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Recognizing the power of information technology

H+ HUMBER RIVER HOSPITAL

HUMBER RIVER HOSPITAL is one of Canada's largest community acute care hospitals, serving a population of more than 850,000 people in the northwest Greater Toronto Area.

The multi-site hospital currently operates out of its Wilson Avenue acute care site and Finch and Church Street reactivation care centres with a total of 722 beds, just over 3,800 employees, approximately 700 physicians and over 1,000 volunteers.

Affiliated with the University of Toronto and Queen's University, Humber River Hospital is North America's first fully digital hospital. Part of Humber River Hospital's digital infrastructure includes completely automated laboratory services, robots sorting and mixing medications, electronic health records, tracking systems for patients undergoing surgery that update families through their cellphones and patient computer bedside terminals – all varieties of technologies that automate information, eliminate paper and provide a connected experience for patients, staff and families.

Humber River Hospital was awarded Accreditation with Exemplary Standing in 2018 and since its opening in 2015 has received numerous awards and accolades for technological advancements and innovation (www.hrh.ca).

Optimizing Nursing Practice through Integration of Best Practice Guidelines into Electronic Medical Records

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WHAT WE LEARNED:

1. Embedding the RNAO BPGs into the EMR at HRH permitted forcing functions to be established that increase evidence-based practice integration and reduce practice variation, ultimately contributing to the delivery of highly reliable care.

2. The digital infrastructure at HRH has enabled the creation of monitoring dashboards with RNAO BPG-specific process indicators (nursing-sensitive indicators) that facilitate the measurement of patient outcomes and provide an opportunity for improving nursing practice.

Abstract

A commitment to best practice guidelines (BPGs) is crucial for ensuring the safety of patients. Recognizing the power of information technology, Humber River Hospital has integrated BPGs into the electronic medical record (EMR) infrastructure. The large-scale implementation institutes a uniform standard of care and ensures adherence to BPGs through a forcing function designed to require nurses to complete and document the necessary assessments. The initiative strengthens the audit process and provides the opportunity to identify long-term trends. The implications of the quality improvement initiative are discussed. Due to the widespread use of EMRs, the replication of this initiative is economically feasible in other healthcare settings.

Electronic medical records (EMRs) have been implemented in the hospital environment for electronically storing patient data since 2006 (Chang and Gupta 2015). The value of EMRs is its capacity to influence patient health outcomes (Olchanski et al. 2017). There are a seemingly endless number of possible applications for EMRs, including performance monitoring and generation of customized reports (Bird et al. 2003). To date, EMRs have not been effectively harnessed to optimize nursing practice (Leapaldt 2016).

Several studies have indicated that nurses do not routinely assess patients for potential adverse outcomes such as fall risk and pressure injury (Gunningberg and Ehrenberg 2004; Stephenson et al. 2015). These adverse events are judged to be highly preventable, with some studies finding that 40% of falls (McMahon et al. 2014) and 43% of pressure injuries were preventable (Downie et al. 2013). Performing risk assessments regularly and in a timely manner can greatly reduce the risk of adverse events to patients (Arfanis and Smith 2012; Doran et al. 2014). One step to achieving this is for nurses to be prompted to complete the necessary assessments through the EMR. Based on the Health Belief Model of "cues to action" construct (Hochbaum et al. 1952), the EMR at Humber River Hospital

(HRH) was specifically designed to prompt nurses to implement risk assessments and interventions using the Registered Nurses' Association of Ontario's (RNAO) best practice guidelines (BPGs).
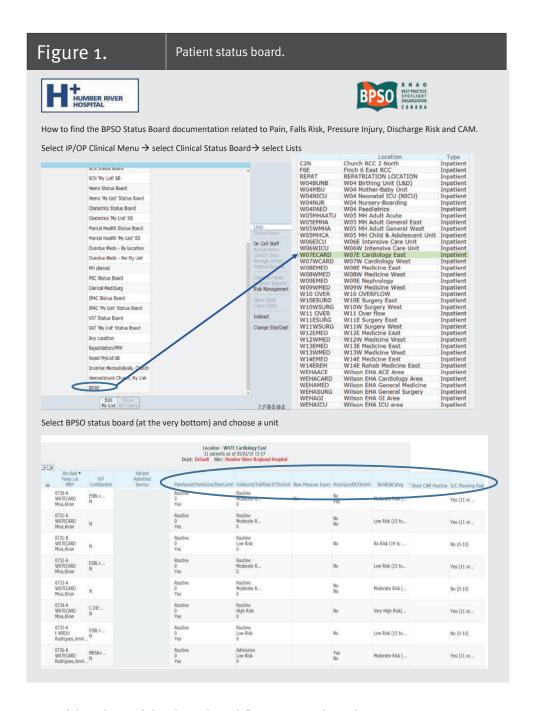
The RNAO BPG Program

Funded by the Ministry of Health and Long-Term Care and developed by RNAO, BPGs provide a systematic, evidence-based approach to improve practice and patient health outcomes and are critical to advancing nursing care excellence (Grinspun 2001, 2015, 2016, 2018; Grinspun and Bajnok 2018; Grinspun et al. 2001, 2014, 2018). RNAO supports healthcare facilities in the implementation and evaluation of multiple clinical and healthy work environment BPGs over a three-year period through the Best Practice Spotlight Organization (BPSO) candidacy process (RNAO 2012). To advance the implementation of RNAO BPGs further, Nursing Quality Indicators for Reporting and Evaluation (NQuIRE) was launched by RNAO in 2012. NQuIRE was established to enable quantitative impact analysis of BPGs on nurse, patient and organizational outcomes (Grinspun et al. 2015; Lloyd 2012). NQuIRE is a data system of nursing-sensitive quality indicators derived from RNAO BPGs that track the progress of BPSOs across multiple indicators. NQuIRE includes indicators that are classified into three categories based on Donabedian's framework: structure indicators (measuring organizational characteristics), process indicators (measuring nursing activities) and outcome indicators (measuring patient outcomes) (Donabedian 2005; VandeVelde-Coke et al. 2012). HRH is committed to implementing five RNAO BPGs across the three-year BPSO pre-designate phase, including pressure injuries, pain management, care transition, fall prevention and delirium, dementia and depression.

Aim

The aim of this article is to describe the development of HRH's innovative EMR-based approach to screening patients at risk for adverse outcomes, using RNAO BPGs that were implemented in the first year of the BPSO pre-designate phase.
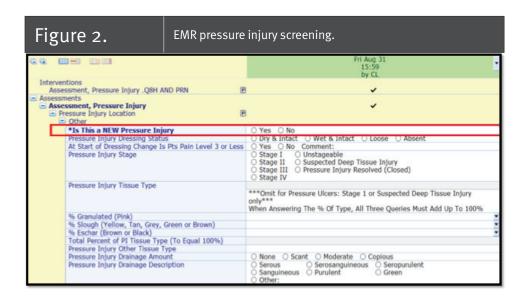
Program Description

In January 2018, a multidisciplinary team was established to integrate BPGs into the EMR. The BPG Task Force was composed of several staff members from the Evidence Based Practice Integration, and Information Services departments. The team assembled to develop and identify RNAO BPG elements to be embedded into the EMR. The BPG Task Force evaluated and modified existing risk assessments to ensure alignment with RNAO BPGs and achieve optimally effective and efficient nursing documentation within the EMR. NQuIRE process indicators, such as risk assessment completion upon admission, and outcome indicators, such as the number of hospital-acquired pressure injuries, were selected for each BPG and added to the nursing documentation page.

Figure 1.   Patient status board.

A careful analysis of the clinical workflow was conducted prior to EMR integration to determine how and when the assessments should be displayed. Members from the Information Services department then designed and configured the IT architecture to ensure optimal data capture and functionality. All relevant assessments, based on predefined criteria, for each patient were populated in the nurses' task list within the EMR. Accompanying information to support the uptake of BPG interventions, such as how often the assessment should be completed, the

time frame between assessments and whether the assessment is overdue and for how long, were also integrated into the EMR. Finally, a clock icon was built to appear next to nursing assessments that require completion in order of priority. This signalling function was constructed to enable nurses to easily visualize which assessments are most appropriate. The project was initiated in January 2018, and hospital-wide implementation took place in July 2018.

To monitor for RNAO BPG implementation adherence, the BPG Task Force developed enhancements to the patient status boards. A snapshot of the current state for every patient, in relation to the assessment (nursing activity) and the outcome (patient-specific outcome), was created (Figure 1). *Forcing function* elements were embedded in the EMR, requiring nurses to document, for example, whether a new pressure injury (hospital acquired) was identified or not to proceed to the next nursing activity. Upon successful completion of the necessary risk assessment, the nursing activity is designated as completed on the BPSO Status Board. If the patient has a new pressure injury (hospital acquired), then another forcing function occurs whereby a series of therapeutic nursing interventions based on the RNAO BPGs are triggered. Figure 2 provides an example of the EMR pressure injury screening with forcing functions.

Figure 2. EMR pressure injury screening.

Implications

Implementation science has taught us that much more is required for nurses to integrate evidence-based practice successfully in their work environment than the availability of RNAO BPGs (Grinspun et al. 2018). Support and resources at the micro, meso, and macro levels are essential for optimizing and sustaining uptake of evidence (Grinspun et al. 2018). In addition to the robust implementation framework developed by RNAO, technology has been identified as an important
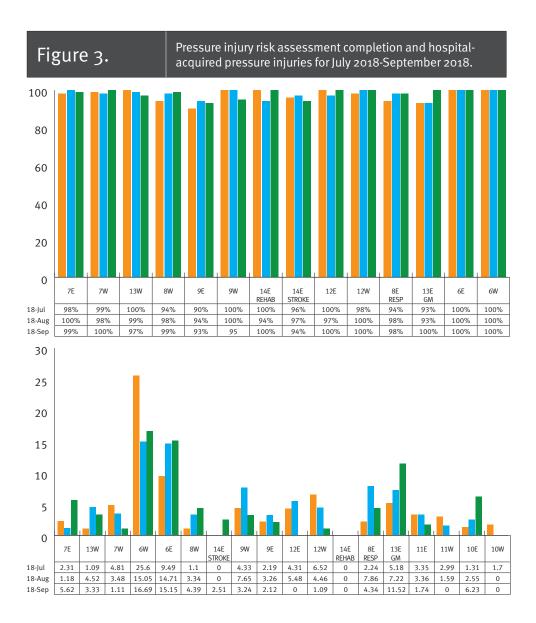
enabler of evidence-based practice integration (Wilson and Bajnok 2018). HRH, with its fully digital landscape, has leveraged technology to maximize evidence-based practice integration.

One of the most significant components of the digital infrastructure that has been established for RNAO BPG integration is the forcing function. By definition, a forcing function is "an aspect of a design that prevents the user from taking action without consciously considering information relevant to that action" (Papantoniou et al. 2002). The EMR at HRH is designed to force conscious attention on RNAO BPG assessments and interventions, making it easy to deliver evidence-based care. Additionally, the forcing function of the EMR at HRH creates a hard stop that cannot be bypassed unless nurses change their actions to align with the RNAO BPGs (Institute for Healthcare Improvement 2016). At HRH, the key benefit being leveraged through the technology is decreased nursing practice variability.

Integration of RNAO BPGs into the EMR can provide both short- and long-term benefits for nursing practice, as well as patient outcomes and organizational performance. In the short term, data collection through the EMR facilitates monthly reporting of process and outcome indicators data for submission to the NQuIRE data system. Clinical leaders have readily available access to BPSO status reports that serve as internal and external benchmarking tools. Ongoing review and analysis of BPSO data provide the opportunity to identify and address challenges in current practice across the hospital. Figure 3 provides a sample of the data (which are posted on quality dashboards on the hospital units), across the units, for the completion of risk assessment of pressure injury upon admission.

Timely follow-up with nurses who have not completed the necessary BPG assessments is made possible through performance reports generated by the system. Clinical leaders can then assist nurses in closing the gap between best practice and current practice so that patients can receive optimal care. Real-time identification and coaching are essential for elevating and sustaining RNAO BPG integration. For nurses, the integration of RNAO BPGs into the EMR is essential for monitoring patient progress over time and informing decisions regarding therapeutic interventions.

The long-term benefits of the EMR system design for RNAO BPG implementation provide the most exciting opportunity for care transformation. Impending upgrades to the IT system will provide minute-by-minute updates of patient status through a clinical analytic dashboard. The ability to predict potential adverse outcomes by identifying and analyzing patterns and changes in patient status will further enhance the potential for every patient to consistently receive the safest and highest quality care.

| Figure 3. | Pressure injury risk assessment completion and hospital-acquired pressure injuries for July 2018-September 2018. |

	7E	7W	13W	8W	9E	9W	14E REHAB	14E STROKE	12E	12W	8E RESP	13E GM	6E	6W
18-Jul	98%	99%	100%	94%	90%	100%	100%	96%	100%	98%	94%	93%	100%	100%
18-Aug	100%	98%	99%	98%	94%	100%	94%	97%	97%	100%	98%	93%	100%	100%
18-Sep	99%	100%	97%	99%	93%	95	100%	94%	100%	100%	98%	100%	100%	100%

	7E	13W	7W	6W	6E	8W	14E STROKE	9W	9E	12E	12W	14E REHAB	8E RESP	13E GM	11E	11W	10E	10W
18-Jul	2.31	1.09	4.81	25.6	9.49	1.1	0	4.33	2.19	4.31	6.52	0	2.24	5.18	3.35	2.99	1.31	1.7
18-Aug	1.18	4.52	3.48	15.05	14.71	3.34	0	7.65	3.26	5.48	4.46	0	7.86	7.22	3.36	1.59	2.55	0
18-Sep	5.62	3.33	1.11	16.69	15.15	4.39	2.51	3.24	2.12	0	1.09	0	4.34	11.52	1.74	0	6.23	0

Conclusion

RNAO BPGs provide the building blocks for nursing practice optimization. The EMR infrastructure has allowed HRH to be able to support nursing practice on a large scale and to advance improvements in patient outcomes. Both nurses and clinical leaders recognize the value of adherence to BPGs. As a result of this intervention, nurses are provided with evidence-based assessment tools at their fingertips and the ability to quickly and consistently assess patients. Clinical leaders will be able to identify trends, improve health care quality and readily make informed clinical decisions. As well, the data generated from this initiative can be analyzed to assess improvement in patient safety outcomes. Digitalization of

BPG documentation overcomes many of the challenges related to paper-based BPG auditing, including the reduction of documentation time, minimization of workflow disruption and collection of researchable data. The EMR has facilitated point-of-care nursing adherence to BPGs and provided a source of rich data that can be gathered and analyzed to gain knowledge of the impact of nursing interventions on patient safety and outcomes. Future studies could further explore the long-term benefits of such an initiative. Furthermore, the rapidly expanding use of EMRs around the globe means that this is an economically viable and technically feasible option for adoption and integration of RNAO BPGs in other hospital settings to consistently increase adherence to RNAO BPGs and optimize clinical practice and results for safe and high-quality care for patients, as well as organizational effectiveness and performance.

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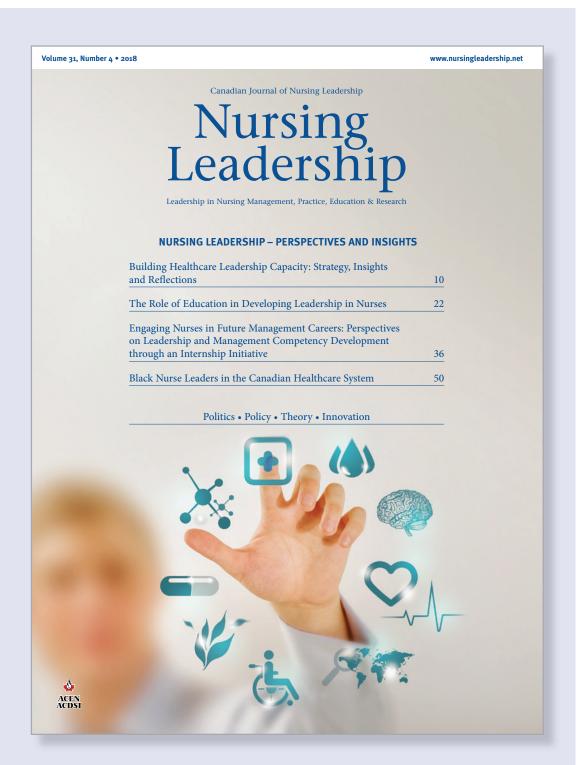
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