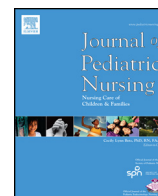




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Use of Electronic Visibility Boards to Improve Patient Care Quality, Safety, and Flow on Inpatient Pediatric Acute Care Units¹

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ABSTRACT

Purpose: Effective information exchange among healthcare providers is critical to the delivery of high quality care. Electronic visibility boards (EVB) are an established tool for improving health care efficiency and promoting communication between healthcare team members.

Design and Methods: Seattle Children's Hospital (SCH) sought to evaluate the use of EVBs as a tool to improve patient care quality, safety and flow in a pediatric inpatient setting. EVBs were placed on the cancer and surgical patient care units at SCH, and displayed data flowing directly from the electronic health record.

Results: This paper describes the conceptual framework used for designing these boards, and details on the design methodology, testing approach, and successful deployment of the boards.

Conclusions: The close collaboration between development analysts and clinical nursing is highlighted as a key to successful EVB implementation. Initial metrics indicate improvements in incentive spirometry compliance, nursing documentation of care plans, and flow awareness on the units.

Practice Implications: These results suggest that with appropriate design, EVBs can effectively enhance patient safety and care, and may be a useful tool for implementation on other pediatric inpatient units.

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Background Knowledge

As part of quality improvement systems, hospitals often rely on huddles for exchanging key information between staff members. At a huddle, all nursing care staff on a wing or cluster gather around a board for 5–10 min to review key patient information. Huddle is the language used at Seattle Children's Hospital (SCH); other organizations may refer to it as a brief meeting, team conference, or staff check in. At SCH, white boards displaying key patient information pertaining to patient care and flow have historically been a foundation of the huddle process on nursing units. However, due to both growth in hospital volume and an increase in patient acuity, white boards became a decreasingly effective tool for nursing information flow on the units. Some of the challenges experienced with the white boards included: (1) display of inaccurate and outdated information, (2) poor visibility remotely, and (3) requiring time-consuming manual user input for updates. As part of SCH's pursuit of excellence, the hospital recognized that the white board system required updating in order to maintain a high level of patient quality, safety, and flow. To address this gap, SCH designed and

implemented electronic wall-mounted 75-inch monitors and a desktop dashboard accessible through the electronic health record (EHR). This article focuses on the design and implementation of these electronic visibility boards, as well as the impact on patient quality, safety and flow metrics on two SCH acute care units, the Cancer Care Unit and the Surgical Unit.

Background of Electronic Visibility Boards

Electronic visibility boards (EVB) can improve patient care efficiency (Clark, Moller, & O'Brien, 2014) and foster communication among multidisciplinary healthcare team members (Fitzpatrick, 2013), two areas where hospitals universally struggle. However, there are gaps in the current published data, as most of the results outlining the impact of electronic dashboards on inpatient units have focused on emergency rooms (Randell et al., 2015). Thus, there is a need for studies evaluating the potential impact of EVBs on inpatient units.

The key to successful implementation of EVBs is careful and thoughtful design that considers the needs of both healthcare staff and patients equally during development (Musanti, Downing, Forrester, Fochesto, & O'Keefe, 2015). The data displayed must ultimately be timely, pertinent, and intuitive (Clarke, Wilson, & Terhaar, 2016). Thus, end users must be included in the design process early on, to ensure that the design yields a useful and accurate tool (Clarke et al., 2016).

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Current evidence provides clear support for displaying data in real time, as this improves patient care by making patient-specific needs visible, and identifying care improvements (Jeffs et al., 2014). These principles provided the basis for the reasonable assumption that accurate design and implementation of EVBs could result in improved patient quality, safety, and flow on the Cancer Care and Surgical Units at SCH.

Local Problem

As SCH has experienced tremendous recent growth, with a resultant increase in both patient volume and acuity, maintaining accurate and up-to-date information on white boards has become an increasing challenge. More than ever, the hospital needs reliable and accurate information displayed at the time of huddles; displaying inaccurate and outdated information on white boards impedes patient care quality, safety, and flow. This presented an opportunity for an innovative nursing solution to optimize visibility of patient care metrics, including quality, safety, and flow data at both the hospital and unit level.

Huddle Cadence & Preparation

At SCH, quality, safety, and flow data are routinely presented at unit huddles. One significant challenge is that a charge nurse may attend over 10 huddles in a typical 12-hour shift in order to ensure safe patient care and hospital operations. Both charge nurses and clinical nurses must prepare for these huddles. While most of the necessary information can be found in the EHR, a charge nurse does not have the time to review each patient's chart multiple times throughout the day. The charge nurse must therefore rely on the clinical nurse's report at cluster/wing huddles, with the information then compiled and recorded by hand on the white board. The time required for preparation for these huddles, as well as the dependence on each individual nurse attending the huddle, reduces the time available for other patient-care activities.

Patient Quality

Effective nursing huddles are impeded by the lack of unit-wide visibility of real time data. Because of this, it is difficult for nurses to know if their documentation is complete, particularly concerning quality measures, such as nursing plans of care and central line care bundles. Quality data are typically only reviewed retrospectively via audits. The ability to observe real time quality data, however, would enable charge and clinical nurses to address care issues in real time, thereby increasing compliance with quality measures and ultimately improving patient outcomes.

For example, prior to implementing the electronic visibility boards at SCH, a focused effort was made to improve nurse compliance with documentation of nursing plans of care. Nurses are taught that the nursing plan of care is a valuable tool to direct individualized care for each patient. The institutional policy states the nursing plan of care must be completed within 24 h from the time of admission and then updated every 7 days. At SCH, while good compliance has been observed at admission, poor compliance has been seen for patients that have remained inpatient for longer than 7 days. Even with a focused effort on education and communication on nursing plans of care, the compliance was 75% for the Cancer Care Unit and 85% for the Surgical Units, both below the hospital goal of 95%.

Patient Safety

At SCH, patient safety is a foundational pillar in daily work, with the hospital continuously seeking ideas for improvements. For example, charge nurse groups reported the need for increased visibility of safety indicators that would help impact decisions regarding admissions and allocation of resource support for clinical nurses providing care. Safety

elements are built into the EHR but require the nurse to access the patient's chart in order to view the data. Visibility of individual patient data for all health team members at unit level is ideal, which would enable clinical nurses to quickly identify safety issues and provide support to peers.

An example of a patient safety improvement opportunity is the Cancer Care Unit's management of patients with sickle cell disease. One of the key nursing interventions for this population is completion of incentive spirometry every 2 h while awake. The hospital goal for incentive spirometry documentation for patients admitted in a sickle cell pain crisis is 80%; however, in June of 2017 the actual rate of documentation was only 36%. This represented a key safety gap, potentially resulting from poor documentation practices.

Patient Flow

Both the Cancer Care and Surgical Units are extremely busy units with high turnover, including rapid admission, discharge, and transfer of patients. This creates a chaotic, fast-paced environment that requires meticulous communication between all staff to ensure safe and efficient operations. Key flow data include anticipated discharges, procedures that require the patient to travel off unit, and tracking of nurse breaks. Unit awareness for nurse leaders, clinical nurses, and the rest of the healthcare team is important for optimal care and flow.

As a way to address patient safety and flow, the Intensive Care Unit (ICU) piloted a provider-focused EVB approximately a year ago. This pilot established the value of using EVBs at SCH as a way to improve patient quality, safety, and flow, and paved the way for design and implementation on other units.

Planning the Improvement Intervention

The EVBs were designed and implemented with an aim to improve patient care quality, safety, and flow. An initial meeting took place with Nurse Informatics Leadership, Informatics Provider and Clinical Application Development Manager. Guiding principles were established and used as a decision-making framework throughout the project. This project was deemed quality improvement by the internal review board.

Guiding Principles

The guiding principles of the project were to: 1) build on existing functionality of the electronic visibility boards previously built for the ICU, 2) consider standards across acute care units and ICU dashboards, 3) allow customization to meet unit-specific strategic goals, 4) meet the needs of a multi-disciplinary team, and 5) display items that are actionable for staff.

Patient Privacy

Patient privacy was an important concern. EVBs were previously implemented in the ICUs, at which there was a review and approval by SCH internal patient privacy team. The regulatory compliance department did recommend more stringent veiling of medical records on the 75-inch monitors; therefore, there are some slight differences between the 75-inch monitors and the desktop dashboards. For example, the desktop dashboard displays each patient's age and gender, whereas the 75-inch monitors do not.

Design Team

The primary project team for each unit consisted of a Clinical Nurse Manager, Informatics Nurse and a Technical Project Manager. The design sessions involved an expanded team, including: Charge Nurses, Residents, Attending Physicians, Clinical Application Development Analysts, Informatics Provider, and Clinical Application Development

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