



# Innovation in Transformative Nursing Leadership: Nursing Informatics Competencies and Roles

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## Abstract

In a recent brief to the Canadian Nurses Association's National Expert Commission on the Health of Our Nation, the Academy of Canadian Executive Nurses (ACEN) discussed leadership needs in the Canadian healthcare system, and promoted the pivotal role of nursing executives in transforming Canada's healthcare system into an integrated patient-centric system. Included among several recommendations was the need to develop innovative leadership competencies that enable nurse leaders to lead and advance transformative health system change.

This paper focuses on an emerging "avant-garde executive leadership competency" recommended for today's health leaders to guide health system transformation. Specifically, this competency is articulated as "state of the art communication and technology savvy," and it implies linkages between nursing informatics competencies and transformational leadership roles for nurse executive. The authors of this paper propose that distinct nursing informatics competencies are required to augment traditional executive skills to support transformational outcomes of safe, integrated, high-quality care delivery through knowledge-driven care. International trends involving nursing informatics competencies and the evolution of new corporate informatics roles, such as chief nursing informatics officers (CNIOs), are demonstrating value and advanced transformational leadership as nursing executive roles that are informed by clinical data.

## Background

The first decade of the 21st century provided compelling evidence supporting the need for transformative leadership in healthcare. National and international groundbreaking reports urge nurses and the nursing profession to contribute proactively through leadership roles (Harris and Murphy 2011; Institute of Medicine and Robert Johnson Wood Foundation 2010; Amara et al. 2000; Kirby 2002; Romanow 2002). Specifically, Amara's (2000) report recommended that eHealth transformational agendas recognize and position nurses as the most qualified to respond to the current changes in our health system. With the intent of eHealth goals to deliver better healthcare that is patient focused, results driven, integrated and sustainable, achieving these goals is critically dependent upon information and information technology. Nursing skill sets continue to align naturally in an environment (i.e., the health system) that is moving towards outpatient care and requires providers to function as teams and assume management roles in facilitating care across the continuum (CNA 2009; Remus 2006; Amara et al. 2000). The authors believe nurses remain most qualified, and well positioned as the largest contributors of healthcare services across all sectors, to support essential clinical transformation efforts through uptake of automated clinical tools (i.e., electronic health/patient records) that will result in new care delivery models.

Recent consultations by the Canadian Nurses Association (2012) advanced this discussion, noting that information must be utilized both as a tool to inform decisions and as an essential element in a preferred future reflecting an informed, effective and sustainable healthcare system. Concurrently, nurse leaders are recognizing that traditional skill sets (i.e., financial, resource management, clinical operations and so on) must be augmented with new skills that enable effective information utilization and management, and support the future-oriented strategic activity inherent in transformational leadership (Meyer et al. 2011). Nurse leaders who equip themselves with new nursing informatics management skills (i.e., information management competency) will be well positioned to reap the benefits that electronic health records (EHRs) offer. Further, those who move their transformative practice agendas forward through successfully leveraging EHRs will make informed, timely decisions that are knowledge driven, creating sustainable healthcare delivery across all nursing settings.

## Fostering the Development of Transformational Nurse Leaders

**NI competencies: Essential skills for nurse leaders**

The Academy of Canadian Executive Nurses (ACEN) (Meyer et al. 2011) suggests that the timing is right and sets the imperative for Canadian nurse leaders to support emerging competencies that will enable health system transformation. Meyer and colleagues (2011: 25) endorse "state of the art communication and

information technology savvy” as recommended leadership competencies. They also recognize the value of technology through competency in communication and information technology. However, the authors of this paper propose that this competency, as stated, underestimates the meaning or appreciation of requisite nursing informatics (NI) competencies and does not fully convey the scope or intensity of effort that nurse leaders will need to invest in such competencies. Instead, we recommend explicit articulation of these distinct informatics skills, defining competencies unambiguously with measureable knowledge dimensions and clear outcomes of application supporting avant-garde leadership (Kennedy and Remus 2012b).

NI competencies are not necessarily new. The American Nurses Association in 2001 was one of the first nursing professional bodies to endorse NI through a formal certification program and a published NI scope and standards of practice (ANA 2008).

NI competencies are increasingly recognized as a new essential skill set, enabling contemporary nurse executives to support and advance healthcare system transformation evidenced by a number of nursing and health professional associations that endorse NI and health informatics competencies (ANA 2008; TIGER 2006; COACH 2009; HIMSS 2012). Understanding the distinction between generic health informatics competencies and NI competencies is necessary for all nursing executives to recognize points of alignment, but also the points where nursing is unique and specifically requires a nursing perspective. COACH (2009: 7) defines health informatics as the “intersection of clinical, IM/IT [information management/information technology] and management practices to achieve better health.” Nursing informatics, as a specialty practice within nursing and as a profession-specific specialty of health informatics, is defined by the International Medical Informatics Association (2009: 4) as “integrating nursing, its information and knowledge, and their management with information and communication technologies to promote the health of people, families and communities worldwide.” In Canada, nursing informatics as a practice subspecialty is visible across all clinical nursing specialties, such as cardiology, paediatrics, respiratory, critical and peri-operative care, and more. NI is a foundational skill set regardless of the clinical specialty or role (e.g., executive, educator, researcher, clinical staff) because each of these roles relies on data/information to inform decisions on a daily basis.

COACH (2010: 25) recommends that health informatics leaders must understand “data context, terminology, privacy, data management and quality as well as the transformation of data into information to support decision making across the health care enterprise.” Extrapolating this same breadth of knowledge is essential to nurse leaders, who must integrate these competencies into executive nursing

roles to advance clinical information management and ensure the integration of NI competencies in health system reform activities. In doing so, nurses and the broader profession of nursing can improve both quality and continuity of care across the continuum by successfully leveraging information and communication technologies (ICTs), demonstrating evidence-based practices and gaining recognition as sophisticated knowledge workers. Nagle's 2008 vision challenges nurse leaders to move forward from an era of Luddites and become luminaries, guiding the profession and leading transformational eHealth agendas.

Recent reports, publications and recruitment trends illustrate how leading health-care organizations are recognizing the value of nursing informatics competencies (Manos 2012; Murphy 2011; Harrington 2011, 2012; Harris and Murphy 2011; Simpson 2011). Catholic Healthcare Initiatives (Alfano et al. 2012), a large US multisite healthcare provider (32 healthcare organizations spanning 19 states), has created a strategic, systemwide chief nursing informatics technology officer role. This role is structured as a dyad with a systemwide chief medical informatics technology officer role and supports six tactical/regional chief nursing informatics officers (CNIOs) partnered with six regional chief medical informatics officers (CMIOs). Linda Hodges (cited in Manos 2012), an executive recruiter, reports that the recruitment of CNIOs is on the rise as a result of academic health science institutions' and large integrated health systems' placing value on NI skills and knowledge to facilitate meeting "accountable care organization" (ACO) mandates. Further, Manos (2012) has reported on other health and health-related organizations that are advocating for NI competencies and executive CNIO roles (e.g., Veterans Affairs, IT vendors and policy makers, among others).

Organizations that recruit nursing informatics leadership roles support the integration of NI competencies as an essential specialty role within nursing and healthcare leadership and believe that this contemporary approach will achieve two important goals. First, this approach will help protect healthcare system sustainability through information-informed decisions, and secondly, it supports achievement of the ultimate vision of healthcare – that of knowledge-driven care grounded firmly in outcomes and efficiency (Manos 2012; Currie 2011; Kimmel 2012; Pringle and Nagle 2009; Mays et al. 2008; Nagle 2005). Matney and colleagues' (2011) investigation into the NI data–information–knowledge–wisdom framework supports the value of distinct NI roles in which nurses link data, information, knowledge and wisdom in meaningful ways. Her work extends the next generation of NI definitional work around NI competencies (Gonçalves et al. 2012; Staggers et al. 2001, 2002). CNIO and/or nursing informatics executive (NIE) roles, although increasingly evident in organizational and regional infrastructures across the United States, are new and not yet widely accepted. Hodges (cited in Manos 2012: 4) suggests the slow uptake and acceptance of both

the CNIO title and new role parallel the adoption pattern of CMIO roles, which evolved over a 10-year span. Therefore, Hodges anticipates and suggests that CNIO titles/roles will take time to become accepted and adopted. Dr. Ferdinand Velasco (cited in Manos 2012: 5), a vice-president CMIO, is encouraging his Texas healthcare organization to consider creating a CNIO position now. Velasco suggests that these emerging CNIO roles are “a good indication of the significance in the nursing dimension in the healthcare role and IT.” Further, he emphasizes that effective clinical workflow redesign needed to transform care delivery and meet meaningful use criteria make it imperative that CMIOs and CNIOs work together (Velasco, cited in Manos 2012: 5). Interestingly, Velasco’s endorsement of CNIO roles supports Amara’s (2000) prediction, where nurses and the nursing profession are positioned as the most qualified to respond to the current changes in our health system and meet eHealth transformational agendas. The latter emphasizes the ongoing value – the return on investment (ROI) – placed on nurses and in particular, new nursing informatics leadership roles, such as NIEs or CNIOs.

#### NI competencies and professional nursing practice

The 2003 Institute of Medicine (IOM) report (IOM 2003) on quality of care featured an extensive examination of the skills required by all healthcare professionals to optimize leadership and clinical excellence in dynamic, information-rich environments. According to the IOM (2003, cited in Dreher and Fitzgerald-Miller 2006: 29), today’s health professional must be able to “(1) provide patient-centered care, (2) work in interdisciplinary teams, (3) employ evidenced-base practice, (4) apply quality improvement and, fundamental to the preceding four, (5) make use of informatics.” For the purposes of this discussion, informatics encompasses the broad knowledge base concerned with all aspects of information literacy, not just computer competence (Saranto and Hovenga 2004; Kerfoot and Simpson 2002). Although a relative latecomer to the skill set of most health professionals, informatics is the most fundamental, owing to its inherent ability to inform and enhance the performance of the other four IOM competencies (Dreher and Fitzgerald-Miller 2006).

Development of NI competencies informs client-centred care, supports interdisciplinary teamwork, provides evidence to support quality improvement and ensures the incorporation of evidence into practice (Dreher and Fitzgerald-Miller 2006). Increasingly, however, NI has gone beyond simply incorporating evidence into practice to enabling the extraction of meaningful data from practice to inform clinical and administrative decisions from bedside to boardroom across the continuum of care. The latter exemplifies lived experiences of nursing informatics competencies or applied nursing informatics in practice settings. Herein lies the critical and essential relationship that integrates nursing informatics with

professional practice (Remus 2006). Across Canada, organizations that have adopted the Canadian Health Outcomes for Better Information and Care (C-HOBIC) measures into their documentation standards of practice can demonstrate and experience the initial benefits of knowledge-driven care where meaningful clinical data are informing decisions and reshaping clinical practice and administrative policies. Early C-HOBIC adopters are reporting excellent indicators using their data to facilitate knowledge-driven care (White, 2012). One example includes the Joseph Brant Hospital in Burlington, Ontario, which reports utilizing C-HOBIC data to develop quality resource projects that support evidence-based decisions at the point of care and ultimately influence corporate strategic decisions. A second example is the South Bruce Grey Health Centre – Chesley site in Chesley, Ontario, which reports using C-HOBIC measures every three days on its Restorative Care Unit to monitor patients' progress in the program.

An examination of why, despite the compelling value and impact on nursing and healthcare, NI competencies are not yet widely adopted by nurse leaders reveals a knowledge gap and perhaps, even more seriously, a lack of recognition of how influential NI is in daily practice. A number of nursing informatics leaders have diverse opinions on this phenomenon, where NI competencies are neither embraced nor well understood by nursing leaders. Nagle (2009) explained that the majority of nurses do not embrace or understand the notion of informatics, or understand its meaning and the relevance to their work. Richards (2001: 8) observed that nursing and nurses appear to be “passively accepting the inevitable saturation of computer technology into all aspects of health care,” both from a computer and information literacy perspective. Barron McBride (2005, 2006) examined clinicians' perceptions and concluded that informatics was still not considered fundamental to clinical practice but viewed rather as an “add-on.” Pringle and Nagle (2009) explained that historically, nurses have not been “information users” because patient information was not readily available in paper-based practice environments prior to EHR implementations, and recommended continued education to achieve that broad integration of NI competencies into the nursing perspective. Gonçalves and colleagues' (2012: 130) research on NI competencies provides optimism that adoption is on the horizon and emphasizes that both the current and future nursing workforce must be prepared to perform effectively in “safety-focused, integrated, patient-centred,” technology-enabled and information-rich environments. Although the aforementioned perspectives lend insight into nurse leaders' indifferences to the essence of NI competencies' skills and knowledge, research to address this phenomenon is still required. The potential volume of data now being generated by the healthcare system has exploded, in part due to the number of data sources, and the number of solutions that can generate information to inform decisions.

More than ever, nurse executives must be information leaders and guide the nature and scope of information, supporting executive decision-making and innovation. Consequently, NI competencies must be integrated broadly to extend beyond discrete IT implementation activities (work process redesign, clinical systems, EHRs and so on) to all information-dependent nurse executive activities.

### Developing NI competencies

The emerging value of nursing informatics competencies is evident not only in healthcare organizations, but also in academia. Richards (2001) argued that academic faculty preparing the nursing workforce are far removed from the realities of practice environments, further exacerbating the challenge of preparing graduates who are able to lead in contemporary environments through innovative change, and promote awareness of and competency in electronic environments.

However, academic and professional institutions in Canada and the United States are increasingly acknowledging the importance of nursing informatics as an essential skill set and are embedding key NI competencies into traditional nursing education curriculums (CASN 2012; RNAO 2011; TIGER 2006). Innovations in traditional academic programming are also emerging to offer future nurse leaders programs that combine traditional nursing education with health informatics programs. Graduates of such programs as the combined master's program at the University of Victoria emerge with a range of sophisticated informatics skills combining knowledge and skills from both a master's degree in nursing as well as a master's degree in health information science (University of Victoria 2012).

Opportunities to build NI competencies are not restricted to formal academia. The United States' Technology Informatics Guiding Educational Reform (TIGER 2006) initiative developed a national informatics education strategy for its existing nursing workforce. At NI2012 held in Montreal, TIGER launched its new internationalization phase, complete with an international board including representation from Canada, Asia, South America and Europe. Additionally, a range of continuing education opportunities exist in Canada and beyond. Such opportunities include the National Institute on Nursing Informatics (NINI) at the University of Toronto (2012), various "bootcamp" programs affiliated with Canadian universities and professional interest groups such as the Canadian Nursing Informatics Association.

### **Innovation in Nursing Leadership Roles**

#### A glimpse into the future

The emerging trends integrating NI competencies and the evolution of new corporate nursing informatics roles are converging to propel nurses towards leading health system transformation. Barron McBride (2005, 2006) identified that

evolving digital environments present an opportunity for nursing to achieve its preferred future, because the paradigm shifts taking place align with long-held nursing values, although these are not always realized. Shifting paradigms today reflect a more holistic systems approach that focuses on patients, their safety and the provision of ethical care that is evidence based and outcomes driven.

Table 1 highlights characteristics of the progressive informatics journey, illustrating where our healthcare landscape has been, our current status and our preferred future (Kennedy and Remus 2012a).

**Table 1.** Characteristics of healthcare systems

<b>Industrial Revolution</b>	<b>Information Age (Today)</b>	<b>Knowledge Age (Our Preferred Future)</b>
Tiered, Bureaucratic, Provider-Centric Structures; Acute Care Driven	Flattened, Programmatic, Provider-Centric Structures	Consumer-/Patient-/Client-Centric Structures
Professional Care Silos;	Interdisciplinary Teams;	Interprofessional Knowledge Teams;
Memory-Based Practices	Information Workers; Evidenced-Based Practice; Outcomes Orientation	Knowledge Workers; Practice-Based Evidence; Outcomes Based
Paper Record-Based Care	Hybrid Electronic-/Paper-Based Systems	Integrated EHR, Business and Clinical Systems

Source: Kennedy and Remus 2012a  
 EHR = electronic health record.

Harrington (2011) describes the ultimate benefit of EHRs as “clinical intelligence” (CI), the new business intelligence of healthcare. With the increasing availability of EHRs, information to support health system decisions is readily available and coordinated, and can further be exploited through analytics to be proactive versus reactive in decision-making. These new digital tools propel us towards the “knowledge age” of the future, which will include the use of practice-based evidence (PBE).

Practice-based evidence represents the next generation of evidence-based practice (EBP), and occurs when nurses in all practice domains have user-friendly, accessible EHR analytical tools at their fingertips. Nurses must be able to query clinically actionable and timely data, resulting in efficient, effective health delivery across the continuum of care (Harrington 2012; Kimmel 2012; Krohn 2008). Data that are available and actionable at the point of care will change clinician behaviour, as clinicians will finally have credible information informing their care and be better



positioned to collaborate and coordinate patient-centric care. This describes our preferred future, when clinical transformation can be realized and knowledge-driven care is achieved. Access to real-time clinical data housed in comprehensive repositories (i.e., EHR systems with robust analytical tools) at the point of care differentiates PBE from our EBP environments today. Here, EBPs rely on data that have undergone analysis utilizing traditional, retrospective research methods (i.e., inclusion/exclusion criteria; variable limitations and so on) generating EBP. Interestingly, implementing evidence in practice environments today takes up to seven years with current methods, which is too long, according to Cadmus (2011). She challenges nurses and the nursing profession with the “need to re-think how decision support can be accelerated” (Cadmus 2011: 39). To accelerate decision support systems for nurses and nursing endorses the adoption of nursing informatics competencies so that CI through practice-based evidence can be achieved (Barron McBride 2005; Cadmus 2011; Currie 2011; Murphy 2011; Nagle 2005, 2008; Nickitas and Kerfoot 2010; Pringle and Nagle 2009; Simpson 2011).

To fully realize CI, electronic health systems must be deliberately designed to incorporate sound data management practices and offer functionality to provide robust data analysis tools that generate real-time decision support at the point of care. However, according to Zhang, as cited in Monegain (2012), many systems today lack sophisticated design and functionality and are based in the “DOS age” in terms of usability, leaving clinicians frustrated. System design today affords only data-level or information-level functionality, creating inefficiencies in monitoring health system performance (e.g., organizationally, jurisdictionally and so on). Kimmell (2012) suggests that more than 80% of an individual’s time is spent finding, formatting and building reportable data. She contrasts this situation with our future electronic systems, when PBE will be enabled through robust analytics and clinicians will spend 80% of their time generating actionable results, yielding unforeseen health human resource productivity efficiencies and driving sustainable healthcare delivery. This is where clinical intelligence is realized and knowledge-driven care is achieved.

Although these nursing informatics essentials and roles have yet to undergo research or analysis, cumulative experiences to date illustrate quantifiable value of this emerging phenomenon. Anecdotal accounts of initial successes with CNIO roles, the associated nursing informatics competencies and their deliverables/ outputs lend validity, value and return on investment to the health system and the nursing community at large (Harrington 2012a,b; Manos 2012; Harris and Murphy 2011; Simpson 2011; Amara et al. 2000). Today, enabling CI is challenging given the current state of reporting environments. Structures typically include decision-support departments staffed with teams of analysts working in partnership with IT personnel to query diverse, non-integrated clinical/business data-

bases to generate retrospective reports using potentially out-of-date retrospective data. Most organizations have a significant backlog of reports and analysis requests, some of which are never realized to inform practice or corporate decisions (Kimmel 2012). Additionally, retrospective, delayed reports are fraught with data integrity issues as a result of disparate EHR, clinical and business system data architecture designs. Organizational system design approaches seldom conform to an industry standard for data storage and management. Data entry practices are inconsistent and driven through customized template designs (e.g., text, uncoded duplicate data) that lack standardized terminologies (Kimmel 2012). Nurse leaders will play a key role in driving the progression of CI through contributions to systems design, organizational design approaches and effective data management leadership.

Achievement of knowledge-driven care through clinical intelligence depends on the development of nursing informatics skills and knowledge across the nursing profession from the point of care through to executive roles. Executive nursing informatics roles (e.g., CNIOs) are essential in Canada to drive EHR and clinical systems, processes and practice re-design across healthcare organizations and systems, government, IT vendors and professional practice organizations. In particular, the design and optimization (usability through cognitive clinical workflows) of clinical information systems supporting knowledge-driven care will be realized only through the leadership of skilled nurse and medical informaticians (Harrington 2011, 2012; Kimmel 2012; Monegain 2012; Currie 2011; Kerfoot and Simpson 2002; Simpson 2011).

## **Conclusion**

Future nurse executives who develop NI competencies and seek new informatics executive roles will be well positioned to provide transformative leadership that drives patient safety, high-quality care delivery models and knowledge-driven care through practice-based evidence. Further, organizations adopting CNIO roles will achieve significant and tangible return on investments, including successful deployment and adoption of information and communication technologies that are clinically relevant, efficient and effective and meet fiscal and clinical benchmarks. This future landscape reflects a transformed healthcare system that is the obligation of nurse leaders and the profession and the expectation of all Canadians.

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Let's talk

