Menu Case Study 3: Medication Administration Record

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Menu Item: Medication Administration Record

Executive Summary

Ontario Shores Centre for Mental Health Sciences (Ontario Shores) is a public teaching hospital specializing in comprehensive mental health and addiction services for those with complex, serious and persistent mental illness. The facility, located in Whitby, Ontario, Canada has 15 specialized inpatient units and extensive outpatient and community services, serving a total regional population of approximately 2.8 million. The organization is staffed by approximately 1,300 employees with 326 inpatients beds (servicing over 115,000 patient days annually), and approximately 60,000 annual outpatient visits.

With adoption of the electronic medical record (EMR), Ontario Shores decided to implement closed-loop medication administration. The goals of this project were to:

- Enhance patient safety by reducing the potential for medication errors reaching the patient
- Evaluate practices and implement quality improvement initiatives as needed to achieve minimum 95% scan rates as per Healthcare Information and Management Systems Society’s (HIMSS) Electronic Medical Record Adoption Model (EMRAM) Stage 7 standards.

Point of care staff were involved in vendor selection and in working groups specific to the project. After extensive training for staff, including additional education for “super-users” to provide added on-unit support, the Bedside Medication Verification (BMV) with an electronic medical administration record (eMAR) was launched. Initial evaluation showed sub-optimal adherence, so quality improvement initiatives were undertaken to improve adherence to exceed 95% scan rates. Implementation of this system has allowed a number of medication errors to be prevented from reaching the patient, ultimately improving patient safety.

Background

Ontario Shores is a 326-bed teaching hospital specializing in comprehensive mental health and addiction services for those with complex serious and persistent mental illness. Prior to implementation of the EMR in 2009, all medication orders were completed on paper records and faxed to pharmacy and administration was documented on paper-based charts. The Canadian Adverse Events study (Baker et al., 2004) estimated that the adverse event rate in Canadian hospitals was 7.5 per 100 patients. This study identified that, of the 2.5 million hospital admissions in Canada each year, 70,000 were associated with an adverse event that could have been prevented if the right systems and checks were in place.
With paper-based medication administration systems, such as the one Ontario Shores had in place prior to 2010, medication administration errors are difficult to catch. Closed-loop medication administration systems have the appropriate prompts, checks and decision-support to fully ensure that patients are given the correct medication at the proper times.

**Local Problem**

With a paper-based Medication Administration Record, Ontario Shores had limited ability to track and monitor medication administration errors. Incidents due to errors may have occurred without recognition, and therefore without proper reporting of the root cause. Evidence-based guidelines dictate that closed-loop medication administration is best practice for improved patient safety. **Ontario Shores aimed to enhance patient safety by implementing BMV with an eMAR.** Once the system was implemented, the additional challenge of increasing adherence rates, guided by HIMSS EMRAM Stage 7 standards, was undertaken.

**Design and Implementation**

**Figure 1: Implementation Strategy**

| Preparation | Initiated by senior management  
| Device Selection | BMV working group created.  
| eMAR | Led by Information Technology with collaboration from Clinical Informatics and Professional Practice.  
| Data Selection | Vendor demonstrations attended by point of care staff and Clinical Managers.  
| Training | Evaluation and selection.  
| eMAR plus BMV | Switch from paper-based to electronic documentation.  
| Training | Extensive training for clinical staff: 8 hours of hands-on learning according to adult education principles.  
| | Super-users recruited and trained to offer additional support on the units for go live.  
| Evaluation | Go live with BMV. Fully electronic closed-loop medication administration system implemented.  
| Intended Outcome | Examine data from EMR to assess scan rates for patient and medication and implement quality improvement initiatives as needed.  
| | >95% scan rates  
| | Prevention of medication errors from reaching the patient. |
How Health IT was Utilized

Figure 2: BMV/eMAR Protocol

Clinical Informatics and Professional Practice leveraged on the EMR functionality to develop decision support protocols, ensuring maintenance towards adherence to nursing practice standards while enhancing patient safety. Error messages were generated if the patient or medication could not be verified. Error messages also warned if the dose scanned was too high or low and if the time or frequency of administration was incorrect. Automated messages prompt additional required information (e.g. injection site, pulse, patch site, etc.) within the eMAR.

Table 1: Examples of Error Messages

<table>
<thead>
<tr>
<th>Error</th>
<th>Message</th>
</tr>
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<tbody>
<tr>
<td>Incorrect patient scanned</td>
<td><img src="image1.png" alt="Error Message Image" /></td>
</tr>
<tr>
<td>Administering a medication that is</td>
<td><img src="image2.png" alt="Error Message Image" /></td>
</tr>
<tr>
<td>not currently due</td>
<td><img src="image3.png" alt="Error Message Image" /></td>
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</table>
Data was pulled from the EMR to track scan adherence rates. It was noted that rates were lower than indicated by HIMSS EMRAM standards. Hence, a quality improvement project was launched to improve scan rates.

**Value Derived**

This initiative provided great value to patient safety by ensuring proper verification and administration of medication. Real-time identification of errors provided a safeguard in reducing the potential for medication errors to reach the patient. As evident in Figure 3, adherence to BMV/eMAR scanning has created the ability to mitigate the adverse effects of medication errors. The scan errors demonstrate how the system alerts the nurse of error when discrepancies occur, thus preventing incorrect medication administration. As a result, key opportunities have been realized, including the opportunity to proactively prevent errors from occurring which was more difficult with the paper-based system. Additionally, Ontario Shores now had visibility to this information which created opportunities to use data to convey patient safety information to nurses. This further enables us to sustain best practices related to medication administration.

The ability to evaluate adoption and adherence proved valuable to the organization. Through examination of data in the EMR, it was noted that scan adherence rates were sub-optimal (Figure 4), prompting the launch of a quality improvement initiative. Letters of expectation were issued to all nursing staff whose adherence was lower than 90% over a six month period, communicating the standards of practice expectations and the importance of meeting target adherence levels related to patient safety. A monthly data surveillance process has been developed to ensure sustainability of the scan rates, in which a Clinical Informatics Analyst sends a report to Professional Practice, who follows up with each Clinical Manager whose unit’s adherence has fallen below the 95% target scanning rate.
Detailed reports are then provided for each nurse on that unit and the Clinical Manager follows up with their staff through review of practice expectations. As a result of these efforts, there has been an overall upward trend in scan rates for patient and medication, and targets have been consistently achieved and exceeded since March 2014.

Figure 3: Scan errors caught by the system, preventing medication administration error.
Overall, it is evident that as scanning rates continue to maintain target rates, many scan errors continue to be triggered within the system, truly depicting the benefit realization of closed loop medication administration process leveraging on technology.

**Lessons Learned**

It was fairly evident post-go live that there was a lack of clear understanding of processes when clinicians and clinical leaders were given the task of choosing medication carts and point of care devices. The low participation rate by clinical leaders and clinicians during the vendor demonstrations and limited understanding of future state resulted in inaccurate number of devices, such as medication carts and barcode scanners, to be available for the go live date. Point of care clinician involvement and education on processes are vital in the success of appropriate device selection.

Realization of low scanning rates from the EMR data led to the development of a Medication Task Force which included the Patient Care Facilitator from each unit and other members of Nursing Council. This group investigated challenges to scanning and found that a number of barriers were contributing to the low scan rates. For instance, some units did not have enough scanners to efficiently scan all patients at medication time. The barcoded labels on some of the medications were located in such a way that scanning was not functioning or was very awkward to accomplish. Finally, the importance of scanning and implications from a patient safety perspective had not been understood fully to all staff.

Creating a process to monitor scanning rates has ensured sustainability of adherence to practice standards related to medication adherence. As described earlier, an audit was done at the individual nurse and specific medication level to identify key medications that were not being scanned and to determine any nurse specific barriers to scanning. This practice continues on a monthly basis when rates
drop below target. As a result of the audit, more scanners were purchased to ensure that all units were properly equipped for closed loop medication administration. Barcodes were relocated on certain medications to enable scanning. To help raise awareness of the importance of scanning from a patient safety perspective, letters of expectation were sent out via the Clinical Managers to each nurse who had a medication or patient identification scan rate of less than 90%. These letters were not punitive and did not remain on the nurses’ employment records, but were simply a means of communicating the organizational expectations. Professional Practice and Clinical Informatics met bi-weekly with the Clinical Managers and Clinical Nurse Specialists to discuss successes and challenges with the process and to follow up with solutions when appropriate. A sustainability strategy in continuing to highlight the significance of closed loop medication administration was to create a competition among all the inpatient units where the units with the highest scanning rates each month would enter into a draw to win a prize. This data from the EMR continues to be used to communicate organization-wide scan adherence rates which are published on Ontario Shores’ intranet and intrahospital television communication as a consistent reminder of this significant patient safety practice and to celebrate successes. This strategy has enabled us to consistently achieve 95% and higher scanning rates in eMAR/BMV since its implementation.

**Financial Considerations**

<table>
<thead>
<tr>
<th>Equipment</th>
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<tr>
<td>Pharmacy and Patient Care Units</td>
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<tr>
<td>Additional scanners were bought a few years after the Go live</td>
<td>23,087</td>
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<tr>
<td></td>
<td><strong>550,093</strong></td>
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<thead>
<tr>
<th>Training</th>
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<tr>
<td>Nursing Staff (8hr)</td>
<td>154,048</td>
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<tr>
<td>Instructor (clinical educator OR clinical analyst) and Super-user</td>
<td>38,074</td>
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<td><strong>192,122</strong></td>
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| Total Medication Administration Cost | 742,215 |

Recent literature reports the cost of a moderate to severe adverse drug event (ADE) at a Canadian tertiary care hospital as $12,700 (Wu et al, *J Eval Clin Pract*, 2007. 13(3): 440-8). In 2011, Ontario Shores experienced 5 incidents that resulted in a moderate ADE. With ongoing quality improvement, this was reduced to 2 moderate ADEs in each of 2012 and 2013 and only 1 moderate ADE in 2014 once the 95% target scan rate was consistently met and enhanced adherence to closed loop medication administration leveraging on technology was achieved. Thus, quality improvement initiatives have potentially prevented the occurrence of 10 ADEs (3 in each of 2012 and 2013, and 4 in 2014), resulting in an estimated cost avoidance of $127,000.