

**Title: An Organized Strategic Focus to Achieve National Patient Safety Goals (NSPGs)
Augmented by an Electronic Medical Record (EMR)**

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Applicable National Patient Safety Goals (NPSGs):

- Improve accuracy of patient identification
- Improve the effectiveness of communication among caregivers
- Improve the safety of using medications
- Reduce the risk of health care-associated infections
- Accurately and completely reconcile medications across the continuum of care
- Prevent wrong site, wrong patient, wrong procedure

Technology used in this study:

- Computerized Provider Order Entry (CPOE)
- Electronic Medical Records (EMR)

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Background knowledge

Medical errors, despite a decade of improvement efforts, still result in thousands of needless loss of life. Healthcare organizations are striving to achieve the safest possible system for their patients. Nationally, the National Patient Safety Goals (NPSGs) have been published to specifically target areas that, if the goals are implemented, can successfully reduce untoward events in patients. The purpose of the Joint Commission's NPSGs is to promote specific improvements in patient safety. Documentation of "success" at achieving these goals as a "complete set" is difficult. Of note, less than 40% of hospital systems currently are achieving 50% of the NPSGs (Improving America's Hospitals 2008).

Local problem

Nemours is one of the nation's largest pediatric subspecialty physician group practices in the nation. Nemours also manages the Alfred I. duPont Hospital for Children in Wilmington, Delaware. Approximately 280,000 children (~1 million encounters) are serviced each year by Nemours providers. The Nemours Executive Team (CEO, COO, CFO, and Vice-Presidents) have utilized the Balanced Scorecard approach (Kaplan and Norton, 1996) to promote its strategic vision. At least annually, that strategic plan and the objective measures to track progress are reviewed. Each operating entity has a strategic plan that is a cascade from the overall plan. Appropriate initiatives and operational changes are discussed to facilitate positive change.

Two years ago, the Nemours Executive Team with Board endorsement specifically stated that one of its objectives for long-term strategic focus is to become a leader in patient safety. We undertook a system-wide and transparent approach to demonstrate progress towards our objective of compliance with each of the applicable goals to at least a 90% level. Our quest and attainment of the NPSGs has been augmented and facilitated by our use of an EMR system. Our improvements in patient safety have resulted, in part, from the expectations created by the NPSGs and, in large measure, are due to other system improvements and the efforts of associates. By using the EMR, we have been able to imbed key steps into work-flows, quantify results with real-time data, demonstrate how process improvement impacts outcome, and positively influence behavior.

The purpose of this descriptive report is to illustrate how we are exploiting our use of the EMR and data warehouse not only to track our progress, but, even more importantly, to guide, when possible, our associates in fostering the spirit of the NPSGs.

Intended improvement

The NPSGs highlighted in this report are relevant to our population, were present in both 2009 and 2010, and were subject to quantifiable measurement. Table 1 demonstrates the specific NPSG, the applicable setting, how each is tracked and reported, and finally how the EMR augments the strategic process. In total, six NPSGs are highlighted along with 12 quantifiable (Table 1) measurements that are aggregated for this quarterly report. Compliance with each goal will be measured. To qualify as meeting the goal, there must be a minimum of 90% in the tracking score. A further strategic goal is to have query-able and granular data elements and processes within the EMR such that the due diligence documentation of the attainment of a NPSG at both the system and patient-encounter specific detail level can be attained without manual chart review not Provider self-report.

Planning the Intervention

At least monthly, the progress towards achieving each NPSG is discussed at Quality-run meetings. At least quarterly, each Executive Team meeting and Operating entity formally discusses its specific results for each measure. This discussion, led by the Quality team, discusses successes, problems, data access issues, plans for improvement, and reassessments. The results are shared with appropriate providers and teams for their input regarding how to improve the process. The rationale behind “why” the success of each NPSG is related to how we track and use the EMR is as follows:

NPSG I. *Improve the accuracy of patient identification.* Classically, a hospital wristband is used to identify and ensure that the correct patient is being impacted, but the use of a wristband alone is not foolproof, and Nemours is now progressively using bar-coding technology in addition to wristbands to confirm, in real time, correct patient identification and to provide feedback to caregivers to prevent errors or pain.

NPSG II. *Improve the effectiveness of communication among caregivers.* Communication errors are either the primary or secondary etiology of more than 70% of all medical errors. These errors can occur due to a lack of formal “hand-off” of care and/or lack of the timely reporting of critical medical information. The fully integrated Nemours electronic medical record now allows legible, understandable and just-in-time information of critical results.

NPSG III. *Improve the safety of using medications.* Medication errors constitute the largest category of reported medical errors. Physicians have been trained to use abbreviations when prescribing and ordering, but the use of many abbreviations has resulted in errors. The electronic medical record alerts physicians when an unacceptable abbreviation is being used when entering a prescription. Unacceptable abbreviations are ones that have been identified as being potentially dangerous because they can be interpreted with more than one meaning. Bar-coding of medications also assists with ensuring proper drug administration.

NPSG IV. *Reduce the risk of health-associated infections.* There are times when more than just hand washing is needed to prevent infections. Specifically chosen and timed antibiotics can help prevent many wound infections for selected surgical cases.

NPSG V. *Accurately and completely reconcile medications across the continuum of care.* Ensuring that caregivers and patients have a documented list of current and changed medications is called medication reconciliation. Medication reconciliation reduces medication and communication errors. While nationally recognized as being crucial, it is also recognized that this process is difficult to ensure and document system-wide. Using a combination of multi-disciplinary teams, the electronic medical record, and Nemours internal research by our Nursing Department, Nemours has created an EMR-based process to facilitate medication reconciliation.

NPSG VI. *Prevent wrong site, wrong patient and wrong procedures.* Nationally, approximately 21% of surgeons have reported that at some time in their career, they would have performed a procedure that was either not the correct procedure, performed on the wrong body part, or performed on the wrong patient. Conducting a formalized and regimented pre-procedure verification process that includes a final “team check” immediately before the procedure begins may help reduce this risk. Nemours surgeons are using both a team-based approach and verification via the electronic medical record to reduce the risk of this serious error.

HIT dimensions utilized

The practice environment at Nemours has been electronic for nearly a decade through the deployment of a proprietary Electronic Health Record (EpicCare, Epic Systems Corporation, Madison, WI.). Nemours designs call for a highly integrated electronic environment. From the earliest contact with patients, whether inpatient or outpatient, the medical record is interfaced with other systems and imaging. Clinical, research and financial data are combined in our enterprise data warehouse. The enterprise data warehouse is also available to several custom-

based web applications for viewing. Appropriate securities and compliance with HIPAA are maintained. Queries and reports are generated by a team of analysts in collaboration with the Quality experts and operational leaders.

Outcomes

Figure 1 shows (as an example for NPSG V) the long-term trend in results and the alterations to the system that have occurred following a multidisciplinary quality improvement and EMR enhancements to achieve those results. The rate of complete documented outpatient medication reconciliation improved from 30% of encounters to near 90%. Other results are as follows:

NPSG I Improve the accuracy of patient identification: Medication bar-coding rates are near 92%, from a baseline of 20%. **NPSG II** Improve the effectiveness of communication among caregivers: Turnaround of medical imaging critical readings improved by more than 50%. **NPSG III** Improve the safety of using medications: Unacceptable abbreviations in prescriptions occur in less than 0.06% of prescriptions. **NPSG IV** Reduce the risk of health-associated infections: The proper timing of perioperative antibiotics is now part of the formal time-out process and has improved from a rate of 82% to 97%. **NPSG VI** Prevent wrong site, wrong patient, and wrong procedure: No instances have occurred in two years.

Barriers encountered and Challenges

Figure 2 highlights the classical fishbone analytic approach that we have used to identify and then use to improve upon our process flow. The example utilized is specifically for Medication Reconciliation.

Summary

At the beginning of 2008, only 16% (2/12) of the illustrated NPSG measures could be shown within the EMR to be performed at a level > 90%. As of July 2010, 92% (11 of 12) of the illustrated NPSGs indicated > 90% electronic documentation of compliance. The lone NPSG measure that did not indicate > 90% compliance was recorded at 89%. This measure is a component of outpatient medication reconciliation (distributing a revised medication list post encounter to patients) that has not yet been reported nationally at this level.

Interpretation

Wide-ranging and system-wide improvements in patient safety can be achieved utilizing the EMR. However, even when an EMR is used, progress requires time and an organized effort with system buy-in and focus. We believe that we are the first organization that has been able to achieve such quantifiable results.

Conclusions

We demonstrate how a pediatric healthcare organization having a strategic focus on patient safety, an EMR infra-structure, and process improvement guided by national goals (NPSG) can achieve significant, reproducible, and sustainable improvement in safe practices.

Financial considerations

All implementation costs are internal opportunity costs. Cost reductions are seen in both short-term (cost per error), Opportunity (time to investigate), and long-term (malpractice premium and payout). Potential new net revenues will also be attained through the Federal "Meaningful Use" reimbursement program that rewards for similar processes outlined in this paper.

Table

National Patient Safety Goal	Inpatient Hospital	Outpatient Physician Practices	Tracked By	How Electronic Medical Record (EMR) augments the process
Goal-Improve the accuracy of patient Identification.				
➤ Use of Two Patient Identifiers	✓	✓	% Administration of Drugs via barcode	Closed-loop bar coding medication administration
Goal-Improve the effectiveness of communication among caregivers.				
➤ Timely Reporting of Critical Test Results	✓	✓	Tracking receipt of test result (%)	The EMR, Laboratory Information, and Medical Imaging systems flag and track calls and contacts
Goal-Improve the safety of using medications.				
➤ Managing Look-Alike/Sound-Alike Medications	✓	✓	Observations through tracers, presence of list, staff knowledge of us, storage of meds (%)	Proper upper case and lower case fonts present during electronic prescription
Proper Labeling of Medications (Tracer)	✓	✓	Observations during tracers, staff knowledge and observation of prepared meds (%)	Closed-loop bar coding medication administration links labels to patient order
Goal-Reduce the risk of health care-associated infections.				
➤ Preventing Multi-Drug Resistant Organism Infections	✓		Follow patient-specific incidence	Infectious Disease led Antibiotic Stewardship program in place that reviews all cultures and antibiotic management decision via an EMR query and feedback to Providers
➤ Preventing Surgical Site Infections	✓		%Cases with appropriately timed pre-incision prophylactic antibiotics	Intraoperative EMR requires prompts during "Time Out" before case and tracking via EMR
Goal-Accurately and completely reconcile medications across the continuum of care.				
➤ Comparing Current and Newly Ordered Medications	✓	✓	Patient medication list reviewed upon admission and/or encounter start	Drug-specific attestation required in EMR
➤ Communication Medications to the Next Provider	✓	✓	Medication list confirmed during handoff	Patient reviewed medication list immediately accessible in EMR
➤ Providing a Reconciled Medication List to the Patient	✓	✓	Reconciled medication summary redistributed to patients	Tracked print-out of medication list upon changes and/or new prescriptions tracked
Goal-Prevent wrong site, wrong patient, wrong peron surgery				
➤ Conducting a Pre-Procedure Verification Process	✓		%Cases	Intraoperative EMR required documentation prompt during "Time Out" before case
➤ Marking the Procedure Site	✓		%Cases	Intraoperative EMR required documentation prompt during "Time Out" before case
➤ Performing a Time-Out	✓		%Cases	Intraoperative EMR required documentation prompt during "Time Out" before case

Figure 1

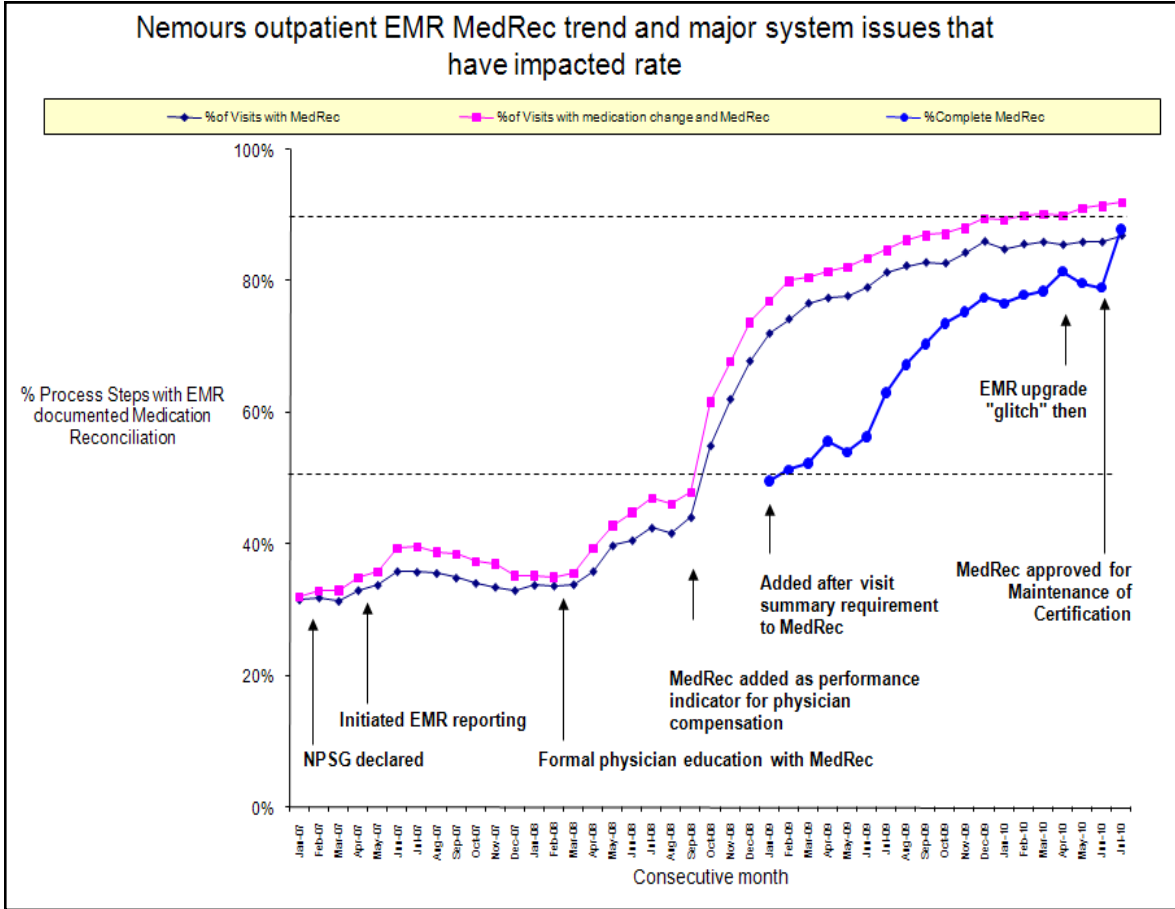


Figure 2

