FIRST

Do No Harm

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Spaulding Rehabilitation Hospital Boston: Failure Mode and Effects Analysis in Preparation for a Safe Hospital Move

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Spaulding Rehabilitation Hospital Boston is an inpatient rehabilitation facility that provides intensive, interdisciplinary care and support for individuals recovering from injury or illness. On April 27, 2013, we successfully moved 112 patients to a new, state-of-the-art facility in the Charlestown Navy Yard. Many months and years of planning went into preparation for the move. In October of 2012, hospital leadership made the decision to conduct a Failure Mode and Effects Analysis (FMEA) prior to the move to help maximize safety and efficiency during the move process.

A FMEA is a quality improvement tool that utilizes a pro-active team-based approach to identify possible failure modes before they occur. In addition to identifying failure modes, it also facilitates a methodical approach to prioritizing the severity of the potential effects of the failure mode. After the failure modes are identified and prioritized, processes are redesigned to implement safer and more efficient outcomes.

Steps in Conducting a FMEA

The Joint Commission has identified 8 steps in conducting a FMEA (Figure 1).

Assembling the Team

One of the most critical steps in the process was to assemble an effective, multidisciplinary team. A group of approximately 30 staff formed the "Move Day Committee." Four key individuals were named as "Team Leads" for the FMEA process: Patient Move Day Commander; two Move Committee Leaders; and a student intern responsible for project managing the FMEA.

Diagramming the Process

The processes and sub-processes were illustrated in detail. The team met biweekly to diagram the "High-Level Process Flow" of the move in a flow-chart format (Figure 2).

1. Select a high-risk process and assemble a team
2. Diagram the process.
3. Brainstorm potential failure modes and determine their effects.
4. Prioritize failure modes.
5. Identify root causes of failure modes.
6. Redesign the process.
7. Analyze and test the new process
8. Implement and monitor the redesigned process.

Fig. 1: Steps in FMEA

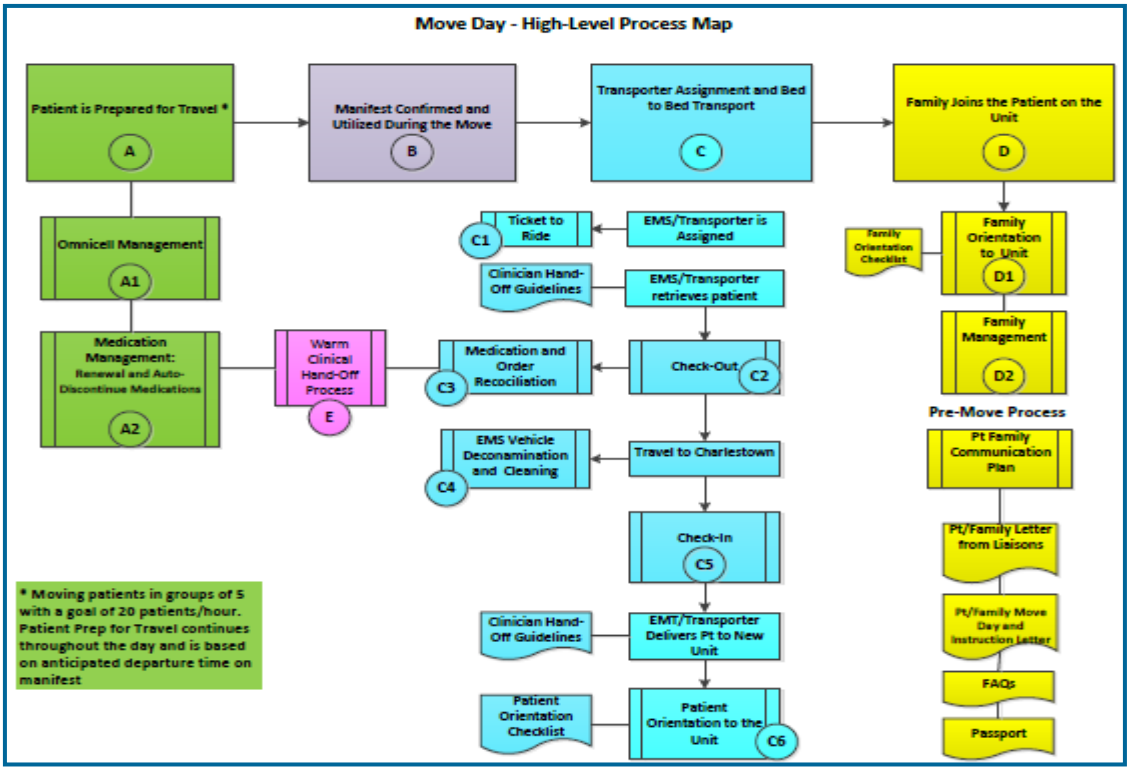

Fig. 2: High-Level Process Flow

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Subgroups were formed that met regularly to define the individual processes and sub-processes leading up to and through the move itself. One of the sub-processes developed by the team was "Medication and Order Reconciliation" (Figure 3).

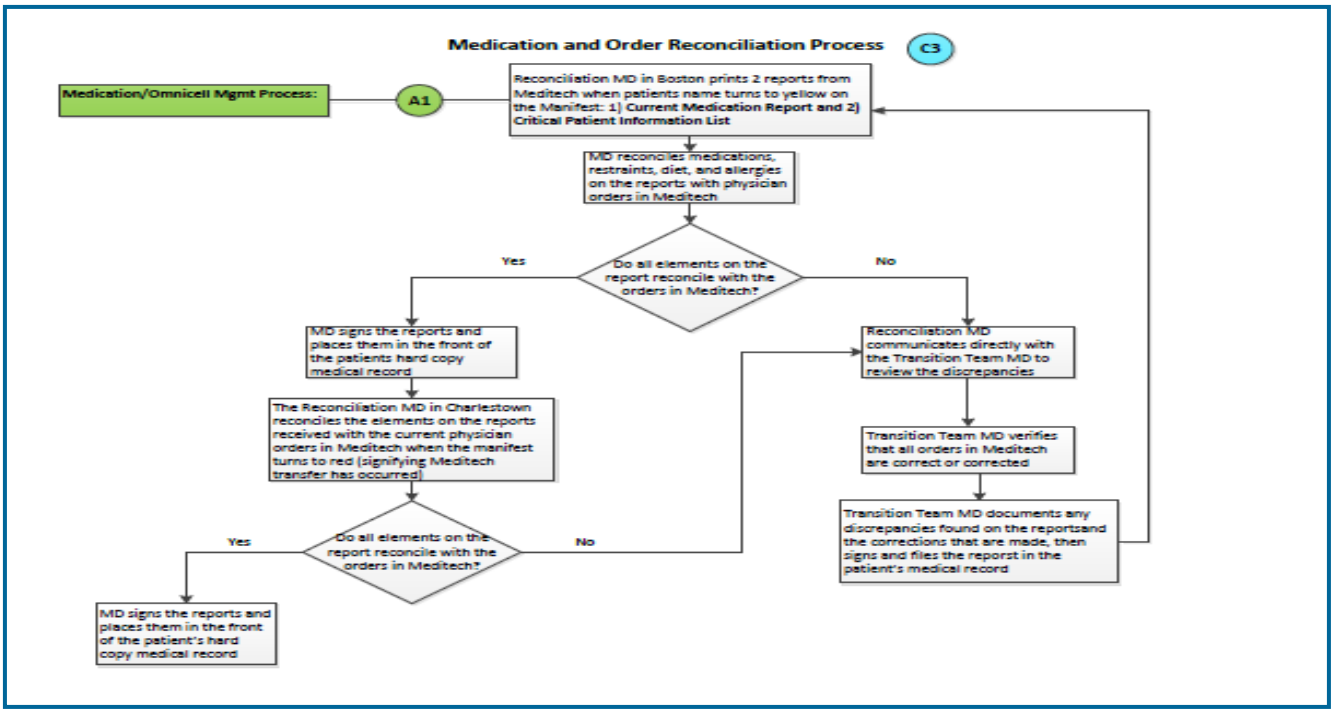

Fig. 3: Medication and Order Reconciliation Sub-Process Flow

Brainstorming Potential Failure Modes and Their Effects

A "failure mode" is any event that is the cause of a functional failure. The team held a brainstorming session to identify: as many ways possible that each step in the process could fail; failures that could impact another step in the process; and the effects that each failure could have, should they occur. Figure 4 illustrates the outcome of this step for the process of Medication and Order Reconciliation.

Medication and Order Reconciliation	Failure Mode	Effect of Failure Mode
Reconciliation MD in Boston prints 2 reports from Meditech when patients name turns to yellow on the Manifest: 1) Current Medication Report and 2) Critical Patient Information List	IS failure - unable to print reconciliation reports	Potential for medication and orders to be incorrect or omitted
MD reconciles medications, restraints, diet, and allergies on the reports with physician orders in Meditech	An order change made during the move may get missed	Missed medications, incorrect diet, restraint orders, allergies may be omitted
If all med and orders reconcile, MD signs the reports and places them in the front of the patients hard copy medical record	None	
The Reconciliation MD in Charlestown reconciles the elements on the reports received with the current physician orders in Meditech when the manifest turns to green (signifying Meditech transfer has occurred)	Error in reconciliation	Missed medications, incorrect diet, restraint orders, allergies may be omitted
If all med and orders reconcile, MD signs the reports and places them in the front of the patient's hard copy medical record	An order change made during the move may get missed	Missed medications, incorrect diet, restraint orders, allergies may be omitted
If any meds or orders do not reconcile (either in Boston or Charlestown) Reconciliation MD communicates directly with the Transition Team MD to review the discrepancies	None	
Transition Team MD verifies that all orders in Meditech are correct or corrected	Receiving MD in Charlestown may not be familiar with patient's meds and orders (if not the attending)	Missed medications, incorrect diet, restraint orders, allergies may be omitted
Transition Team MD documents any discrepancies found on the reports and the corrections that are made, then signs and files the reports in the patient's medical record	Report may not get filed	Report would not be available for future clarification, if indicated

Fig. 4: Potential Failure Modes and Their Effects for Medication and Order Reconciliation

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Prioritizing Failure Modes

To identify the failure modes that are considered the highest-risk and determine which processes needed improvement, a "Risk Priority Number" or RPN was calculated. Three scales were utilized to determine the RPN: 1) detectability -how likely is the failure mode to be detected if it occurs; 2) occurrence - how likely is it that the event will occur; and 3) severity - how severe would the consequences be. The failure modes were then rank ordered from highest to lowest RPN. The Medication and Order Reconciliation Process was our top priority to analyze and address through proactive risk reduction (Figure 5).

Process Step	Failure Mode	Effect	Occurrence	Detection	Severity	RPN
At 7:30am on Friday 4/26 (for Saturday meds) Pharmacist will review "Auto Discontinue Report"	Auto discontinue meds may get missed between Friday and Saturday	Medication omission and potential patient harm	3	3	5	45
MD reconciles medications, restraints, diet, and allergies on the reports with physician orders in Meditech	An order change made during the move may get missed	Missed medications, incorrect diet, restraint orders, allergies may be omitted	2	4	5	40
If all med and orders reconcile, MD signs the reports and places them in the front of the patient's hard copy medical record	An order change made during the move may get missed	Missed medications, incorrect diet, restraint orders, allergies may be omitted	2	4	5	40
Transition Team MD verifies that all orders in Meditech are correct or corrected	Receiving MD in Charlestown may not be familiar with patient's meds and orders (if not the attending)	Missed medications, incorrect diet, restraint orders, allergies may be omitted	2	4	5	40
On Friday 4/26, Pharmacist reviews "Renewal Report" for meds that are due to expire on Saturday and Sunday	Renewal meds may get missed between Friday and Monday	Medication omission and potential patient harm	2	3	5	30

Fig. 5: Risk Prioritization Numbers for Medication and Order Reconciliation Process

Identifying Root Causes of Failure Modes

To prevent potential failure, the team met to identify the root causes of each failure mode. The FMEA is a proactive approach to a root cause analysis, effectively identifying the fundamental reason, or combination of reasons that a failure mode could occur. Figure 6 represents a sample of the work of the team in conducting a root cause analysis for Medication and Order Reconciliation.

Medication and Order Reconciliation	Failure Mode	Root Cause	Occurrence	Detection	Severity	RPN
MD reconciles medications, restraints, diet, and allergies on the reports with physician orders in Meditech	An order change made during the move may get missed	Timing; if order is changed after reconciliation reports are written	2	4	5	40
Transition Team MD verifies that all orders in Meditech are correct or corrected	Receiving MD in CT may not be familiar with patient's meds and orders (if not the attending)	Lack of mechanism in the process to verify accuracy with the attending MD	2	4	5	40

Fig. 6: Root Cause Analysis of Medication and Order Reconciliation Process

The Redesigned Process

The strategies that the team used in process redesign were to prevent the failure from happening (decreasing the likelihood of occurrence), to prevent a failure from reaching the person (increasing detect ability), and to protect the person if a failure occurs (decreasing the severity of the effects/harm). *See Figure 7 and 8 for the redesigned Medication and Order Reconciliation Process*.

Medication Order Management	Failure Mode	Root Cause	What Can Be Improved?
On Friday 4/26, Pharmacist reviews "Renewal Report" for meds that are due to expire on Saturday and Sunday	Renewal meds may get missed between Friday and Monday	Heavy workload due to move (Pharmacists and Physicians)	MDs review and renew any critical medications prior to Friday to minimize the # of meds due for renewal
At 7:30am on Friday 4/26 (for Saturday meds) Pharmacist will review "Auto Discontinue Report"	Auto discontinue meds may get missed between Friday and Saturday	Heavy workload due to move (Pharmacists and Physicians)	Pharmacist will also run and review this report on Saturday for Sunday to catch any additional critical auto-d/c or renewal meds

Fig. 7: Determining What Can Be Improved

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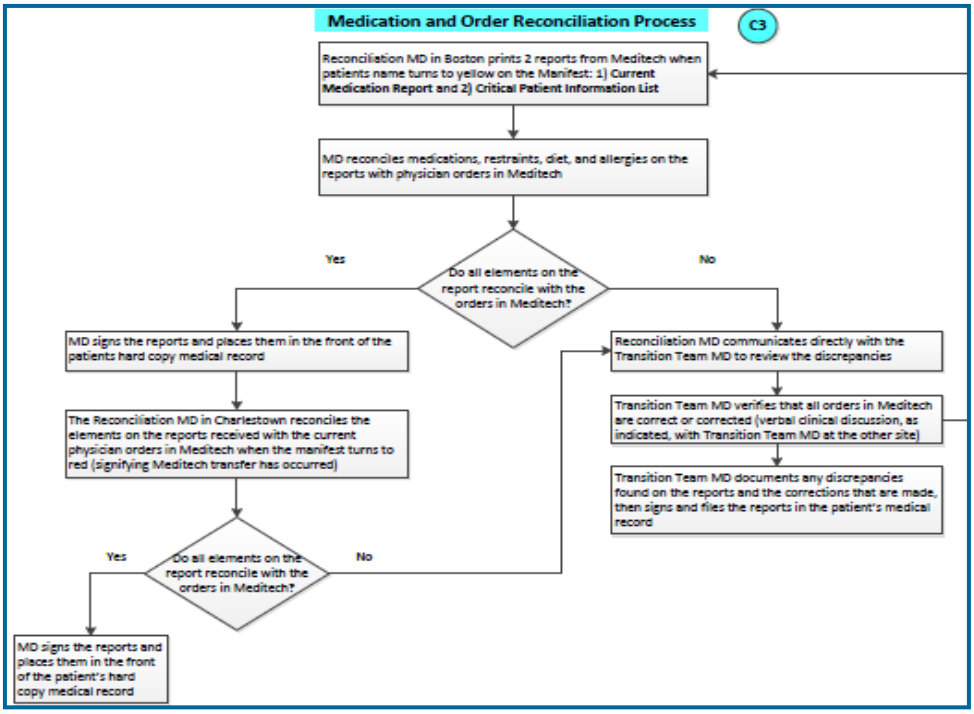

Fig. 8: Redesigned Process for Medication and Order Reconciliation

Spaulding Rehabilitation Hospital's new facility in Charlestown Navy Yard.

Analysis and Testing of the New Process

The redesigned process was analyzed by repeating steps 1-3 of the FMEA. The RPN of this process changed from 40 initially to 10 on redesign, which was a 75% reduction in risk (Figure 9). The newly designed process significantly reduced the risks associated with medication and order reconciliation and was ready for implementation on Patient Move Day!

Medication and Order Reconciliation	Failure Mode	Root Cause	Occurrence	Detection	Severity	RPN
Transition Team MD verifies that all orders in Meditech are correct or corrected ***and verbally discusses any discrepancies with the Transition MD from the sending unit***	Receiving MD in Charlestown may not be familiar with patient's meds and orders (if not the attending)	Missed medications, incorrect diet, restraint orders, allergies may be omitted	2	1	5	10

Fig. 9: Redesigned Process Step

Implementation of the Newly Designed Process: Move Day!

On April 27th 2013, the patient move process began. Thirty-six physicians were present to implement the newly re-designed medication and order reconciliation process. This group of physicians was a combination of both inpatient attending physicians, as well as those who typically practice in an outpatient setting. Half of the physicians were assigned to the Nashua Street facility; the remainder were at the new Charlestown Navy Yard Hospital.

The process of medication and order reconciliation had actually begun twenty-four hours earlier. Clinical pharmacists had reviewed both the "renewal" report in Meditech, as well as the "auto d/c report" to preliminarily catch any medications that were due to expire during the weekend of the patient move, and communicate accordingly with the attending physician. Additionally, as depicted in the process, a critical information sheet containing each patient's medications, allergies, diet, therapy orders, restraints and weight bearing status had been printed. On the morning of the move, the physicians at the Nashua Street facility reconciled the printed critical information sheets with the current electronic orders in each patient's record. This first point of reconciliation was designed to catch any new orders that had been entered after the sheets were originally printed.

As patients were moved to the new facility, the critical information sheets were not far behind. As the patient's electronic orders were "transferred" in the Meditech system, the group of physicians at the Charlestown facility reconciled the printed sheets that had come over with the patients, with the new electronic orders. In all, an average of seventy data points were verified for each patient. An error rate of approximately 2% was noted in reconciling all of the orders. These errors were noted to be medication changes that had been made at the Nashua Street facility that were not communicated via a warm hand-off

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as required in the re-designed process. All medication discrepancies were discovered as patients arrived at the new facility, and the second point of reconciliation was accomplished.

The day ended as all one hundred and twelve patients were safely moved to the new facility. The medication and order reconciliation process had worked well. The process was a learning opportunity for the outpatient physicians to see first-hand the process for inpatient medication reconciliation. For the inpatient attending physicians and residents, there was a realization that an order for one of these critical pieces of patient information was vulnerable to being missed. Above all, it was an illustration of the importance of warm-hand-offs and good communication.

Lessons Learned

One of the key aspects that contributed to the success of the FMEA was the composition and effectiveness of the team. It was essential that the team be multi-disciplinary to represent diverse viewpoints, but also include those with both subject matter knowledge of the process, as well as those with a broader reach and decision making authority. It was also critical to use individuals who had expertise in performance improvement and excellent analytical skills. For these reasons, leadership buy-in was critical, as was the inclusion of front-line staff and quality improvement experts. The team worked well together, and was ultimately instrumental in the success of the move.

The important lesson learned for all involved was that no matter how safe and reliable a process appears, when human factors are taken into consideration, there is room for potential error. The FMEA not only helped identify the potential failure modes, but assisted with the prioritization of the work. Although many potential failure modes were initially identified, the greatest impact would have been an error in medication or order reconciliation. This realization was instrumental in determining allocation of resources on move day, and helped ensure a safe move for all patients and staff involved.

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The following article on the use of Volumetric Capnography at New Bedford Rehabilitation Hospital, a VIBRA Healthcare Hospital, is reprinted, with permission, from South of Boston MD News (October 2010). New Bedford Rehab reports that it continues to experience positive patient outcomes from the use of this technology. The hospital's ventilator weaning rate is 91% and average length of time to weaning is 12 days.

Volumetric Capnography at New Bedford Rehabilitation Hospital

Non - Invasive Monitoring Technology Decreases Weaning Time

Karen Ellery-Jones (South Boston MD News)

Few medical professionals would deny the immense clinical benefits that are derived from mechanical ventilators. First introduced in the 1920s to help patients with poliomyelitis, mechanical ventilation continues to be an effective and lifesaving tool for patients suffering from respiratory difficulties resulting from serious accidents, surgeries or illnesses. Yet, mechanical ventilation does have implicit risks, including an increased chance of pneumonia and damage to sensitive lung tissue. Additionally, the endotracheal or tracheostomy tube can cause considerable discomfort and result in loss of mobility and diminishing quality of life. So, weaning patients from their ventilators as quickly and efficiently as possible is preferable, but it can be a long process.

However, for ventilator patients at New Bedford Rehabilitation Hospital, a 90-bed long-term acute care hospital in southeastern Massachusetts, physicians and respiratory therapists are using the latest non-invasive monitoring technology to accelerate the weaning process, which has resulted in a 29 percent reduction in the average length of time patients spend on ventilators.

The "GPS" of Ventilator Management

Director of Pulmonary Medicine, Albert M. Loerinc, MD, noted that volumetric capnography provides continuous data reflecting the status of the patient's ventilation and perfusion. "We call volumetric capnography the GPS of ventilator management," he says. Volumetric capnography is very different from standard capnography which measures the partial pressure of carbon dioxide in respiratory gases. Volumetric capnography measures the actual volume of exhaled carbon dioxide. "We can monitor the changes in the exhaled volume of carbon dioxide breath by breath and minute by minute so that when changes are made to ventilator settings, we can tell immediately whether those changes are providing improved ventilation." If the exhaled volume of carbon dioxide is stable or increasing, the change in ventilator settings is beneficial to the patient. If the exhaled volume of carbon dioxide is decreasing, then either alveolar ventilation or perfusion to the lung is decreasing.

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Manny Berthil, RRT, Director of Respiratory Therapy, says that before they started using volumetric capnography, clinical staff would make a change in the ventilator settings and then perform an arterial blood gas analysis to assess the efficacy of the ventilator change.

"We would be looking at the patient's respiratory status retrospectively as opposed to how he or she is currently doing," he says. "Arterial blood gas determinations are a one-time snapshot, whereas volumetric capnography is continuous monitoring of what is happening physiologically to the patient."

Upon admission, the team utilizes volumetric capnography to optimize the patient's ventilator settings. Once the patient is stabilized on their new ventilator settings, the weaning process begins. The team continues to use volumetric capnography to assess the patient's cardiopulmonary status throughout the weaning process and to decrease the time of ventilator dependency.

"A patient's clinical condition can vary at the time ventilator setting changes are being made," explains Dr. Loerinc. "A patient may develop tachypnea, tachycardia or diaphoresis. However, if the volume of exhaled carbon dioxide remains stable, we know that the clinical decompensation is not related to the change in ventilator settings and weaning can proceed. The patient may be anxious or in pain, which then needs to be addressed. Conversely, if a change in ventilator settings creates a situation where the exhaled carbon dioxide level begins to drop, we can differentiate whether the problem is related to decreased ventilation or worsening perfusion. We are able to back off those changes before the patient becomes symptomatic."

"Effective use of volumetric capnography requires training and a lot of hands-on experience" says Dr. Loerinc, who along with Berthil spent several days training at Duke University Medical Center to learn and apply the practices now employed at New Bedford Rehab Hospital. "As a result, we have decreased the average length of time patients are on mechanical ventilation by 29%."

"This technology is a valuable tool that assesses the cardiopulmonary status of a patient, and provides information as to how likely a patient is to wean." Berthil says, "We can determine the VD/VT (dead space to tidal volume ratio) which can help predict successful weaning. It also helps us determine the optimal PEEP level for lung recruitment." Patients are typically not even aware of the machine that is attached to their ventilator, but can certainly feel the benefits of the technology.

Additional Benefit to COPD Patients

For patients suffering from COPD, volumetric capnography can also be used in conjunction with humidified high-flow oxygen devices as a tool for lung recruitment, the practice of re-engaging or capturing alveoli that may not be fully participating in gas exchange. "COPD patients can now transition from a conventional ventilator to high flow oxygen therapy to eventual weaning, because physicians and therapists are able to accurately measure the exhaled CO2", says Berthil. "We have had a high level of success using humidified high flow oxygen devices in gaining back the regions of the lungs that have been underutilized or not utilized at all. The patient is getting a continuous flow of air and taking over the work of breathing. The patient can then gradually wean from the high flow."

Regional Reputation

Patients are referred to New Bedford Rehab because of the strong reputation the hospital has earned over the years for successfully weaning hard-to-wean patients. Patients are typically transferred from acute care hospitals in Boston, Rhode Island and southeastern Massachusetts for additional rehabilitation, including ventilator weaning.

"We specialize in treating medically complex patients who need daily intervention," says Dr. Loerinc. "We work as a team with pulmonary physicians, respiratory therapists, nurses, physical therapists, occupational therapists, speech therapists, psychologists, case managers and dieticians to rehabilitate the patient. Most of our patients are very debilitated, so our goal is to work together to get these patients back to a state of better health."

Because no two patients are alike, weaning from the ventilator is individualized and tailored to each patient based on that particular patient's underlying needs. With an experienced team of professionals working in a multidisciplinary model, and with a long history of weaning ventilator-dependent patients, New Bedford Rehab continues to be a leader in providing high quality acute care for chronically critically ill patients. By incorporating volumetric capnography in the care of mechanically ventilated patients, the pulmonary team can manage and wean these patients much more effectively.

Boston Medical Center Improvement Project: Medications In Hand for Patients with Asthma Prior to Discharge

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Laura Johnson MD MPH, *Chief Resident, Boston Combined Residency Program in Pediatrics*
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Introduction: Asthma is the most prevalent chronic disease in pediatrics with a majority of patients receiving suboptimal therapy (1,2) and with minorities disproportionately affected (3). Adherence to controller medications such as inhaled corticosteroids can prevent emergency room (ER) visits and hospitalizations, but there is no defined best practice to promote adherence to discharge medications after a hospitalization. Unpublished data from Boston Medical Center's (BMC) pediatric ward suggests that up to 40% of patients discharged from an asthma exacerbation do not fill their discharge prescriptions by 48 hours after discharge. This proportion is similar to medication filling data after discharge from the pediatric ER at BMC (4). Since patients cannot take medications they do not have, a logical first step towards promoting medication adherence is to ensure patients leave the hospital with their medications in hand. A resident-led team organized a series of interventions over the past two years to increase the number of patients with asthma leaving the hospital with their discharge medications.

Setting: The BMC inpatient pediatric ward admits slightly over 250 patients with asthma exacerbations per year. Four interns, two supervising residents, and an attending staff the ward. Residents rotate every four weeks and attendings rotate every two weeks. A full-time unit coordinator collects data for quality initiatives. The hospital owns and operates an outpatient pharmacy enrolled in the 340B program with easy access to the inpatient unit. The resident-led project was conducted in accordance with the ACGME requirement for a resident Quality Improvement (QI) curriculum and was based on the Model for Improvement (5).

Aim: Increase the percentage of patients with asthma discharged from the BMC pediatric ward with medications in hand to 75% by June 2013.

Tests of Change:

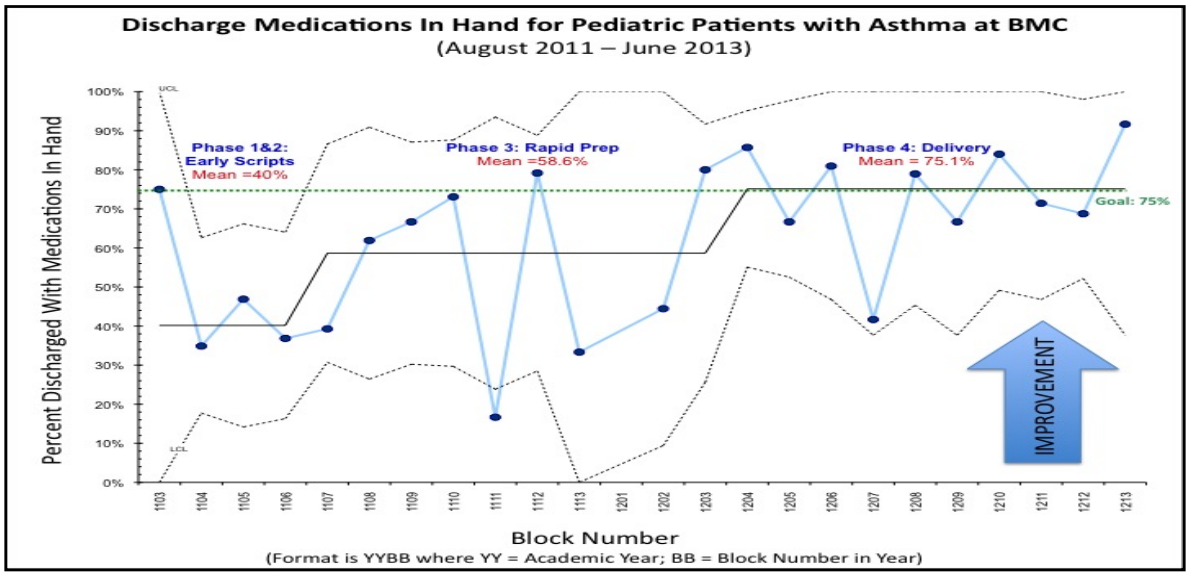
Phase 1: We instructed rotating house officers at each rotation orientation to write discharge prescriptions at the time of admission (or as early in the patient's course as possible) and encouraged attendings to discuss discharge medication plans earlier in the course of an admission.

Phase 2: We made workflow improvements for interns to facilitate the first intervention, including note templates, electronic medical record usage tips, and prescription writing guides.

Phase 3: We utilized the BMC outpatient pharmacy's rapid "Discharge Medication Preparation" protocol to expedite preparation of medications. This protocol prepares medications in under an hour (compared to average wait times of several hours). Families were able to fill prescriptions quickly and without the need to leave the hospital grounds.

Phase 4: We developed a system in partnership with the outpatient pharmacy to have a pharmacist deliver discharge medications directly to a patient's bedside prior to discharge. This novel protocol allows for discharge teaching to take place with a nurse, a pharmacist, the patient, and the patient's family all in the same room at the same time.

Results: Prior to the start of this QI project, the percent of patients with asthma discharged with medications in hand per month was 0%. The annotated Statistical Process Control Chart showing the change in percentage of patients leaving the hospital with their medications over the last two years as a result of the tests of change can be seen below. Each data point represents a four week interval with a different house officer team. Because Phase One and Phase Two happened in quick succession, they are grouped here for simplicity.



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Discussion: A steady increase in the mean rate of discharge with medications can be seen, though there is clear block-to-block variability. There are many potential sources for the variability seen within the blocks. Rotating resident groups did not participate in the Medications in Hand initiative consistently. While some may have been overwhelmed with other clinical responsibilities, others were unable to be oriented properly to the processes. In particular, during Block 1111, where the data point falls below the Lower Control Limit, the interns were not properly oriented to the project until the third week of their rotation due to scheduling limitations of the organizing team. The seasonal nature of the asthma census - lower in the summer, higher in the winter - can also contribute to the variability. For example in Block 1113 (June 2012) only four patients were discharged without medications in hand. However because only six patients with asthma were admitted during that block (compared to the average of 20 per block), the calculated percentage is low. Additionally, if interns rarely use the project's protocols because of a low census, they are more likely to encounter difficulties and make errors when compared to interns using the protocols regularly.

Despite these limitations, our project has broken down several barriers our patients face when presented with the complexities of a hospital discharge. Without a doubt, the partnership with the BMC outpatient pharmacy to rapidly fill and deliver discharge medications had the largest impact on the percent of medications disbursed prior to discharge. However, other cultural shifts were necessary including changes in the intern, resident, attending, and nursing workflow in preparation for discharge. Nurses in particular were instrumental in preserving the tests of change as a "standard of care" across rotation blocks, so that each incoming intern group was held to the standards of the previous group.

Conclusions: Asthma admissions are well suited to the provision of discharge medications prior to discharge. Resident-led rapid-cycle tests of change using the Model for Improvement can successfully increase the proportion of patients admitted for asthma who leave the hospital with discharge medications in hand. Specifically, the use of a medication delivery process in conjunction with a hospital-owned outpatient pharmacy increased the proportion of patients discharged with medications in hand. Next steps include analyzing clinical outcomes of this initiative such as readmission rate and emergency department visits for asthma.

Special thanks: Sandra Mumanachit, Kelly Fitzgerald, Patricia Hite, Jose Baria, Robert Miranda

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Safety and Quality Review Corner: Choking episode with cardio-respiratory arrest.

The patient was admitted to the rehabilitation hospital for medical management and rehabilitation after an acute care hospitalization for cardiac and renal disease. She was participating in physical and occupational therapy aimed at improving her functional mobility. While eating her meal, she was observed to choke on a piece of food. The Heimlich maneuver was unsuccessful; a code was called. CPR was begun, respiratory therapy was unable to clear the patient's airway. The patient was intubated and the pulseless electrical activity algorithm was followed. Paramedics arrived, continued resuscitation efforts and transferred the patient to an acute care hospital.

Internal review did not reveal any deficiencies in care that impacted the actual choking episode. The patient was cognitively intact and had not complained of any problems with dysphagia. There were no indications for a modified diet or supervision/assistance with meals. Review of the code revealed that the IV was placed immediately, but epinephrine was delayed; the delay appeared to be related to physician expertise and availability for decision-making due to the physician's involvement in assisting with chest compressions. The following improvement measures were implemented:

- Policy revisions were made to define and clarify the roles of each member of the code team during a code.
- Monthly mock codes are now conducted to assess code team member competence and identify opportunities for improvement.
- All members of the code team were advised to "speak up" if they see delays in the implementation of the resuscitation algorithm.
- De-briefing sessions will occur after a code, to provide immediate feedback and education to the code team.

Planning for Surgery at New England Baptist Hospital

A process designed to mitigate risks for patients with co-morbid conditions.

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New England Baptist Hospital (NEBH) offers nationally recognized expertise in orthopedic surgery. As the site of one of the first artificial hip replacements in the country, NEBH continues to lead the way in new methods to diagnose and treat all forms of musculoskeletal disorders and disease. The hospital is a teaching affiliate of Tufts University School of Medicine and conducts teaching programs in collaboration with the Harvard School of Public Health and the Harvard School of Medicine.

At NEBH, our goal is to achieve the best possible outcomes for our patients and to deliver exceptional care. In pursuit of that goal, our pre-admission screening process has been engineered to identify significant medical co-morbidities and social risks in preoperative patients and to mitigate those risks through the development of a comprehensive multi-faceted plan.

All pre-surgical patients at NEBH undergo a preadmission screening evaluation, which is carried out by nurse practitioners, and supported by pre-established guidelines. Based on each patient's medical condition, testing may be required based on predefined Preoperative Testing Guidelines. Patients who have ongoing active medical problems, or who have multiple co-morbidities are assigned to the high-risk group. These patients usually fall in the ASA class III, and require a preoperative cardiology evaluation and, when necessary, subspecialty clearance depending on their active ongoing medical problems. Patients who have one or more serious or unstable medical conditions (ASA class IV) are considered very high risk, and may require a second medical opinion. If the consulting cardiologist determines that a more comprehensive medical evaluation is necessary, a preoperative intensivist consultation will be requested. Having the intensivist involved in the patient's preoperative evaluation and management process is valuable as these patients will usually be admitted to the ICU post-operatively, which results in improved continuity of care. Patients over the age of 90 years are also considered at higher risk, and a preoperative cardiology consultation is always requested for this age group, regardless of the patient's past medical history. As with the ASA IV patients, the cardiologist will determine if an intensivist or other subspecialty consultation is required.

After the pre-admission screening unit visit and requisite consults have been completed, a team comprised of registered nurses and a physician review the patient's chart to ensure that the patient is prepared for surgery. The initial record review is completed by the nurses. They make sure that all consults, laboratory and radiologic results have been completed. They call out any concerning results or consultant perspectives and signal to the physician. Additional consults may be ordered and a preoperative patient care conference may be called. For some very high risk cases, there may be the need to involve the patient and family for additional discussions about risks, benefits and support required during the postoperative period.

The other very important aspect of the high risk process is the generation of a list of patients that are designated as high risk based on our criteria. This list is sent, on a daily basis, to a discrete list of physicians, surgeons, advanced practice nurses, physician assistants, nurse leaders and case managers. The list allows for planning on patient placement, postoperative and discharge care requirements.

Through NEBH's comprehensive pre-admission screening and perioperative planning process, we strive to achieve the best possible outcomes for all patients, regardless of their medical risks.

Examples of Types of Patient Events Reported in Safety and Quality Reviews.

Acute Care Hospitals

- Perforated aorta during laparoscopic cholecystectomy
- Delayed diagnosis of appendicitis
- Cerebral infarct following cardiac catheterization
- Incorrect NG tube placement
- Delayed diagnosis of testicular tortion
- Meningitis following sinus surgery
- Aspiration in patient on CIWA protocol
- Falls with injury in outpatient areas
- Delayed treatment of hypokalemia
- Surgical site infections
- Medication errors involving heparin
- Delayed treatment of sepsis (wrong antibiotic)
- Stroke s/p femoral tibial bypass
- Lower extremity paralysis s/p femoral tibial bypass
- Bladder rupture s/p excision of bladder tumor
- Wrong site anesthesia block
- Suicides/attempted suicides

Rehabilitation/LTAC Hospitals

- Post-dialysis code
- Found unresponsive
- Respiratory failure
- Myocardial infarction
- Contrast induced nephropathy
- Pulmonary embolism

Quality and Patient Safety Division Notes

- Weekly Patient Safety Rounds at *Harrington Hospital* include the Administrator on call, a member of the Quality and Patient Safety Department and available Board members. Examples of improvements resulting from these rounds are new lighting in the ICU, a standardized code cart and new pharmacy location in the Cancer Center. Harrington Senior Leaders do additional rounding, specifically to engage staff in discussions aimed at improving the patient experience and recognize employee excellence.
- A correlation of post operative bariatric surgery complications to patients who smoked resulted in *Winchester Hospital* revising its pre-operative protocols for bariatric surgery. Patients who screen positive for nicotine are reevaluated for surgery after abstinence of cigarettes for at least three months.
- *Sturdy Hospital* designed an "automatic prompt" to improve mobility for patients who are assessed as high risk at the time of admission. The prompt sends a request to physical therapy for patient screening and services.
- *Massachusetts Eye and Ear Infirmary* focused on HAPU prevention in its operating rooms. All operating rooms are now equipped with gel pads for use in all cases of 2.5 hours or greater, pre and post operative nursing skin assessments are required, and outcomes are monitored through the hospital's incident reporting and screening systems.
- *Taunton Hospital* implemented a new pain scale for non-verbal patients: FLACC (face, legs, activity, cry, consolability).
- Ambulatory Practices A number of hospitals have reported that they are engaging their ambulatory practices in office risk assessments and education on safety awareness and quality improvement. Hospitals are also developing mechanisms for their ambulatory providers to share "best practice."

Two Workshops Held in June:

"Advancing Innovations & Sustainable Improvements in Patient Safety" Workshop

Held June 13th in Marlborough, a QPS Division co-sponsorship with the Massachusetts Society for Healthcare Risk Management and the Massachusetts Hospital Association.

The workshop was facilitated by Patrice Spath, MA, RHIT, of Brown-Spath & Associates. Ms. Spath described the elements of becoming a "High-Reliability Organization;" how to measure reliability; the factors to consider in determining reliability levels; and how to select the best process and system redesign methods for high risk activities. Lastly, Ms. Spath discussed how to use high reliability design solutions to address problematic safety behaviors. Over four hundred seventy-five people have now attended the workshop over four dates.

Leading on Quality and Safety: Briefing for Hospital Trustees and Physician Leaders

Held June 3rd in Burlington, a QPS Division co-sponsored event with the Massachusetts Hospital Association

James Conway, MS, FACHE, Principal, Governance and Leadership Group, Pascal Metrics and Leslie Selbovitz, MD, Chief Medical Officer and Senior Vice President for Medical Affairs at Newton-Wellesley Hospital spoke to hospital and health system board members and physician leaders on their role and accountability in the governance and leadership of quality and patient safety.

CONTACT THE QPSD

To be added to the QPSD Newsletter and advisory mailing list, update hospital contact information, submit an article, request an SQR form, or obtain additional information, contact QPSD: Jennifer.Sadowski@state.ma.us or (781) 876-8296.