CANADIAN JOURNAL of EMERGENCY NURSING
JOURNAL CANADIEN des INFIRMIÈRES D'URGENCE
THE OFFICIAL JOURNAL OF THE NATIONAL EMERGENCY NURSES' ASSOCIATION
www.NENA.ca www.CJEN.ca

Advancing emergency nurses' leadership and practice through informatics: The unharnessed power of nurses' data

Christopher Picard[1,2*], CD, BSN, RN, ENC(C), Manal Kleib[1], MSN, MBA, PhD, RN

[1]Faculty of Nursing, University of Alberta, Edmonton, AB, [2]Covenant Health, Edmonton, AB

*Corresponding author
picard.ct@gmail.com, 780-735-2836. Faculty of Nursing, 4-171, Edmonton Clinic Health Academy, University of Alberta, Edmonton, AB T6G 1C9. https://orcid.org/0000-0001-9377-3106 Twitter: @CtPicard

Manal Kleib MSN, MBA, PhD, RN, kleib@ualberta.ca, 790-248-1422. Faculty of Nursing, 5-112, Edmonton Clinic Health Academy, University of Alberta, Edmonton, AB T6G 1C9. https://orcid.org/0000-0002-4680-6750

Abstract

Collection of data in healthcare is vitally important to inform clinical decisions, resource planning and monitor effectiveness of care. The Canadian Emergency Department Information System and Canadian Triage Acuity Scale are primary tools for collecting such data. Although emergency nurses use these tools to collect significant patient and healthcare data on a daily basis, their understanding of the purposes and implications for collecting these data is unknown. Emergency nurses' limited awareness about informatics, and the under-representation in information and communication technology strategic initiatives and research are barriers to their realizing the full benefits of information and communication technology. The National Emergency Nurses Association is well positioned to provide the leadership required to move nurses from being data collectors, to information users by maximizing their potential to advance Canadian emergency nursing practice through informatics.

Key words: informatics, datasets, triage, emergency nursing

Key Takeaways

- Canadian ED nurses use CEDIS and CTAS to generate vast amounts of comparable electronic patient data nationally.
- Data generated during triage such as narrative notes have been used internationally for disease surveillance and research. In Canada the data has not been well explored.
- Although Canadian ED nurses are significant collectors of data they are underrepresented in national informatics working groups.
- There is a need for national leadership to describe nursing informatics competencies and increase nurse participation in informatics.

Collection of data in healthcare is vitally important to inform clinical decisions, resource planning and monitor effectiveness of care. The Canadian Emergency Department Information System (CEDIS) and Canadian Triage Acuity Scale (CTAS) nationally are primary tools for collecting and storing such data in emergency departments (ED). Although nurses use these systems on a daily basis, there is a paucity of research describing nurse understanding of these systems and the implications of data collection for national-level healthcare planning. There is also a mismatch between how nurses collect these data and use it in the context of care, with nurses being under represented in both research and policy development. This paper will briefly describe these data systems, and identify opportunities for nurses to assume leadership in ED informatics.

ISSN: 2293-3921 (print) | ISSN: 2563-2655 (online) | https://doi.org/10.29173/cjen37
Print publisher: Pappin Communications http://pappin.com | Online publisher: University of Alberta www.library.ualberta.ca/publishing/open-journals

CEDIS and CTAS as Foundational Pillars of Canadian ED Informatics

The CEDIS dataset uses the standardized International Classification of Disease (ICD) codes, with specific data elements unique to ED practice (Innes et al., 2001; Grafstein et al., 2003). Standardized clinical terminology or language for CEDIS and the National Ambulatory Care Reporting System (NACRS) data standard fulfill data reporting requirements, as mandated by the Canadian Institute for Health Information (CIHI), and enable 84% of Canada's emergency departments to collect patient data in a format that is useable to those who need it (CIHI, 2019). The breadth of CEDIS data reported to CIHI varies between hospitals; but the minimum dataset includes: patient-, provider-, and facility-specific information.

CEDIS data has been used to perform disease surveillance, track work that is being done in EDs, identify quality indicators and create decision support tools (Grafstein, Bullard, Warren, Unger, & CTAS National Working Group, 2008). CEDIS data and historical trends allow administrators to predict workload, compare costs, throughput, and patient demographics between sites for benchmarking purposes (Grafstein et al., 2008). Managers use data to monitor patient acuity levels, department flow, and monitor for pandemics (Grafstein et al., 2008). Bedside, clinicians generate CEDIS data through live time mapping of patient acuity level and location, and through point of care order entry, vital signs tracking, and electronic charting (Rowe et al., 2006). Arguably, one of the most tangible and best-validated benefit of CEDIS is from electronic triage assistance using the Canadian Triage Acuity Scale (CTAS).

CTAS is one of the most comprehensively studied English-language triage tools in existence (Hinson et al., 2018). It is used internationally and when large study samples were assessed, CTAS was the only triage system to have zero deaths in the lowest acuity level of patients studied (Farrohknia et al., 2011). The CTAS represents a clinical decision support tool that uses information entered into CEDIS data fields to aid care providers' clinical judgment when assessing patients in the ED. This information includes elements such as coded primary complaint, narrative summary of the triage assessment, and vital signs to help nurses assign an acuity score. These acuity scores offer guidance on how long patients can safely wait, how frequently patients are reassessed, to which areas of the department patients are stratified, and which patients should be seen first. CTAS-aided triage has been proven superior to clinical gestalt (Dong et al., 2005) with excellent predictive validity for length of stay, severity of illness and resource utilization (Dong et al., 2007) and, therefore, 95% of Canadian EDs use CTAS as their preferred triage system (Rowe et al., 2006). Clearly, using these systems requires more than technical proficiency to be able to appreciate the role of information and communication technology (ICT) as a tool for data and information management in complex healthcare environments such as the ED.

Describing the Collection-Use Gap in Canadian ED Data

Although Canadian ED nurses use the CEDIS and CTAS to collect significant patient data on a daily basis, their understanding of the purposes and implications of these data is largely unknown. To date there is a surprising paucity of nurse representation in ED informatics research, quality improvement, or professional advocacy. For example, nurses perform nearly all triage and collect 20 to 50% of the required CEDIS data fields, yet only 5% of these fields are dedicated to capturing the work nurses do (CIHI, 2018a; CIHI, 2018b). Despite being a large group of care providers and users of ED datasets (Canadian Nurses Association, 2019a; 2019b), nurses have limited representation in initiatives aimed at enhancing ED information systems, such as the CEDIS National Working Group (NWG) (Canadian Association of Emergency Physicians [CAEP], n.d.). Initially, this initiative was intended as a joint project between CAEP and the National Emergency Nurses Association (NENA) (Innes et al., 2001). Nonetheless, ED nurses represent less than 13% of the CEDIS NWG membership, with a majority of physicians steering this group (CAEP, n.d.). Additionally, ED nurses have limited participation in ED informatics research in Canada and are under-represented within research and steering committees charged with setting direction on the ICT use in EDs, despite being primary users of these technologies. For example, when the author list of a large review was assessed, nurses constituted only 15% of CTAS researchers, with only one study of CTAS having had a nurse as the principal investigator (Hinson et al., 2018).

Given their high involvement in collecting CEDIS data and using CTAS, an opportunity exists to highlight ED nurses' contributions, and to examine the value and impact of this data on practice and patient outcomes. NENA is well positioned to provide the leadership required to move nurses from being data collectors, to information users by maximizing their potential to advance emergency nursing practice through informatics.

Informatics Competency as A Catalyst for Change in Emergency Nursing

Informatics tools have the potential to improve consistency of care, patient outcomes, cost efficiency, and nursing knowledge (Nagle & White, 2018). Nursing Informatics is defined as the "science and practice (that) integrates nursing, its information and knowledge, with the management of information and communication technologies to promote the health of people, families, and communities worldwide" (IMIA Special Interest Group on Nursing Informatics, 2009, para. 4). Historically and to this day, nurses' work is all about data and information. At the point of care, ICT tools such as clinical information systems are essential for managing and synthesizing healthcare and patient data needed to support clinical decision-making for all healthcare providers including nurses.

According to the Canadian Nurses Association (CNA) and Canadian Nursing Informatics Association (CNIA), technology and innovation are continuously transforming healthcare and nursing practice (CNA & CNIA, 2017). For nurses to adapt to

this new culture of digital health, they must acquire and maintain competency in informatics so that they are able to optimize practice and keep pace with advances in technology (CNA & CNIA, 2017). Informatics competent nurses are better able to advocate for incorporating data elements unique to nurses' interventions in existing and emerging clinical information systems so that nursing knowledge and contributions to improving patient and system outcomes are more visible (CNA & CNIA 2017; Canadian Nurses Association, 2006; 2019b).

For example, within Canadian emergency nursing, nurses have a unique opportunity to show the value of nursing narratives inputted into triage datasets, which is evolving internationally, but not explored within the Canadian context yet. For example, nurses' triage narratives have been studied in a systematic way (Government of Western Australia, 2009), and used for real-time bio-terrorism surveillance (Chapman et al., 2004), and for epidemiological purposes such as identifying injury (McKenzie et al., 2010) and drug use patterns (Indig et al., 2008). These studies have shown that triage narratives can be used in isolation (Sterling et al., 2019) or in combination with ICD codes (Horng et al., 2017; Mitchell et al., 2009) for epidemiological research; with some research suggesting that the triage narratives may even be superior to coding or ICD codes for identifying clinical cases (Indig et al., 2009). Despite the time invested by Canadian triage nurses in recording these data during triage assessments, to date there has been no push for CIHI to include it as part of mandatory data reporting. Initiatives to incorporate triage narratives into nationally collected data could create a whole new source for epidemiological data, a source that starts at the earliest moments in patient care. Yet, these opportunities are currently being missed out due to limited awareness about emergency nursing informatics.

In 2012, the Canadian Association of Schools of Nursing (CASN) developed and approved the Nursing Informatics Entry-to-Practice Competencies for Registered Nurses in Canada (CASN, 2012; Nagle et al., 2014). These competencies include the following dimensions: Information and knowledge management, professional and regulatory accountability in using digital technologies, and the ability to use various digital health technologies in the delivery of patient care. Although these competencies have been in existence for over a decade now, a survey by Canada Health Infoway of nurses providing direct care (n=2058) revealed only 30% of these nurses were familiar with these competencies, just 7% actually applied the competencies in their practice, and 67% were not familiar (Canada Health Infoway, 2017). In another recent study involving practicing registered nurses in Alberta (n=2,844), results revealed the two main areas nurses reported struggling most with were: information and knowledge management and the use of ICT in the delivery of patient care, core elements of informatics competency (Kleib & Nagle, 2018a). Although no specific research is available yet on ED nurses' perceived competency in informatics, these studies suggest that these patterns are likely evident in this group.

As a self-regulated profession, the emergency nursing standards of practice provide "the lens by which the public views and evaluates nursing performance and to which nurses are held accountable" (NENA, 2018, p. 4). Currently, the Emergency Nursing Scope and Standards of Canadian Practice and the Emergency Department Core Competencies emphasize advanced practice, the use of CEDIS and CTAS in triage, and research among others skills. However, these documents fail to align these requirements with informatics concepts and competency (NENA, 2018; NENA, 2014a; NENA, 2014b). Given the extensive use of technology in ED and the intricate role ED nurses play in the collection of critical patient and healthcare data in this complex environment, it is of utmost importance that NENA takes a proactive approach to addressing informatics competency needs among this group.

Steps to Close the Gap

As a beginning step toward this goal, NENA can endorse the CNA and CNIA joint position statement on nursing informatics (NI) (2017). Endorsement provides Canadian ED nurses with a direction to understand how informatics is integral to the nursing role. The position statement offers important insights on the value of using standardized clinical languages such as the International Classification for Nursing Practice (ICNP) and InterRAI, providing a roadmap for ED nurses to think about data elements being collected within the CEDIS and whether these capture nurses' work or not. NENA may also consider defining specific strategies based on the NI position statement to expand ED nurses' competency in informatics. This planning, however, would require an understanding of ED nurses' current state of informatics competency. While there are many validated tools such as the SANIC, Self-Assessment of Nursing Informatics Competencies Scale (Yoon et al., 2009); and the Technology Informatics Guiding Education Reform, TIGER-based Assessment of Nursing Informatics Competencies, (Hunter et al., 2013); the Canadian Nurse Informatics Competency Assessment Scale (C-NICAS) is more relevant to the Canadian context because it is based on CASN's entry-to-practice NI competencies for Canadian nurses (Kleib & Nagle, 2018b). Administering this tool for assessing Canadian emergency nurses' perceived informatics competency and factors impacting development of informatics competency in these nurses in future research, which could be sponsored by NENA, would be an important first step to determine current state and identify strategies to address gaps.

CASN's leadership in increasing informatics capacity in Canadian nursing education through defining NI competency requirements for registered nurses and development of educational resources is remarkable (CASN, 2019). For example, CASN's digital health resource, publicly accessible on CASN's website, provides comprehensive learning resources to support self-directed learning in informatics; nonetheless, not many nurses are aware of these resources (CASN, 2019). While these resources were primarily intended to support nurse educators in integrating entry-to-practice NI competencies in nursing education, these learning opportunities can be of benefit to all nurses across practice settings. Increasing awareness about the CNA and CNIA joint position statement and other relevant informatics resources including the C-NICAS and CASN digital health resource may encourage nurses to participate in self-assessment to identify competency gaps, which may subsequently encourage them to obtain formal

or informal education in informatics. NENA, as a national voice for ED nurses, is uniquely positioned to begin engaging ED nurses in this process of learning and valuing the role of informatics in modern day nursing practice.

Conclusion

Canadian ED nurses utilize ICT tools, specifically CEDIS and CTAS, on a daily basis to input important patient and healthcare data. Yet, to date, Canadian ED nurses' awareness about informatics is unexplored. There is also limited nursing representation in ICT strategic initiatives and research within EDs themselves. These barriers may be preventing nurses from realizing the full benefits ICT offers to improve patient and system outcomes, and nursing knowledge development. Describing and advancing ED nurses' informatics competency should be a key priority. ED nurses' contributions, and their ability to examine the value and impact of healthcare data is essential to ensuring nurses are not merely inputting data in hospital clinical information systems datasets as a task, but rather they are able to use these data to improve patient outcomes. NENA is well positioned to lead this change through endorsing the CNA & CNIA joint position statement on nursing informatics to provide guidance to ED nurses (Remus & Kennedy, 2012). Research to understand the state of informatics preparedness in ED nurses is vital to inform future planning. The C-NICAS, a validated Canadian-based informatics competency assessment scale, could be applied to facilitate self-assessment and continuing education in informatics.

About the authors

Christopher Picard has worked in tertiary, rural, and remote areas as an emergency nurse. In his role as a medic with the Canadian Forces he has worked in prehospital, clinical and austere roles both domestically and abroad. Chris currently works as a Clinical Nurse Educator at the Misericordia Hospital in Edmonton Alberta, and is a Masters student with the Faculty of Nursing at the University of Alberta. His research interests are resuscitation care, triage, and nursing informatics.

Dr. Manal Kleib is an Assistant Professor in the Faculty of Nursing, University of Alberta. Her research program aims to transform policy and practice and improve patient outcomes through generating and disseminating knowledge on most effective interventions for improving future and practising nurses' readiness and capability to safely practice in a digital/virtual healthcare context. Key focus areas and interests include nursing informatics competency, digital health literacy/fluency, simulation, virtual reality, and teaching and learning.

REFERENCES

Canadian Association of Emergency Physicians (n.d). CEDIS National Working Group. https://caep.ca/resources/cedis/

Canadian Association of Schools of Nursing. (2012). Nursing informatics entry-to-practice competencies for registered nurses. https://www.casn.ca/2014/12/casn-entry-practice-nursing-informatics-competencies/

Canadian Association of Schools of Nursing. (2019). Digital Health eResource. https://digitalhealth.casn.ca/

Canada Health Infoway (2017). National survey of Canadian nurses: Use of digital health technology in practice. https://www.infoway-inforoute.ca/en/component/edocman/3320-2017-national-survey-of-canadian-nurses-use-of-digital-health-technology-in-practice/view-document

Canadian Nurses Association. (2006). E-nursing strategy. https://www.cna-aiic.ca/~/media/cna/page-content/pdf-en/e-nursing-strategy-for-canada.p df?la=en

Canadian Nurses Association (2019a). *CIHI report reveals optimistic signposts for future of the nursing profession* (News Release). Ottawa, ON. https://www.cna-aiic.ca/en/news-room/news-releases/2019/cihi-report-reveals-optimistic signposts-for-future-of-the-nursing-profession

Canadian Nurses Association. (2019b). Advancing an essential clinical dataset in Canada (Infographic). https://www.cna-aiic.ca/-/media/cna/page-content/pdf-en/advancing-an-essential-clinical data-set-in-canada-infographic.pdf

Canadian Nurses Association & Canadian Nursing Informatics Association. (2017). Nursing Informatics Joint Position Statement. https://www.cna-aiic.ca/en/~/media/cna/page-content/pdf-fr/nursing-informatics-joint-position-statement

Canadian Institute for Health Information. (2018b). NACRS data elements 2018–2019. https://www.cihi.ca/sites/default/files/document/nacrs-dataelements-2018-2019-en.pdf

Canadian Institute for Health Information (2019). NACRS emergency department visits and length of stay by province/territory, 2018–2019. http://www.cihi.ca/sites/default/files/document/nacrs-2018-2019-quickstats-en-web_0.xlx

Chapman, W. W., Dowling, J. N., & Wagner, M. M. (2004). Fever detection from free-text clinical records for bio-surveillance. *Journal of biomedical informatics*, *37*(2), 120–127.

Dong, S. L., Bullard, M. J., Meurer, D. P., Blitz, S., Akhmetshin, E., Ohinmaa, A., … Rowe, B. H. (2007). Predictive validity of a computerized emergency triage tool. *Academic Emergency Medicine, 14*(1), 16–21.

Dong, S. L., Bullard, M. J., Meurer, D. P., Colman, I., Blitz, S., Holroyd, B. R., & Rowe, B. H. (2005). Emergency triage: Comparing a novel computer triage program with standard triage. *Academic Emergency Medicine, 12*(6), 502–507.

Farrohknia, N., Castrén, M., Ehrenberg, A., Lind, L., Oredsson, S., Jonsson, H., … Göransson, K. E. (2011). Emergency department triage scales and their components: A systematic review of the scientific evidence. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 19*(1), 42.

Government of Western Australia - Department of Health. (2009). Operational directive OD0205/09: Emergency department and emergency services patient-level data collection and reporting. https://ww2.health.wa.gov.au/About-us/Policy-frameworks/Information-Management/Mandatory-requirements/Collection/Emergency-Department-and-Emergency-Services-Patie nt-Level-Data-Collection-and-Reporting

Grafstein, E., Bullard, M. J., Warren, D., Unger, B., & CTAS National Working Group. (2008). Revision of the Canadian emergency department information system (CEDIS) presenting complaint list version 1.1. *Canadian Journal of Emergency Medicine, 10*(2), 151–161.

Grafstein, E., Unger, B., Bullard, M., & Innes, G. (2003). Canadian emergency department information system (CEDIS) presenting complaint list (version 1.0). *Canadian Journal of Emergency Medicine, 5*(1), 27–34.

Hinson, J. S., Martinez, D. A., Cabral, S., George, K., Whalen, M., Hansoti, B., & Levin, S. (2018). Triage performance in emergency medicine: A systematic review. *Annals of Emergency Medicine, 74*(1), 140–152.

Horng, S., Sontag, D. A., Halpern, Y., Jernite, Y., Shapiro, N. I., & Nathanson, L. A. (2017). Creating an automated trigger for sepsis clinical decision support at emergency department triage using machine learning. *PloS one, 12*(4), e0174708.

Hunter, K., McGonigle, D., & Hebda, T. L. (2013). TIGER-based measurement of nursing informatics competencies: The development and implementation of an online tool for self-assessment. *Journal of Nursing Education and Practice, 3*(12), 70–80. https://doi.org/10.5430/jnep.v3n12p70

Indig, D., Copeland, J., Conigrave, K.M., & Rotenko, I. (2008). Why are alcohol-related emergency department presentations under-detected? An exploratory study using nursing triage text. *Drug & Alcohol Review, 27*(6), 584–590.

Indig, D., Copeland, J., & Conigrave, K. M. (2009). Comparing methods of detecting alcohol-related emergency department presentations. *Emergency Medicine Journal, 26*(8), 596–600.

Innes, G., Murray, M., & Grafstein, E. (2001). A consensus-based process to define standard national data elements for a Canadian emergency department information system. *Canadian Journal of Emergency Medicine, 3*(4), 277–283.

International Medical Informatics Association. (2009). IMIA-NI definition of nursing informatics updated. https://imianews.wordpress.com/2009/08/24/imia-ni-definition-ofnursing-informatics-up dated/

Kleib, M. & Nagle, L. (2018a). Factors Associated with Canadian Nurses' Informatics Competency. *CIN: Computers, Informatics, Nursing, 36*(8), 406–415. https://doi.org/10.1097/CIN.0000000000000434. https://www.ncbi.nlm.nih.gov/pubmed/29596068

Kleib, M. & Nagle, L. (2018b). Psychometric properties of the Canadian Nurse Informatics Competency Assessment Scale (C-NICAS). *CIN: Computers, Informatics, Nursing, 36*(7), 359–365. https://doi.org/10.1097/CIN.0000000000000437 https://www.ncbi.nlm.nih.gov/pubmed/29634497

McKenzie, K., Scott, D. A., Campbell, M. A., & McClure, R. J. (2010). The use of narrative text for injury surveillance research: A systematic review. *Accident Analysis & Prevention, 42*(2), 354–363.

Mitchell, R., Finch, C., Boufous, S., & Browne, G. (2009). Examination of triage nurse text narratives to identify sports injury cases in emergency department presentations. *International Journal of Injury Control and Safety Promotion, 16*(3), 153–157.

Nagle, L. M., Crosby, K., Frisch, N., Borycki, E. M., Donelle, L., Hannah, K. J., … Shaben, T. (2014). Developing entry-to-practice nursing informatics competencies for registered nurses. Paper presented at the *Nursing Informatics,* 356–363.

Nagle, L., & White, P. (2018). Proceedings from the 2018 national nursing data standards symposium. Paper presented at the *3rd National Nursing Data Standards Symposium,* 7-9.

National Emergency Nurses Association. (2014a). Minimum requirements for an ED nurse. http://nena.ca/w/wp-content/uploads/2014/11/Minimum-requirements-for-Ed-nurse.p

National Emergency Nurses Association. (2014b). Emergency nursing core competencies. http://nena.ca/w/wp-content/uploads/2014/11/NENA-Core-Competencies.pdf

National Emergency Nurses Association. (2018). Emergency nursing scope and standards of Canadian practice, sixth edition. http://nena.ca/w/wp-content/uploads/2018/11/Standards-of-ED-Nursing-Practice-2018.pd f

Remus, S., & Kennedy, M. A. (2012). Innovation in transformative nursing leadership: Nursing informatics competencies and roles. *Nursing Leadership, 25*(4), 14–26.

Rowe, B. H., Bond, K., Ospina, M. B., Blitz, S., Schull, M., Sinclair, D., & Bullard, M. (2006). Data collection on patients in emergency departments in Canada. *Canadian Journal of Emergency Medicine, 8*(6), 417–424.

Sterling, N. W., Patzer, R. E., Di, M., & Schrager, J. D. (2019). Prediction of emergency department patient disposition based on natural language processing of triage notes. *International Journal of Medical Informatics*.

Yoon, S., Yen, P., & Bakken, S. (2009). Psychometric properties of the self-assessment of nursing informatics competencies scale. *Studies in Health Technology and Informatics, 146*, 546–550.

Look for supplemental materials such as author interviews and podcasts at www.CJEN.ca

The Canadian Journal of Emergency Nursing (CJEN) is the Official Journal of the National Emergency Nurses Association (NENA) of Canada. This article has been made available at no cost in partnership with NENA and the University of Alberta Libraries.