

A process improvement strategy for patient safety

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Abstract—Most change processes fail. Success requires a systematic approach based on the best practices performed within a setting of significant commitment by the organization and its leaders and staff. The Institute for Healthcare Improvement (IHI) framework for improvement was used along with cascading organization-wide performance indicators with specific targets and the implementation of performance reporting. This approach successfully improved the two patient safety practices of acute myocardial infarction and medication reconciliation.

This Executive Training for Research Application (EXTRA) project sought to establish an effective approach to implementing and sustaining a process improvement program for patient safety practices in response to a government policy decision to publicly report hospital standardized mortality ratio. The intervention took place between December 2008 and November 2009 at Bluewater Health in Sarnia, Ontario, Canada. This is a multisite community general hospital with 320 beds, 1,700 employees, and 160 credentialed physicians serving a population of 128,000. It was recognized that neither the hospital standardized mortality ratio nor the safety culture could be directly influenced because of their complexity, so the intervention focused on sustaining compliance with two safety initiatives of “Safer Healthcare Now! Bundles”—“Medication Reconciliation” (Med Rec) and “Acute Myocardial Infarction” (AMI). This decision was based on a concept by Reason¹ who suggests that a systems approach to quality that incorporates multiple defensive barriers can decrease the risk of adverse events. This article presents the results of the process improvement project on the two safety programs together with the key lesson learned. Before and after measures were used to assess success.

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USING EVIDENCE

Complex adaptive system approaches such as that described by McDaniel et al² tell us that organizations are social entities formed by numerous mutually interacting parts.³ These interactions and their outcomes are unpredictable, making the management of processes designed to achieve improvements difficult and uncertain. A large majority of improvement projects fail because of this complexity.⁴ Given this risk of failure and the complexities of change, the authors turned to the evidence on successful change frameworks that were practical “how-to” tools. Having an organized framework assists in the development and implementation of quality and safety improvement projects.⁵ Ideally, these approaches provide a set of accountabilities for operationalizing decisions that cascade from senior leadership to the frontline. The most effective frameworks ensure that senior leaders define the strategy, middle management executes the strategy, and the frontline leader achieves tactical results.⁶ The techniques that were considered included the IHI model for improvement, Baldrige criteria for performance excellence, lean approaches, six sigma, and the National Health Service innovation and improvement strategies. The IHI quality improvement framework was selected because of its widespread use and several published successes in hospitals that resembled the study site.

THE INTERVENTION

Setting aims

This is the step of defining what you are trying to accomplish by setting aims based on evidence. They should be time specific and measurable, and they should define the population of patients who will be affected. The project aims were chosen because medication reconciliation at discharge has been found to prevent errors that would compromise quality.⁷ IHI and its partners in the saving lives campaign encouraged hospitals and other healthcare providers to take the following steps to reduce harm and deaths: (1) deliver reliable, evidence-based care for acute myocardial infarction and (2) prevent adverse drug events

by implementing medication reconciliation. These two sets of practices are supported by relatively strong evidence.⁸

Establishing measures

This stage requires teams to use quantitative measures to determine if a particular change actually leads to an improvement. The specific project measures were determined by a team composed of leaders, managers, and frontline staff who served as the project teams for the two safety bundles projects. The targets for Med Rec were greater than 70% completion at 24 hours after admission and less than 10% still incomplete at 72 hours after admission. The metric for AMI was a door-to-needle time for drugs of less than 30 minutes 100% of the time.

Selecting and testing changes

All improvement requires making changes, but not all changes result in improvement. The strategies and tactics that were selected and implemented by the project teams were based on data analysis, Failure Mode and Effects Analysis (FMEA), and process flow mapping techniques. It is important to select potential improvements to trial by answering three questions proposed by Langley et al.⁹ These questions are the following: (1) What are we trying to accomplish? (2) How will we know that a change is an improvement? and (3) What changes can we make that will result in improvement? The answers inform the Plan-Do-Study-Act (PDSA) cycles and give them guidance and focus.

The analysis done for AMI determined that the critical failure point was getting the Electrocardiogram (EKG) done quickly. The team selected change ideas to improve their triage of the patient and the process for EKG acquisition. PDSA cycles to test the potential changes resulted in a new paging process for alerting the EKG technician and installation of satellite clocks to accurately document and track time. The Med Rec team found the admission process in the emergency department to be a failure point and created a computer checklist and education rounds about Med Rec. An admissions nurse was moved to the emergency department on a full-time basis and began using a computer checklist as part of the nursing admission history, and a pharmacy technician completed follow-ups with the admitting physician to ensure the accuracy of medication orders. Multiple rapid-cycle PDSA cycles were used to test all changes.

Implementing changes

After testing a change and refining the change through PDSA cycles, the team then implemented practice change in the whole patient care department. The implementation stages adopted tactics from Berwick¹⁰ specifically by (1)

supporting these innovators, (2) making early adopter activity easily observable, and (3) creating slack for change.

The project leader developed a support plan for both projects and assigned two nurse educators who were trained in quality improvement methodology. These three then established a segmented project plan with a project review schedule to assess progress and remove barriers, to create a communication forum, and to celebrate small incremental successes.

Project observability was pursued by creating a new documentation process, changing the admission processes, and enlisting physician champions. The IHI Model for Improvement decision trees, the PDSA rapid cycle tests, and process maps were communicated at special staff meetings and posted in departments and newsletters.

Slack for change was created by assigning specific time for the project leaders and staff to participate in the project. It was clear that to sustain improvement efforts we needed to demonstrate the benefit of the change, a clear fit with normal work processes, and develop a more effective system to easily monitor progress.

There was an emphasis on education about improvement methodology and measurement. The executive sponsors were held accountable for the results of the overall project. They met with the improvement team steering committee biweekly to review data, to check the project schedule, to help remove barriers, and to celebrate the successes with the team. The performance improvements were analyzed using a scorecard report presented at the Quality Committee of the Board and publically at monthly board meetings. The executive sponsors worked to create a culture of improvement and a deeply engaged staff by ensuring everyone had a clear understanding of improvement plans as an integral part of their work. The project team members were given opportunities for external training opportunities. The authors also linked the intervention project to safety rounds, which had just begun at the hospital, as a way of linking the project to other organizational safety practices.

THE RESULTS

The intervention took place between December 2008 and November 2009. Improvements were achieved for both AMI and Med Rec. Results are shown in Table 1; an increase in thrombolytic delivered in less than 30 minutes from an initial 50% to 100% after the project is documented. Increased Med Rec completion rates were achieved at both 24 and 72 hours after admission.

Lessons learned

The intervention project was successful in improving outcomes in both patient safety bundles. The lessons learned include the importance of teamwork, training, leadership, frontline champions, and the courage to create the condi-

Table 1. Pre-/Post-intervention project indicators

<i>Measure</i>	<i>Date:</i>	<i>Date:</i>
HSMR	2007/08: 105	2008/09: 88
Outcomes AMI (%)	Dec 2008	Nov 2009
1. Aspirin at arrival	100	100
2. Aspirin at discharge	100	100
3. Beta-blocker prescribed at discharge	100	100
4. Thrombolytic agent received (less than 30 min)	50	100
Outcomes Med Rec	Dec 2008	Nov 2009
Adverse drug events	3	1
1. Medication reconciliation success		
% complete within 24 h	47	63
% non-complete at 72 h	28	11
Patient satisfaction (%)	100	100

tions for change. Consistent with others,^{11,12} we found that visible and consistent executive leadership was essential to providing support and removing barriers for the project leaders and team. This was achieved by having clearly articulated support from the chief executive officer for the project and having executives serve as project sponsors who participated regularly as part of the project team planning sessions and problem-solving meetings. It was clear that this gave the project a level of importance and created momentum to move it ahead. We found an unmistakable effect on the enthusiasm of project participants and how others perceived the importance of the improvement activities stemming from the high visibility of the senior leaders, who in this project were the vice president, the chief nurse executive, and the chief of staff.

We also cannot overemphasize the importance of having staff and physician champions for increasing the visibility of change projects and assisting in the subsequent adoption and spread of change. Similar to Reinertsen et al,¹³ we noted that getting the new processes implemented as practice changes at the bedside was greatly facilitated by peers. These champions served to inform, demonstrate, encourage, and decrease resistance by imparting enthusiasm and showing that things can be done differently without hardship. They served both as early adopters and project supporters, and their being part of the natural work groups in which practices were changed was important to success.

Providing evidenced-based tools to the project team to use in the form of change frameworks, change tactics, and implementation tools is also key.¹⁴ This should be formalized, and both education sessions and leadership assistance are needed to enable the project teams to use these tools successfully. Creating protected time to implement the improvement projects and recognizing and celebrating

successes were also important. Given the competing pressures for both time and resources, the dedicated time for improvement projects is essential, and leaders need to be proactive here so that the project work is not simply an “add on” to what staff already have to do in the workplace.

Our results confirm the experience of others that thought should be given to understanding how practice change may be both implemented and sustained before implementing any change initiative. Initiatives fail not only as a result of lack of skill and motivation of the participants but also because a lack of capacity both within organizations and professional staff to engage in the change process.¹⁵ The leaders of change programs need to keep in mind that a detailed assessment must be done of both the readiness and the capacity to engage in change. They should complete this assessment and have strategies identified for any needed supports before starting the program.

We observed that real-time data were necessary for continued engagement and execution of rapid-cycle changes. This data acquisition continues to present challenges for hospitals. For some indicators, a manual collection process was necessary. Tracking projects through approaches like scheduling biweekly reviews with the project team was instrumental in sustaining the momentum. Progress reports to the organization’s leadership team and the quality committee of the board ensured monitoring and oversight of projects at the highest level of the organization and helped to sustain the engagement. There was also a motivating effect from the reporting of the project progress to the board of the hospital and its quality committee.

There are numerous models and frameworks that may be used to guide and support an organization in change. Although singular aspects of many of these models and frameworks may be seen as useful, it is important that organizations not attempt to create a hybrid of many different models. We tried assembling various tools and techniques early in the project but found that the approach caused confusion. Such a hybrid approach may lead to a sense of a lack of connectedness of the initiatives within the organization, which in turn will impact the ability to spread the initiatives and ensure long-term sustainability.

The long-term outcome of the projects has yet to be determined, and there is a risk of drift back to old habits. The diversion of time and effort to these projects resulted in measurable improvement. We are unable to determine at this time if staff and financial resources had a direct beneficial impact on hard measures such as patient outcomes and satisfaction, but other literature suggests that it would over the longer-term.^{10,12,14} These interventions should be replicated across the healthcare sector to determine benefit and outcomes in other settings. Our experience shows that successful safety improvement projects can be implemented, but the success of implementation should not be mistaken for successful spread and longer-

term sustainability. The authors believe that spread and sustainability merit specific and special attention in order to maintain and benefit from early gains.

Managing change and improvement projects is difficult, even under ideal circumstances, but this can be done successfully if there is strong and consistent leadership support. This support should occur within a setting of a proven framework for quality improvement guided by clear aims and goals that are measurable and pursued by a team enabled for success. These teams need to be developed and cannot simply be an assembled group. They need the knowledge, skills, and abilities of quality improvement together with the change tools for successful pursuit of their improvement projects. However, if the organization ensures that these requisites are in place, successful change can occur as evidenced by the experiences described here.

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