Using Lean to Enhance Heart Failure Patient Identification Processes and Increase Core Measure Scores

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ABSTRACT

Background: Heart failure (HF) is the leading cause of hospitalization among older adults in the United States. Health systems target readmission rates for quality improvement and cost reduction.

Local Problem: Heart failure core measure (CM) scores at our medical center were lower than the national average, and methods for capturing the appropriate documentation on HF patients to ensure CM compliance were not clear.

Methods: An interdisciplinary team determined barriers to increasing CM scores, gathered baseline data, and identified gaps in the existing process.

Interventions: The team implemented an accurate reporting system and error-proofing process, redesigned the process for identifying patients admitted with a HF diagnosis, and developed a patient appointment section before discharge in the electronic medical record.

Results: There was a decrease in readmissions within 30 days of implementation from 12% to 8%, and HF CM compliance score increased from 88% to 100%. The percentage of HF patients not identified during hospitalization decreased from 17% to 0%. Heart failure patients discharged with a 7-day follow-up appointment increased from 88% to 98%.

Conclusion: Through implementation of an interdisciplinary-led process improvement and lean methodologies, metrics and CMs were achieved.

Key words: core measures, heart failure, lean methodology, quality improvement, rapid improvement event

Heart failure (HF) is the leading cause of hospitalization among older adults in the United States.[1] The incidence of HF exceeds 5.8 million in the United States and accounts for significant morbidity and mortality among adults 65 years of age and older.[2,3] Heart failure is estimated to cost the nation more than $32 billion annually in health care expenditures, and with the growing aging population, these costs are forecasted to increase to $70 billion by 2030. Heart failure prevention and strategies to improve the delivery and efficiency of care are critical to reducing the burden of this disease.[4] In addition, health care systems are increasingly targeting all hospitalization readmission rates because of the potential for improvement in quality of care and reduction in cost.[5,6]

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LEAN PROCESSES IN HEALTH CARE

Lean methods have become popular in the health care setting to improve processes related to workflow and eliminate duplication in patient care.[7,8] Lean approaches have been used to eliminate missed opportunities through the implementation of new protocols for nurses in a public hospital setting[9] as well as in emergency departments and other hospital and medical settings.[10-12]

Lean methodologies were selected for this quality improvement (QI) project. Lean is a management philosophy created to eliminate waste and improve overall quality. Lean QI approaches assist in logical and critical thinking to improve workflow processes and other quality issues.[13] A3 thinking is a concept tool used in lean that brings together the Plan-Do-Check-Act cycle of thinking and pairs the concept with the steps of quality-control circles, visual management, and information dissemination.[14] The use of the information regarding the QI project summarized using A3 helps facilitate discussion with frontline team members and managers to gather feedback on current or recently implemented process changes.[15] A3 also assists in problem-solving skill development.[16] Rapid improvement events (RIE) (eg, Kaizen Events), typically conducted over the span of 3 to 4 days, are used in QI and lean to expedite process change and finalize the solutions into standardized processes quickly.[17]

Additional lean approaches used for this QI project included the value stream analysis, which serves as a visual process to detail key process flows, including electronic, verbal, and paper, that exist within a process and help determine metrics that will drive improvement.[10,17] Gemba walks were also used during the course of this RIE. Gemba is a managerial and quality concept used by administrators in hospitals and other clinical settings to observe and engage consumers and health care providers to discover exactly how the daily processes are being undertaken.[18,19]

THE JOINT COMMISSION CORE MEASURE SCORES

Core measures are a requirement of the Centers for Medicare & Medicaid Services to ensure basic care for patients. Core measures refer to a set of evidence-based standards of care and compliance with these standards increases patient outcomes.[11,20] Hospital compliance with these standards of care often determines hospital reimbursement rates and national standards for comparative hospital ratings. The basis of core measures is improved patient outcomes, and the published results of a hospital's core measure compliance rates influence patient-provider choice.[21] These standardized measurements are necessary as health care systems make steps toward value-based reimbursement.

The purpose of this project was to investigate the effectiveness of using lean methodologies and interprofessional collaboration to improve HF patient identification processes and improve HF core measure scores at a regional medical center. This project became necessary due to the regional medical center's low congestive heart failure (CHF) core measure scores.

METHODS
Project design

A review of a regional medical center's HF patient identification process revealed that, while patients continued to receive quality treatment, a labor and time-intensive process existed for the CHF coordinator to identify HF patients. Current processes for HF patient identification required a 2-person team reviewing 6 reports daily to identify potential HF patients. Each patient was categorized as a HF patient, potential HF patient, or no history of HF. The list of patients and potential patients was then rereviewed for missing core measure data. Time observations showed that reviewers spent approximately 4 hours daily locating the patients who could have an *International Classification of Diseases, Ninth Revision* (*ICD-9*) HF primary discharge code placed during their visit. A communication diagram (Supplemental Digital Content Figure 1, available at: http://links.lww.com/JNCQ/A432) was created to depict the time intensity and the number of persons who were involved in the identification and care of 1 HF patient admission. Institutional review board approval was not required for this QI project.

The existing processes were reviewed by the RIE interprofessional team. Key RIE team participants included the assistant nurse manager of the cardiovascular intensive care unit/stepdown unit, a value optimization system core team member, the CHF coordinator, a frontline nurse from the heart failure progressive care unit, the assistant nurse manager of the HF progressive care unit, the manager of clinical documentation improvement specialists, an advanced clinical applications information technology specialist, a frontline nurse, and a clinical informatics member.

Over a 1-week period, the RIE team examined existing process gaps and worked to identify appropriate solutions and interventions to address those gaps using lean methodologies. During the RIE preparation phase, the team conducted

at least 6 time studies and mapped the current processes. Through current state mapping, the RIE team observed that the existing methods for HF patient identification and the associated processes relating to patient discharge were lengthy, requiring 2 full-time employees to review a total of 6 reports for the identification of HF patients as well as multiple communication exchanges between nurses and other clinical and frontline staff. The RIE team also conducted 7 cycles of Gemba walks to speak with frontline team members to identify waste and inefficiencies in the current process. A gap analysis of the current processes was completed, and 4 main gaps and the individual root causes were identified (Table).

During the preparation phase, the current reason for action, the current state of the event baseline metrics, how those metrics were determined, and the achievement goals were determined. This was followed by a series of 5 lean experiments with weekly monitoring of the processes. The number of steps to accurate HF patient identification was recorded along with patient readmission rates and the number of patients provided with appropriate postdischarge follow-up appointments. The solutions designed during this weeklong session were then implemented and tracked for 90 days post-RIE. Baseline metrics were obtained prior to the start of the project, with measurable achievement goals determined by an interprofessional team.

Baseline metrics

The need for a HF core measure score RIE originated from the inpatient value stream analysis that was completed prior to the implementation of this project. It was determined that through process redesign, time could be better allocated to the patient and the health care providers. Areas identified for improvement were education, medication management, discharge teaching, and appointment clarification. After reviewing state and national core measure scores, the initial data showed that for a rolling 6-month average, the HF core measure score was 78%, which was below the national standard of 92% set by the Centers for Medicare & Medicaid Services.[20,21]

The RIE team, under the guidance of executive leadership, determined that the target core measure score should be set at 93%. The following 4 objectives were set for the 3-month RIE evaluation period from the event date and were based on what the interprofessional team considered achievable during the specified 90-day period:

1. The percentage of HF patients who were unidentified during hospitalization will decrease from 17% to 10% within 90 days of process implementation.
2. The percentage of HF patients discharged with a 7-day primary care provider/clinic follow-up will increase from 88% to 100% within 90 days of process implementation.

Table. Gap and Root Cause Analysis	
Description of Gap	**Root Cause "WHY"**
1. Lack of continued patient visibility	No education in nurse orientation class, dependent on support staff, no accountability, not on CHF list, no true process
2. Missed opportunities to meet core measure for discharge instructions	No CHF coordinator, no physician champion, lack of time, lack of knowledge of available resources, lack of resources to teach/educate, not done repeatedly by nurse (eg, new nurse), dictated incorrectly, patient load, lack of accountability
3. Missed opportunities to meet core measure for scheduling follow-up appointments	Lack of communication and accountability of who will make appointment/who has made appointment, other departments focus on their own core measures, importance of 1 wk data/time follow-up needs, patient identification of CHF, clinic not having availability in 7 d
4. Lack of nurse education/knowledge on clinic resources	Focus on core measure not on CHF clinic resources, difficult to have individual interaction and resources, importance of date/time for appointment. Get With the Guide Lines vs CMS, conflicting messages, already has appointment with primary care provider

Abbreviations: CHF, congestive heart failure; CMS, Centers for Medicare & Medicaid Services.

3. The percentage of HF patients readmitted to the hospital will decrease from 12% to 9% within 90 days of process implementation.
4. Heart failure core measure compliance score will increase from the previous 6-month average of 78% to 93% within 90 days of process implementation.

HF identification process implementation and process evaluation

Process sustainment meetings conducted with the RIE team members during the 90-day period discussed the relevant metrics initially identified. When it was noted that metrics were not displaying favorable trends, root cause analyses were conducted to address issues seen with the new processes. In addition, monitoring of the baseline metrics assisted the CHF coordinator to conduct real-time problem solving when there was a variation in the trend.

Solution approaches that addressed each of the root causes identified were created. The team conducted "silent-brainstorming," which is a method of generating ideas to counteract the root cause problem.[22] The team compiled several "If We …, Then We Expect …" statements that correlated with the identified gaps. The team then designed experiments addressing the "If We …, Then We Expect …" statements. Those experiments were prioritized and narrowed by those that would influence the baseline metrics that the RIE team would be monitoring. The team ran multiple cycles of each of the chosen experiments designed to error-proof and test the validity and efficiency of the new process design (Supplemental Digital Content Table, available at: http://links.lww.com/JNCQ/A433).

As a result of the new identification process of HF patients, the CHF coordinator was enabled to provide real-time feedback to the nursing team caring for HF patients. Written standard work visually detailing steps of the new process and ensuring uniformity was created and tested. With the inclusion of the HF clinic nurse practitioner as part of patient care, while patients were in the hospital, the CHF coordinator was able to devote more time to HF patient education. This more efficiently implemented process enabled the HF coordinator and nursing team to produce more timely identification of HF patients. This resulted in not only improved HF core measure scores and earlier interventions in patient education but also a decrease in core measure missed opportunities, translating into an increase in reimbursement for the facility, as well as an associated cost savings with low 30-day readmissions.

RESULTS
Outcome evaluation

Heart failure core measure compliance improved from 78% to 94%. This is a 20.5% increase in core measure scores. Data monitoring for the new processes post event for 90 days showed that patients with HF who were readmitted within 30 days decreased from 12% to 0% at the 60-day interval, which demonstrated 100% improvement. However, at the 90-day point, there was an 11% increase in readmissions. The overall change was an 8.3% decrease in readmissions over the 90-day evaluation period. The number of reports required for identification was reduced by 83% (from 6 to 1), thus eliminating 5 non-value-added steps. The percentage of HF patients who were not identified during hospitalization decreased from 17% to 4%, which indicates a 76.5% improvement in the correct identification of HF patients. The percentage of HF patients discharged with a 7-day follow-up appointment with their primary care provider or the congestive HF clinic improved from 88% to 96% during the same 90-day post event time period (Supplemental Digital Content Figure 2, available at: http://links.lww.com/JNCQ/A434). After using QI and lean method tools, the new process decreased the number of staff needed to complete the identification process from 2 full time employees (FTEs) to 1 FTE, with the second FTE reassigned to monitor the patient with myocardial infarction.

There was also a decrease in the amount of time needed to review the identification reports. This decrease in time of review resulted in approximately 133.33 hours per month for the CHF coordinator to spend on frontline patient education. Earlier identification of the HF patient further enabled greater focus on care and education immediately on patient admission to the facility and continuing education through patient discharge to help ensure that patients received the highest standard of care for their disease.

The QI project impacted patients, nurses, and the facility as a whole. By using lean processes, new standard work was developed, tested,

and implemented, significantly reducing the time needed for the CHF coordinator to identify HF patients. The CHF coordinator could spend more time focusing on patient needs and assist individual patients to identify and understand their disease. The CHF coordinator was also able to dedicate time to the learning needs of the nurses by allowing for more classes and instructional information to assist the nurses caring for HF patients. Lean process improvement positively impacted readmissions through focused specific patient and nurse education. Through informal and anecdotal verbal reports, the HF patient team and staff indicated that the workflow was more effectively streamlined and time efficient, and they commented positively on the outcomes of the process.

DISCUSSION

Although evaluation studies are limited in terms of their generalizability, this intervention demonstrates how lean methodologies may be effectively used to improve HF patient processes, cardiovascular core measure scores, and general health care quality in a hospital setting. Rapid improvement events observations are essential to clarify workflow issues and to assist in determining the root causes of process issues and complications in the health care setting. By utilizing lean and QI methods, the interprofessional team was able to determine the root cause of many barriers to increasing HF core measure scores, more efficiently identify HF patients admitted into the facility, and positively influence HF patient outcomes. Clinical and frontline staff are more engaged and invested in process method change when their innovations are incorporated into a new process. Hospitals may use the process design as it demonstrates efficacy and potential for reducing HF hospital readmissions and improving quality metrics, cost savings, service delivery, and overall patient experience.

Implications

Strengths of this QI project include the ability to demonstrate the usefulness of lean methodologies to improve patient education and outcomes in the inpatient setting. Senior leadership support for the RIE enabled the team to create innovative designs to address the problem. One limitation of the QI project was the inability to include a patient on the team to gain insight to the patient's perspective of the process and op-

portunities for improvement. Future implementation studies could include consumers as part of the RIE team as well as provide a comparative study of a similar facility. A brief postimplementation evaluation survey of the nurses and RIE team members could have provided more concrete feedback on the project.

This project also demonstrated that clinical and nonclinical practitioners have the ability to better understand a complex process such as HF patient identification. The implementation of lean tools and methodologies not only increases the efficiency and effectiveness of the process but also creates clearer lines of communication among the multiple disciplines that are involved in patient care. To continue to thrive in an ever-changing environment, the hospital directive must be 2-fold: meet the national standards for evidence-based care and compliance while demonstrating a positive and sustainable change in patient outcomes, both of which may be accomplished through the implementation of continuous QI.

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