Healthcare transformation is reflected in shifting models of care, increasing use of interprofessional care teams, and the widespread adoption of clinical information systems (CIS) to support care provision. With many organizations investing in CIS, it is essential that nurses have an active role in contributing to the requirements gathering, evaluation, design, and ultimate selection of clinical systems [2-6, 11, 23-27].

Two core aspects of the ongoing transformation to *connected care*, include a) shifting from support of episodic to a more longitudinal perspective of care, and b) increasing opportunities for the individual and family's access and engagement with personal health information, which encompasses access to of all care settings, including the full scope of activities in primary care, home dwellings and specialized care [28].

As the largest group of users of and contributors to health information systems [26], nurses have enormous stakes in transformation of clinical environments. The availability of accurate, timely, and accessible data, collectively referred to as clinical intelligence, is essential in contemporary clinical practice environments. Nurses are ideally positioned to advance clinical intelligence and practice-based evidence through attention to data quality, guideline implementation, as well as design and selection of effective solutions [20].

When operating at their peak, innovative clinical systems provide users with accurate, readily accessible data supporting improved clinical decision making and nursing practice, outcomes and quality measurement, enhanced interprofessional communications, improved patient safety, and sophisticated analytics to inform all aspects of health care delivery and administration [2, 6, 9, 18, 21, 22]. However, when nurses are not engaged in design and procurement processes, they frequently find themselves working with systems that fail to meet clinical needs, and are subsequently compelled to find workarounds to maintain patient safety to compensate for system flaws or even failed implementations [4, 26, 36]. In these instances, nurse executives must "function as the voice of patient care" [3] in assertively advocating for functionality and workflows that effectively meet patient care needs and their safety.

As demands for data-driven decisions across healthcare systems continue to rise, the infrastructure supporting clinical information management will necessitate interoperable information systems seamlessly linked with financial, human resource, organizational systems. CIS that incorporate principles of data science and analytics to inform evidence-based decision making are critical elements of this demand [21, 22, 29]. However, in many instances, clinical information systems are the last to be deployed, after laboratory, radiology, financial, admission-discharge and transfer, and other modules have long been in use. Nurse executives can use tools like the AONE Guiding Principles [24,25] to develop capacities and prepare to advocate assertively to introduce solutions that are unambiguously patient-centric, and meet nursing needs with intuitive interfaces, clinical decision support solutions, and unrestricted access to databases in centers of excellence. Nurses and nurse executives are best positioned to represent nursing workflows and core nursing needs supporting patient care.

Where nurses are unable to provide leadership and clear requirements, other disciplines will emerge to drive change and procurement, such as physicians [3] or information system (IS) experts, who note that a “rare and remarkable opportunity has emerged for the IS community to leverage its in-depth knowledge to both advance theory and impact practice and policy” [29]. Further, in many practice settings, incongruence between existing clinical workflows and Commercial Off-The-Shelf (COTS) products necessitate additional customization and active nursing engagement to represent critical information flows and decision points in nursing workflows. With alignment to workflows being critical to securing an effective CIS, many IS resources recommend alignment to medical or generic workflows [29]. This is not an uncommon approach and illustrates necessity of nurse leaders being active participants in health information system requirements gathering, design, procurement, and implementation.

4. Transformation of the profession

Requirements identification and selection of a digital information system, whether a specific electronic health record (EHR), a clinical information system, a portal, or a selection of mobile apps, are often part of the organization’s larger digital ecosystem (See section C chapter 1 for further explanations about the health ecosystem). Evaluations of systems and the vendors’ offerings are often a procurement decision, influenced by a multitude of interests beyond those of the actual end users. Functional and non-functional requirements, and system choice are likely to reflect priorities and intentions of the organizational procurement division, but engagement and advocacy are important strategies to contribute clinician and end user perspectives.

Being a dependent adoption decision [30], procurement deliberations and decisions can generate challenging conditions for clinical practice. Gaps in clarity of or alignment with the scope of intended clinical transformation, and disrupted information flows within and among interprofessional teams often create challenges during and following implementation of CIS. For the existing workforce of registered nurses, physicians, and other health providers, starting to use a digital information system to document clinical encounters and professional decision making, becomes a process to adopt features and functionalities of already selected systems in the available digital ecosystem. Workforce preparation to maximize the abilities and advantages of the system will depend on the core features and identified problems a system sets out to solve. For example, a CIS can be perceived as invaluable in meeting specific professional requirements for one group of clinicians while it may be seen as very cumbersome to integrate for other professionals in another practice. Workforce preparations can therefore involve different activities.

The strategies required to achieve system transformation must include the strategic vision of what professional practice will be, identification of the necessary clinical and digital competencies, clear articulation of the program of activity with local clinical intelligence and required data needs supporting clinical practice and client outcomes, and overall alignment to organizational, regional/national, and disciplinary strategy and priorities [3, 9, 25]. Nurse leaders’ capacities to shape future practice and ensure up to date competencies of the workforce to access information and apply knowledge are core contributions for the overall preparation of a workforce. This includes abilities to master available systems, support practice-based and data driven decision-making, maintain continuity of care, and ensure patient safety at all times [3, 9, 23]. Informatics

overviews, anticipation and articulation of desired competencies, training requirements and education opportunities would ensure that the workforce has the necessary information technology (IT) skills and digital health literacy [23] to successfully practice and contribute to a transformed healthcare environment. Nurse executives are “in a prime position to bridge research, education, and practice” supporting workforce preparation [9]. Section A chapter 2 discusses the role of formal education in greater depth, and thus, the following section will highlight three core dimensions of workforce preparation: digital literacy, system, and practice.

4.1 Competency in health informatics - digital health literacy

A core challenge whenever health informatics and digital opportunities are introduced in health care is the development of workforce knowledge and articulation of specific competencies. A significant number of all health care professionals are digital immigrants [31], and as such, unfamiliar with many of basic features or functionalities of any digital system. Leadership is about facilitating and ensuring processes where nurses remain highly skilled professionals with added expertise in information technology and nursing. Therefore, digital health literacy or eHealth literacy is an important foundational topic for workforce preparation and in-service training. While often organized as part of deployment of any digital system, training should go beyond system specific introduction to ensure staff have demonstrable competencies to locate and act upon information in digital form [32].

Acquiring new skills and capacities to use and take advantage of the opportunities is a core issue in workforce preparation. Digital literacy or information literacy, informatics awareness or computer experience are connected to the professional use of information technology [33]. Few standards or guidelines are available to integrate broader nursing informatics competencies into either undergraduate or graduate level programs, making it difficult to design appropriate nursing curricula or provide competency guidelines [8, 23, 34, 35]. Defined and validated informatics competencies for nurses at four levels of practice have been available for more than a decade, and provide competencies for the beginner, experienced, Informatics Nurse Specialist and informatics innovator [7, 36]. These levels focus on different expectations regarding technology use, information system use and informatics-specific content issues to guide curriculum development. Educational resources that could apply for workforce preparation are discussed in section B chapter 1 - Informatics Competencies to Start Professional Life: A Global Perspective, and section B: What practicing nurses need to know about Health IT in order to practice today: Continuing education and certification. A collective challenge for nursing executives is to widely disseminate and adopt suggested competency-based training beyond formal academic programs to ensure timely, accessible workforce access.

For workforce preparations to advance digital health literacy a set of minimum level competencies will be necessary. There are suggested two levels of learning:

- *Understand*: demonstrated as a set of knowledge and skills related to actual use of any clinical information system, EHR, or eHealth/mHealth solution
- *Know*: familiarity with and ability to relate a topic in a clinical system to a specific aspect of work, for example laws, ethics and standards.

Therefore, workforce preparation could emphasize competence to access to information for continuous care and patient safety, confidentiality and privacy, conditions for exchange of health data, information use for different digital systems,

and encourages health professionals to provide feedback and actively engage in processes to elaborate and expand the set of suggested competencies [11, 37].

Recommendations for leadership initiatives targeting workforce development include implementation of systematic processes to become digitally competent, and formalizing transitions to mandatory competencies with discrete education programs encompassing a full range of information [23]. This type of educational program would necessarily include foundational knowledge (e.g., data-information-knowledge-wisdom, data standardization, data quality) as well as core set of minimum data, to more advanced levels of information, such as that related to analytics [3, 9, 23]. As progress is made on core or ‘classical’ topics for nursing informatics for both the workforce and nurse executives, attention will need to shift to skills needed for connected care, where new actors join and the need will shift to even greater needs for data science and connecting people to health information [38].

4.2 Competency in information system procurements

An important area of workforce preparation relates to capacity for participation in procurement and customization of a system, where the selection of core features, emphasis on specific data elements or tailored information sequences or data subsets set the stage for local, practice-specific use [3, 9]. Ensuring appropriate workflow support, algorithms, patient safety and quality care when professional requirements and information systems assessment match up with little opportunity for harm is paramount for procurement and further customization of any CIS [24, 26, 39]. These are fundamental considerations leading to workable templates for documentation of professional deliberation and enactment, specifications of guidelines, selection of rules, and making decision support relevant.

As part of the nurse executive scope in procurement processes, it is critical that vendors understand and accept that they must consider more than one workflow to achieve transformation. Simply replicating a linear, generic “paper-based” workflow in a digital environment is insufficient to support authentic transformation and gain the true value of intelligent electronic systems. Nurse executives can challenge vendors to balance workflows, present data in multiple ways, and position the patient and clinical needs as their priorities – rather than forcing clinicians to accommodate to a system design. Further, requirements gathering must specifically include nursing as well as other clinical disciplines to ensure that both functional and non-functional requirements are explicitly captured, prioritized, and considered across the systems development lifecycle – and particularly in the design phase.

4.3 Competency in practice development, teamwork and workflow adaptation

A core challenge to workforce preparation is to learn how to work within CIS and broader digital health information ecosystems, and deal with changes introduced as a consequence of the CIS, either in the representation of professional practice or in the new opportunities to collaborate in hybrid teams. A key feature of current interprofessional teams is equity in contributions by health professionals combined with patient and family involvement. This is the prime example of transcending boundaries in connected health. Many opportunities exist to explore, and exploit information in CIS in concert with patient-generated data and reports of daily living.

Generating the clinical intelligence and practice-based evidence that drives improved patient outcomes through accurate and timely data provision to clinicians and interprofessional forums is only one dimension supporting best practice in transformation. Nurse executives are encouraged to adopt a systems perspective to ensure that such clinical intelligence is incorporated throughout care plans, assessments, and outcomes evaluations in ongoing, health-focused decision making that includes and supports patients. Nurse executives should also seek to include aspects of the following considerations to transformation:

- Prioritizing personalized care and new mechanisms of engaging individuals and families as partners in all aspects of connected health, where personal experience and preferences are incorporated into care delivery, appropriate analytics utilize multiple information sources ranging across clinical information systems; and self-care and clinical decisions are supported through access to Internet of Things-based personal devices;
- Accommodate changes in sites of care, developing models that are sensitive to multiplicity in spatial and temporal dimensions over longitudinal trajectories of care;
- Practice models of interprofessional teams where equity in contributions from the individual and family and health professionals are incorporated in the assessment, deliberations and enactment in ongoing, health related decision making;
- Challenging existing digitization of workflow and practice to support transcending traditional boundaries. Advocacy for transformation beyond simply placing “forms” into electronic environments and expecting clinical outcome improvements.

5. Implications for Leadership

Transformation sits in the convergence of drivers and enablers for a new digital health ecosystem, leadership, and workforce preparation. The layers of complexity within contemporary healthcare environments and the requisite skills needed to effectively lead professional nursing practice necessitate that nurse executives develop explicit informatics knowledge and skills for themselves and their workforce. While collateral competencies developed for effective organizational leadership and clinical information management can be scaled to support broader leadership across the profession of nursing and the healthcare sector, informatics knowledge cannot be delegated to informatics specialists, and nurse executives must prioritize this set of essential skills. Key competencies for nursing executives leading evolving connected care include:

- Fundamental understanding of core informatics concepts and their utility to nursing, professional collaboration and patient safety;
- Understanding how digital health information ecosystems either support or disrupt clinical workflows and the implications of any such changes;
- Ability to actively and accurately represent nursing needs in design and deployment as well as procurement and customization;
- Ability to facilitate/enable development of workforce preparation strategy and educational program, including mandatory competencies, additional competencies; and
- Change management skills to complement informatics skills.

Achieving these competencies will require nursing executives to examine a variety of educational forums, including formal academic programs, as well as entrepreneurial innovations that create opportunity within and beyond the organizations [40] using hybrid solutions for continuous education, such as digital learning environments (e.g., Massive Open Online Courses (MOOC), Small Private Online Course (SPOC), local eLearning courses). As enterprises across the globe continue to increase the pace of healthcare digitization in pursuit of greater quality and success, and the Internet of Things, mHealth, and data analytics continue to gain momentum, it is imperative that a coherent program of discrete opportunities are established to enable development of informatics competencies among nurse executives, and that nurse executives articulate their needs.

In this digital era of increasingly connected health, developing capacities and informatics competencies for nurses and nurses executives are an essential strategic enabler to the achievement of all other executive leadership competencies, including communication and relationship management, knowledge of the healthcare environment, business skills and principles, and supporting nursing practice.

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