


Quality improvement initiative to improve communication domains of patient satisfaction in a regional community hospital with Six Sigma methodology

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ABSTRACT

Background Communication gaps, whether incomplete or fragmented communication, have been the cause of many disasters in human civilisation. Coordination of healthcare is directly related to proper communication and handoffs among multidisciplinary teams throughout multiple shifts during a patient's hospitalisation.

Local problem Patient surveys and direct patient feedback at Mayo Clinic Health System in Mankato, Minnesota, indicated that patient communication with physicians and nurses had declined in 2017 and 2018. Viewing this as an opportunity for improvement, our leadership initiated several changes to increase physician and nurse communication with patients, which resulted in no notable improvements.

Methods A systematic quality improvement approach was implemented by using Six Sigma methodology. Stakeholders from multidisciplinary teams were assembled as the project team. The five steps of Six Sigma methodology (Define, Measure, Analyse, Improve and Control) were followed to create a quality improvement intervention.

Intervention We developed a standardised and easy-to-use bedside team rounding tool to improve patient communication with physicians and nurses.

Results Postintervention patient satisfaction top-box scores exceeded target improvements for both physician (from 78.5% to 82.0%, $p<0.01$) and nurse (from 80.5% to 83.1%, $p=0.04$) communication domains. Physicians had a 33-point increase in percentile rank (from 41st to 74th percentile rank), and nurses had a 25-point increase in percentile rank (from 59th to 84th percentile rank). This increase in communication ranked our institution at the top of national benchmark organisations.

Conclusions Overwhelmingly positive patient feedback was achieved, and postintervention employee satisfaction was primarily positive when compared with preintervention satisfaction.

INTRODUCTION

Leadership at our institution identified a communication gap between multidisciplinary care teams and patients, which was highlighted by suboptimal patient satisfaction

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Effective communication between patients and their healthcare teams is an important factor in achieving patient satisfaction.

WHAT THIS STUDY ADDS

⇒ We implemented a quality improvement initiative to improve patient communication with care teams during rounds. After implementation of the intervention, both patient and employee satisfaction increased. The postintervention percentile ranking of patient satisfaction for communication with physicians and nurses for our institution was equivalent to those of national benchmark organisations.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Implementation of our intervention for patient rounds is applicable to all healthcare institutions.

scores related to communication with physicians and nurses. Evaluation of current practices highlighted the various and inconsistent means of communication by care teams and emphasised that a key stakeholder—the patient—was missing in this communication.

Our previous procedures for inpatient rounds at our institution included a 30 min meeting, referred to as *interdisciplinary team (IDT) rounds*, to review and update each patient's plan of care. We recognised multiple specific concerns about IDT rounds. They lacked the structure of patient-specific content to communicate with the IDT, which often resulted in missed patient-specific details or delays in discharge. Another, and arguably the most important, shortcoming of IDT rounds was a lack of involvement of the patient or primary nurse in the plan of care.

For patients to make informed healthcare decisions and live a healthy lifestyle, they

must understand their plan of care and have trust in and/or a relationship with their care team. When these needs are not met, patients are dissatisfied with the care they receive and are less likely to follow healthcare recommendations. According to the National Assessment of Adult Literacy in 2003, only 12% of Americans are considered to have proficient health literacy.¹ Health illiteracy further complicates the ability of most patients to understand the large amount of information about their diagnoses and plan of care that they receive while in the hospital setting. We focused on patient-centred quality care, clear communication and an understanding of the plan of care among IDT members as areas that needed improvement.

METHODS

This study was conducted according to Standards for Quality Improvement Reporting Excellence 2.0 guidelines.² Six Sigma methodology, widely known as Define, Measure, Analyse, Improve and Control (DMAIC), is a data-driven approach that is used to improve quality and processes. The DMAIC abbreviation represents the five consecutive phases of the process improvement strategy with various tools and techniques, depending on the type and size of the quality or process improvement initiative.³ Many healthcare organisations have used Six Sigma methodology to make important improvements to various processes and systems, such as reductions in patient falls and related injuries,⁴ medication errors,⁵ risk of warfarin medication omission,⁶ surgical procedure cancellations⁷ and door-to-balloon time for cardiac patients.⁸ Healthcare institutions have also used Six Sigma methodology to enhance process performance in gentamicin dosing⁹ and to improve the patient experience.^{10 11}

We used Six Sigma methodology,¹²⁻¹⁵ primarily as a framework, throughout this quality improvement initiative to improve patient communication with care teams during IDT rounds and to report our findings (table 1). Two certified Lean Six Sigma Black Belt team members

guided the project team through each step of the DMAIC framework.

Define

In the Define phase of DMAIC, the project team identified the opportunities for improvement. Regional hospital leadership approved recruitment of a multidisciplinary *project team*, which included a project manager, Six Sigma subject matter experts, a project lead, inpatient department leads from all five hospitals in our healthcare system, a patient experience expert, nursing leadership, clinical leadership and operations leadership. The project team discussed an engagement cadence and defined a time line for the project. In this phase, we finalised our project charter, project objective, scope, milestones, governance team, key metrics and communication plan. The following aim statement defined the objective of our quality improvement effort: to increase the inpatient experience survey domains of physician and nurse communication each by 2% (from 78.5% to 80.5% for physicians and from 80.5% to 82.5% for nurses) by 1 January 2022, without adversely affecting employee satisfaction.

Measure

In the Measure phase of the project, the project team finalised baseline and target metrics with an appropriate data retrieval plan, primarily with the help of the patient experience expert team member. During the Measure phase, sigma level and process capability matrices are typically determined for an existing process, and a baseline and target measure is set for that process. However, we used Six Sigma specifically as a framework, and determination of sigma level or process capability matrices were not relevant to our project.

The project team analysed data obtained from patient satisfaction surveys to select key metrics for our quality improvement initiative. The improvement metric chosen to measure this gap in quality was the patient experience

Table 1 Tools and outcomes for each Six Sigma phase

Phase	Tools used	Outcomes
Define	Project charter Stakeholder analysis Gap analysis	Project opportunity and goal identified Project team formed Approval to proceed obtained from governance team
Measure	Team consensus Histogram Control chart Patient and staff survey questionnaire	Data analysis performed Key metrics of improvement (baseline and target) identified (HCAHPS survey) Employee satisfaction survey developed
Analyse	Brainstorming Fishbone diagram	Root causes of the opportunity identified
Improve	Action register and implementation plan IDT rounding tool	Best practice research Interventions developed, tested and implemented
Control	Control plan Preintervention vs postintervention statistical analysis	Sustainability plan in place

HCAHPS, Hospital Consumer Assessment of Healthcare Providers and Systems; IDT, interdisciplinary rounds.

Table 2 Patient satisfaction scores*

Communication domain	Top-box score, % (percentile rank)			P value
	Preintervention	Postintervention	Point-increase in percentile rank	
Communication with nurses	80.5 (59)	83.1 (84)	25	0.04
Communication with physicians	78.5 (41)	82.0 (74)	33	<0.01
Likelihood to recommend†	68.9 (46)	70.9 (64)	18	0.31

*Preintervention surveys (n=2010 respondents) were collected from March 2020 through February 2021, and postintervention surveys (n=3489) were collected from March 2021 through November 2021.

†Press Ganey loyalty question.

score in the physician and nurse communication domains of Press Ganey surveys. These patient experience scores indicated success or failure in the overall communication between the IDT members (ie, attending physician, bedside nurse and care manager) and the patient.

Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey outcomes are publicly available on the Hospital Care Compare website¹⁶ published by the Centers for Medicare & Medicaid Services. These outcomes are reported as three classifications: top-box, bottom-box and middle-box scores. Top-box scores represent the most favourable response (*always*) recorded for HCAHPS survey items in the following four composite domains: communication with nurses, communication with doctors, responsiveness of hospital staff and communication about medicines.¹⁷ The project team considered top-box scores in these domains to be critical quality items, or critical customer requirements, in the context of this quality improvement initiative.

Between 1 March 2020 and 28 February 2021, 2010 patient surveys were collected, which showed a numeric baseline for the top-box score of 78.5% for communication with physicians (table 2). This score ranked our institution at the 41st percentile of US hospitals also using the Press Ganey patient satisfaction survey. Similarly, communication with nurses had a top-box score of 80.5% during the same time frame, which ranked our institution at the 59th percentile. The project team identified the target measures for the top-box scores as 80.5% for physicians and 82.5% for nurses. Although a target increase of 2 percentage points appeared minimal, increasing the top-box patient satisfaction scores in these two domains would increase the percentile rank of our institution by 16 percentile points to the 75th percentile. Our aim of 2 percentage points was agreed on through project team member consensus that it would improve our overall percentile rank, from an HCAHPS survey score perspective, which we considered to be a small but achievable goal.

To assess employee satisfaction with the quality improvement initiative, three surveys (one preintervention and two postintervention surveys) were sent to employees via email. In this survey, the project team asked all employees, 'How satisfied are you with the current rounding process?'. Respondents selected their satisfaction level

with a 5-point Likert scale, which ranged from extremely dissatisfied to extremely satisfied. The preintervention survey was distributed from 28 October 2020 through 11 November 2020, and the two postintervention surveys were distributed from 6 April 2021 through 26 April 2021, and from 26 August 2021 to 2 September 2021.

Analyse

In the Analyse phase of DMAIC, the project team identified the root causes of the underlying opportunities through the process of brainstorming and use of a root-cause analysis tool called a fishbone diagram (online supplemental figure 1), which reviewed possible causes for the observed gaps in quality. The project team identified and narrowed down specific issues resulting in failed communication between the patient and IDT: (1) unscheduled times for rounds; (2) multiple physicians simultaneously performing rounds in the same unit, which affected nurse availability; (3) care management rounds performed separately at unscheduled times and only with a specific patient population; (4) inconsistent communication methods and times, resulting in fragmented communication; and (5) lack of teamwork in communication and personal interactions, which was perceived as disorganisation by the patient.

In a brainstorming session, the project team identified uncoordinated, fragmented and inconsistent communication between patients and their IDTs as the primary cause and theme for the quality gap. All of the five previously narrowed root causes were further narrowed to a patient-IDT communication gap as the primary cause of the opportunity that was the primary opportunity of interest. This was finalised according to a project team consensus represented by the key stakeholders and consisted primarily of qualitative findings. We did not have data to support the magnitude of each individual cause. In the next phase of DMAIC, we then considered potential interventions to improve the identified causes of poor communication that contributed to the decrease in patient satisfaction scores.

Improve

The Improve phase is important to connect identified cause(s) of a quality gap to potential interventions. In this phase, the project team developed interventions that

were tested and/or fully implemented, and an implementation plan was put into place by using an action register. Before finalising the interventions, the project team thoroughly reviewed published studies to help guide process development, understand best practices in this field, and best attain the project team's goals.

Several studies related to IDT rounds reported positive outcomes in hospital key metrics, such as hospital length of stay, increased nursing participation, happier patients and family members, improved quality of care and enhanced team collaboration.^{18–22} Acal Jiménez *et al*¹⁸ researched several studies related to IDT rounds before implementing their own 8-week quality control project. Nurses were paged by an attending physician 15 min before rounds. If available, a case manager was also encouraged to attend rounds. To ensure all aspects of care were discussed, each discipline had a guide for rounds. Press Ganey survey patient satisfaction scores in the nurse communication domain (82.4%–93.2%) improved during the month of the trial. Decreased hospital length of stay also occurred during the trial period.

A study by Adams and Feudale²³ similarly sought to improve communication among multidisciplinary teams by creating a tool to use during rounds and having stakeholders present at the bedside. After 6 months, collaboration and team member satisfaction had considerably increased. Two additional studies^{18,24} reported an increase in HCAHPS and Press Ganey survey results related to nurse and physician communication. Employee satisfaction with regard to team collaboration also improved.

Shand *et al*²⁵ introduced and piloted the concept of a bedside learning coordinator, in which the learning coordinator acted as a point person for all IDTs involved and, most importantly, facilitated insights from frontline staff. The authors specifically stated that such roles have been widely used in manufacturing industries and service settings other than healthcare, such as the Toyota production system, to help gather insights from frontline staff. Although that study did not report any substantial findings, it highlighted an important point that insights from frontline staff are key for implementing changes in the hospital setting.

Findings from a study by Goyal *et al*²⁶ suggested that a visual management system widely used in other industries, such as manufacturing, retail and the airline industry, can increase communication among caregivers, patients and family members. The authors reported that more than 95% of patients stated that a whiteboard in the patient room was helpful, and 92% stated that they read the information on the whiteboard frequently. This study also showed that physicians used the whiteboards significantly less than nurses did ($p < 0.001$).

In contrast with the study findings described above, Sunkara *et al*²⁷ reported that structured IDT rounds did not directly affect outcomes related to 30-day readmission rates and hospital length of stay. However, IDT rounds did have a marked effect on 7-day readmission rates.

On the basis of all of the reviewed findings, multiple brainstorming sessions with key stakeholders, and summarised lessons learnt, we resolved to eliminate duplicate processes by combining IDT and dyad rounds while reassuring current stakeholders. The bedside nurse, attending physician and case manager were the selected stakeholders required to be present. Physicians and case managers were assigned according to physical location (ie, *geo-based*) and began performing rounds at 09:00 to circumvent any overlaps among rounds. To ensure patient-centred care, these rounds were expected to be completed at the bedside and to include the patient and his or her family. This approach, which became our finalised intervention, would allow patients to be more involved in their care and build a trusting relationship with their IDT. As part of the developed intervention, a rounding tool was created to improve communication among the IDT.

The project team first implemented a pilot intervention before full-scale implementation throughout the region. We first trialled our quality improvement effort in a 9-bed medical/surgical unit and then eventually disseminated the intervention to the other inpatient units in our institution. The new process and rounding tool developed was tested during a 6-week period. Leadership and frontline staff contributed to the development and finalisation of the IDT rounds checklist. The process of performing IDT rounds with the developed checklist was termed bedside team rounding (BTR). During the pilot period, input was sought from stakeholders to provide potential solutions for barriers identified for each of the inpatient units. Quality and practice leaders offered support by approving requested process changes and broadly communicating expectations regarding BTR. These leaders were instrumental in providing support and encouraging practice changes, which were made by performing rounds with frontline staff and addressing identified barriers in real time.

The importance of BTR was multifaceted, and its purpose was to improve the patient experience by providing streamlined communication between the IDT and patient. BTR would also improve efficiency for the IDT by creating a standardised time for team members to connect. Another possible benefit of BTR, which was identified by leadership, was that streamlined communication and efficient care planning may also assist with meeting a previously identified institutional goal of improving discharge time. Furthermore, by improving patient satisfaction scores in areas of communication with both physicians and nurses, the quality improvement initiative could yield a positive financial outcome for our institution through increased reimbursement efficiency by the Centers for Medicare & Medicaid Services.

Control

In the Control phase of DMAIC, the project team established appropriate processes, procedures and protocols so that identified improvements and realised successes

would be sustained long-term. To ensure sustainability of the quality improvement initiative, a process control plan (online supplemental figure 2) was created with specific measures, targets, methods, failure modes, a reaction plan and appropriate ownership for the institutionalised processes.²⁸ Preliminary findings from the pilot intervention suggested that the targeted improvement metric was achieved and sustained throughout the end of 2021. The top-box scores were again reviewed in the first quarter of 2023. Between 1 December 2021 and 30 November 2022, communication with nurses decreased to 80.4 points (67th percentile rank, n=1492), communication with physicians remained at 79.6 points (56th percentile rank, n=1490) and likelihood to recommend decreased to 68.2 points (53rd percentile rank, n=1463). All three HCAHPS survey domains had higher percentile ranks after the pilot intervention than those measured at baseline. However, the top-box scores and percentile ranks did not remain at the desired rate, which was achieved initially after implementation of the intervention. Patient satisfaction scores were not maintained across all domains during the past year. This was due, in part, to staffing challenges encountered by our organisation, which were worse than those of previous years and similarly encountered by many other healthcare organisations.

Statistical analysis

Statistical differences between preintervention and postintervention top-box patient survey scores were determined with t-tests. Statistical analyses were performed with SPSS (IBM). P values <0.05 were considered statistically significant.

RESULTS

BTR tool development

To ensure that clear and concise information was shared among IDT members, the project team generated the BTR tool through 4 weeks of Plan-Do-Study-Act cycles. The tool included pertinent information for each IDT member, along with information about patient experience, safety and quality aspects (online supplemental figure 3). The tool was printed and laminated into pocket-sized and badge-sized cards. Each member of the IDT was expected to reference the card during rounds for each patient to ensure that the black-filled bullet points were addressed verbally. This allowed the IDT and patient to be informed with consistent and accurate information regarding the plan of care.

Patient satisfaction scores in communication domains for physicians and nurses

Implementation of BTR improved the communication domains for both physicians and nurses (table 2). Postintervention communication with nurses significantly increased by 25 percentile points (p=0.04), and communication with physicians significantly increased by 33 percentile points (p<0.01). The likelihood to recommend our institution (from the loyalty section of the Press

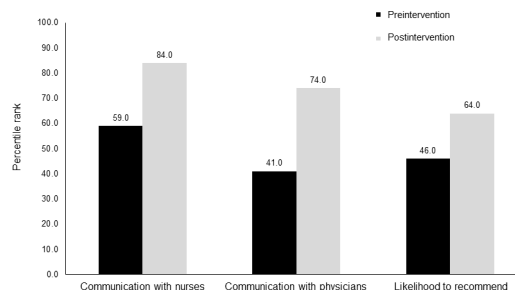


Figure 1 Percentile ranking of top-box scores for communication and recommendation.

Ganey survey) increased by 18 percentile points, but this increase was not statistically significant (p=0.31). Nevertheless, the project team and hospital leadership considered this finding to be meaningful for the institution. The likelihood of recommending the hospital is a top focus area for future improvement at our institution.

Percentile ranking of top-box scores in communication and referral domains

Independent review of the top-box scores suggested that this improvement was not entirely the result of small top-box score increases (figure 1). However, the benchmarking of those scores should be considered to properly gauge the success of the intervention. After reviewing the increases in percentile ranks, we observed that the small increases in top-box percentage resulted in an apparent large increase in the percentile ranks.

Patient feedback

The first part of the HCAHPS survey consists of data quantifiable through 5-point Likert scales. The second part of the survey contains open-text fields, in which patients may provide positive, neutral or negative feedback about their hospital stay experience. To better understand patient perceptions of the implementation of BTR, the project team reviewed this qualitative patient feedback through sentiment distribution, a keyword search and direct patient comments (figure 2). Positive comments increased by 17 percentage points after the intervention was implemented, and negative and neutral comments decreased by 3 and 15 percentage points, respectively. Furthermore, a keyword search of the positive patient comments indicated that the words 'listen', 'team', 'communication' and 'understand' appeared much more often after BTR implementation. 'Listen' and 'team' were among the highest improved terms used after the intervention, with a 279% increased use for 'listen' and 212% for 'team'. A limited number of patient quotations relevant to our quality improvement initiative were chosen and examined during the patient feedback review process. Despite the limited quantity of qualitative data, these feedback messages served as a powerful source of motivation for frontline staff and aided in garnering support for the overall changes.

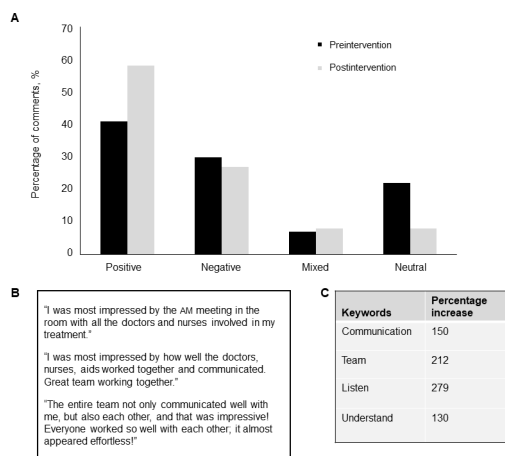


Figure 2 Patient survey satisfaction results. (A) Comment sentiment distribution. (B) Direct quotations from patients after the intervention. (C) Percentage increase in keyword usage in patient comments.

Employee satisfaction

Implementation of a large-scale change such as BTR can be disruptive to frontline employees; therefore, monitoring employee satisfaction with the new rounds process was important for the project team. A preintervention survey and two postintervention surveys showed that the change in the rounds process improved employee satisfaction (figure 3). The results indicated that 49% of employees were satisfied with the preintervention rounds process. Notably, implementation of BTR had an initial negative effect on employee satisfaction levels, which is typical for many large-scale changes to employee workflows. However, after employees adjusted to the new process and some minor changes to increase staff satisfaction were made, such as delaying the start time of rounds by 30 min, employee satisfaction increased by 6 percentage points after the intervention was implemented.

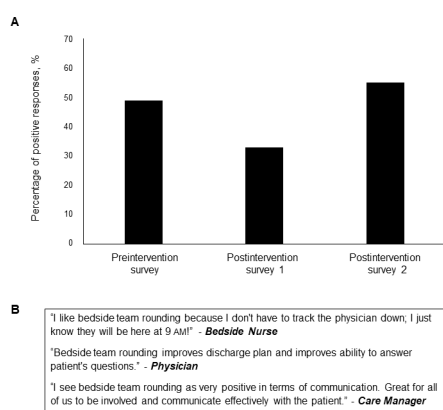


Figure 3 Employee survey satisfaction results. (A) Percentage of positive responses on the preintervention survey (n=51 respondents), postintervention one survey (n=45 respondents) and postintervention two survey (n=68 respondents). (B) Direct quotations from employees after the intervention.

DISCUSSION

The creation of the BTR tool was critical to the long-term success of the overall BTR intervention. This standardised tool provided frontline staff with a structured approach and clarified expectations on what needed to be addressed during rounds. This is especially important for current healthcare work environments, in which standardised, effective and safe communication among teams is complicated by staff members with various experience levels and often new team members. The BTR tool helped standardise the rounding process for the care team.²⁹ This tool also allowed for prerounds data collection in a more concise manner. Many nurses brought lists prepared in advance that specifically addressed all of the items in the tool. The overnight nurses in some units helped to prepare these prerounds lists to help with shift handoffs and reduce the tasks for the incoming nurse. By including quality and safety metrics in this tool, we involved our patients in the discussions regarding their fall risk and the importance of using the recommended interventions to keep them safe. The standardised checklist also allowed for more efficient line (eg, catheter or central line) removal when the physicians and nursing staff discussed this during rounds and orders were placed immediately after. Many previously published studies have shown that application of similar interdisciplinary bedside rounding tools helps reduce undesired patient outcomes, such as infections and an extended hospital length of stay,³⁰ improves communication,³¹ and improves patient safety and the patient experience.³²

Including care managers who assist with discharge planning was an essential part of the quality improvement process. Previously, dyad rounding included only the physician and nurse. This resulted in inconsistent messaging to the care manager and often delays in discharge because of missing equipment or lack of transportation. With BTR, the care manager attended patient rounds on day 1 of the hospital admission and was able to identify what needs the patient would have, in addition to possible barriers, at discharge. This provided adequate time for the IDT to adjust the plan of care and discharge plan.

The comparison of patient satisfaction scores related to the communication domains before and after BTR implementation showed that our structured communication approach was connected to the patient experience, which has been shown by others.^{32 33} We set a modest improvement goal for top-box scores, with the knowledge that consistent application of such interventions and any aspect related to patient satisfaction takes time. In comparison with other institutions, a modest increase in top-box scores can result in a substantial increase in percentile ranking, which occurred in this study. Indeed, the increase in percentile ranking for communication with physicians was significant.

We not only examined national patient satisfaction data to determine our success but also sought input from the patients. After qualitatively reviewing this patient input,

we concluded that the implementation of BTR had a positive effect on patient responses. However, the effect of BTR implementation on employee satisfaction was also an important consideration of our quality improvement initiative.^{34 35} We closely followed a change management process to help support the launch of this initiative. Providing video demonstrations, offering simulation practice times and frequently communicating with front-line staff from the units and senior leadership provided a foundation for this change in workflow. Ultimately, physicians and nurses indicated that BTR was an improvement from the previous dyad rounding workflow.

The implementation of BTR is applicable to all health-care institutions. The feedback from patients showed that they appreciated a team effort and being included in discussions and decisions about their plan of care, which has also been reported in previous studies.^{36 37} Institutions that want to improve discharge efficiency would benefit from our proactive approach to predischarge planning. When BTR was fully implemented at our main hospital site and preliminary data showed that it was successful, the workflow was then disseminated in a stepwise fashion to our other, smaller, hospital sites.

Implementing this large-scale workflow change required buy-in and support from senior leadership and frontline staff. Senior leadership made this project a priority, and many other initiatives to improve early discharge and other patient experience projects were paused so that BTR implementation was the primary focus. At times, both physicians and nurses resisted the changes introduced by BTR. Both groups were concerned about their autonomy and stated that using the tool felt ‘scripted’ and impersonal. Meeting with these teams on a regular basis to take note of their concerns and make changes or provide clarification helped to keep the frontline staff engaged.

Limitations

We implemented this quality improvement initiative at five hospital sites in the Mayo Clinic Health System, which suggests adaptability of our intervention with some modification for other similar sized community hospitals. However, the methods and tools used must be appropriately modified to ensure successful results at other institutions. The COVID-19 pandemic caused staffing challenges in our organisation that considerably affected our designed staffing model to ensure effectiveness and efficiency. The initially designed staffing model required a physician to be paired with a case manager and assigned to a specific hospital wing for the week. These staffing challenges also did not allow for our initially planned in-person education about the implemented changes. We adjusted to this challenge by offering a more flexible learning approach with optional drop-in information sessions. This affected staff buy-in and understanding of the process and required more leadership follow-up and additional real-time validations.

Our study primarily employed the Six Sigma methodology as a framework, with limited use of its statistical components. Consequently, several key statistical elements inherent to Six Sigma were not applied, which may have restricted the comprehensive evaluation of the analytical potential of Six Sigma. Another limitation of our study was incomplete comprehension of HCAHPS scoring, which somewhat diminishes the overall persuasiveness and rigour of our results. Nevertheless, our quality improvement initiative yielded notably beneficial outcomes for our organisation.

CONCLUSION

Any organisation undertaking a patient experience improvement initiative will encounter many opportunities and challenges. Healthcare is complex, and the multitude of decisions that must be made by leadership are often ambiguous, never perfect and prone to well-intended resistance. Ageing facilities and infrastructure, an isolated workforce, and use of technology, such as electronic health records, as a primary communication method rather than personal communication may be perceived as the main reasons for poor patient experience. However, a shared purpose with intense collaboration, a steady focus on patient and family needs, a standardised process for continuous improvement, and accountability and visibility through daily communication can all be leveraged to improve the patient experience.

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Author note This study was conducted according to Standards for Quality Improvement Reporting Excellence (SQUIRE) 2.0 guidelines.

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REFERENCES

- Kutner M, Greenberg E, Jin Y, et al. The health literacy of America's adults: results from the 2003 national assessment of adult literacy (NCES 2006-483). Washington DC US Department of Education; 2006.
- Ogrinc G, Davies L, Goodman D, et al. SQUIRE 2.0 (standards for quality improvement reporting excellence): revised publication guidelines from a detailed consensus process. *BMJ Qual Saf* 2016;25:986–92.
- American Society for Quality. The define, measure, analyze, improve, control (DMAIC) process; 2022. Available: <https://asq.org/quality-resources/dmaic> [Accessed 14 Nov 2022].
- Hill K, Hawk C, Frye D, et al. 20 lean six-sigma significantly reduces hospital patient falls by 40% & falls with injury by 72%. *BMJ Open Qual* 2022;11:A27–8.
- van de Plas A, Slikkerveer M, Hoen S, et al. Experiences with lean six sigma as improvement strategy to reduce parenteral medication administration errors and associated potential risk of harm. *BMJ Qual Improv Rep* 2017;6:u215011.w5936.
- Kallal A, Griffen D, Jaeger C. Using lean six sigma methodologies to reduce risk of warfarin medication omission at hospital discharge. *BMJ Open Qual* 2020;9:e000715.
- Schretlen S, Hoefsmit P, Kats S, et al. Reducing surgical cancellations: a successful application of lean six sigma in healthcare. *BMJ Open Qual* 2021;10:e001342.
- Ellahham Md S, Aljabbari S, Harold Mananghaya T, et al. Reducing door-to-balloon-time for acute ST elevation myocardial infarction in primary percutaneous intervention: transformation using robust performance improvement. *BMJ Qual Improv Rep* 2015;4:u207849.w3309.
- Egan S, Murphy PG, Fennell JP, et al. Using six Sigma to improve once daily gentamicin dosing and therapeutic drug monitoring performance. *BMJ Qual Saf* 2012;21:1042–51.
- Iswanto AH. An improvement of patient's experiences in kemang medical care. *SSRN Journal* 2016.
- Riebling NB, Norouzzadeh S, Reeder G, et al. Quantifying patient satisfaction with process metrics using a weighted bundle approach. *BMJ Open Qual* 2019;8:e000458.
- Young T, Brailsford S, Connell C, et al. Using industrial processes to improve patient care. *BMJ* 2004;328:162–4.
- Dempsey A, Robinson C, Moffatt N, et al. Lean six Sigma redesign of a process for healthcare mandatory education in basic life support-A pilot study. *Int J Environ Res Public Health* 2021;18:21.
- Comfere NI, Matulis JC, O'Horo JC. Quality improvement and healthcare: the mayo clinic quality academy experience. *J Clin Tuberc Other Mycobact Dis* 2020;20:100170.
- Johns Hopkins Medicine. Center for nursing inquiry: quality improvement: the Johns Hopkins University. 2022. Available: <https://www.hopkinsmedicine.org/nursing/center-nursing-inquiry/nursing-inquiry/quality-improvement.html> [Accessed 23 Jun 2023].
- Centers for Medicare & Medicaid Services. Hospital quality initiative public reporting; 2023. Available: <https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/hospitalqualityinits/hospitalcompare> [Accessed 23 Jun 2023].
- Centers for Medicare & Medicaid Services. HCAHPS tables on HCAHPS on-line; 2023. Available: <https://hcahpsonline.org/en/summary-analyses/> [Accessed 23 Jun 2023].
- Acal Jiménez R, Swartz M, McCorkle R. Improving quality through nursing participation at bedside rounds in a pediatric acute care unit: a pilot project. *J Pediatr Nurs* 2018;43:45–55.
- Burns K. Nurse-physician rounds: a collaborative approach to improving communication, efficiencies, and perception of care. *Medsurg Nurs* 2011;20:194–9.
- Heip T, Van Hecke A, Malfait S, et al. The effects of Interdisciplinary bedside rounds on patient centeredness, quality of care, and team collaboration: a systematic review. *J Patient Saf* 2022;18:e40–4.
- Kipps AK, Albert MS, Bomher S, et al. Schedule-based family-centered rounds: a novel approach to achieve high nursing attendance and participation. *Pediatr Qual Saf* 2020;5:e265.
- Okere AN, Renier CM, Willemstein M. Comparison of a pharmacist-hospitalist collaborative model of inpatient care with multidisciplinary rounds in achieving quality measures. *Am J Health Syst Pharm* 2016;73:216–24.
- Adams HA, Feudale RM. Implementation of a structured rounding tool for interprofessional care team rounds to improve communication and collaboration in patient care. *Pediatr Nurs* 2018;44:229–33.
- Riegel N, Delp S, Ward CW. Effects of nurse-physician collaborative rounding. *Medsurg Nurs* 2018;27:149–52.
- Shand J, Allwood D, Lee N, et al. Systematically capturing and acting on insights from front-line staff: the 'bedside learning coordinator'. *BMJ Qual Saf* 2021;30:509–12.
- Goyal A, Glanzman H, Quinn M, et al. Do bedside whiteboards enhance communication in hospitals? An exploratory multimethod study of patient and nurse perspectives. *BMJ Qual Saf* 2020;29:1–2.
- Sunkara PR, Islam T, Bose A, et al. Impact of structured Interdisciplinary bedside rounding on patient outcomes at a large academic health centre. *BMJ Qual Saf* 2020;29:569–75.
- Hoefsmit PC, Schretlen S, Does RJMM, et al. Quality and process improvement of the multidisciplinary heart team meeting using lean six sigma. *BMJ Open Qual* 2023;12:e002050.
- Rice A, Chin M, Parker A, et al. 864: standardized Interdisciplinary bedside rounding improves patient and family satisfaction. *Crit Care Med* 2022;50:427.
- Radhakrishnan NS, Lukose K, Cartwright R, et al. Prospective application of the interdisciplinary bedside rounding checklist 'TEMP' is associated with reduced infections and length of hospital stay. *BMJ Open Qual* 2022;11:e002045.
- Batt N, Ahmetaga A, Blackstock S. G548(P) using a patient led 'comms chart' as a bedside information sharing tool to improve communication. *Arch Dis Child* 2016;101:A325–6.
- Johnston J, Stephenson J, Rajgopal A, et al. Every patient, every day': a daily ward round tool to improve patient safety and experience. *BMJ Open Qual* 2022;11:e001829.
- Ratelle JT, Sawatsky AP, Kashiwagi DT, et al. Implementing bedside rounds to improve patient-centred outcomes: a systematic review. *BMJ Qual Saf* 2019;28:317–26.
- Faulkenbury C. Improving Interdisciplinary communication on the medicine progressive care unit (DNP scholarly project, East Carolina University). *The ScholarShip* 2021. Available: <http://hdl.handle.net/10342/9228>
- Decesere M. Nurse-physician collaboration during bedside rounding: what is the impact on the nurse?. *Electronic Theses and Dissertations, 2020* 2020. Available: <https://stars.library.ucf.edu/etd2020/798>
- O'Leary KJ, Killarney A, Hansen LO, et al. Effect of patient-centred bedside rounds on hospitalised patients' decision control, activation and satisfaction with care. *BMJ Qual Saf* 2016;25:921–8.
- Redley B, McTier L, Botti M, et al. Patient participation in inpatient ward rounds on acute inpatient medical wards: a descriptive study. *BMJ Qual Saf* 2019;28:15–23.