



Summary

Organization

Thibodaux Regional
Medical Center

Industry

Health Care

Business Problem

Increased rate of pressure
ulcers in hospital patients

Methodology

DMAIC

Solution

Enhance staff awareness
of skin care including
prevention, risk assessment
and treatment protocols

Benefits/Results

- Cost avoidance of
\$300,000 annually

The Challenge

Although pressure ulcers (commonly known as bedsores) are a danger to elderly patients with limited mobility, hospital inpatients of any age can also exhibit the problem. "Tissue damage can actually begin within hours of applying pressure to a certain part of your body," explains Sheri Eschete, a Medical Technologist and BMG-certified Black Belt at Thibodaux Regional Medical Center in Louisiana.

According to Eschete, tissue damage that leads to a pressure ulcer may begin as a patient recovers from surgery, or even while in surgery if circulation is greatly reduced to a particular part of the body. Pressure ulcers can be prevented, however, with proper assessment and preventive care for high-risk patients.

Besides the obvious pain and discomfort for patients, pressure ulcers can lead to complications, and treatment requires a longer length of stay. These additional costs can range from \$4,000 to \$40,000, according to the Agency for Healthcare Research and Quality (AHRQ). In addition, recent legislation has led to an increase in lawsuits against caregivers who fail to prevent the condition.

At Thibodaux Regional, the rate of inpatients that develop pressure ulcers is much lower than the industry average. Even so, the facility's Continuous Quality Improvement data showed a moderate increase between October 2003 and June 2004. Thibodaux's performance improvement projects focus on five key areas, one of which is quality. Therefore, finding a way to reduce the rate of "defectives" became a perfect Six Sigma project for Eschete.

The Process

Eschete and her team followed the DMAIC methodology with a stated goal of eliminating Stage 3 and 4 pressure ulcers (the more severe form), as well as reducing Stage 2 ulcers from 4.0 to less than 1.6 per 1000 patient days per quarter (a 60 percent reduction). The project focused on "nosocomial" pressure ulcers, or NPUs, limiting the scope to only those that appear 72 hours

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— Sheri Eschete

Black Belt

Thibodaux Regional Medical Center

after admission. Based on the average increased length of stay (four days), plus estimated cost avoidance for legal damages, the team determined that the project savings could equate to over \$300,000 annually. Also recognized were the less tangible, although undeniably important benefits of increased quality of care and decreased risk of complications for patients.

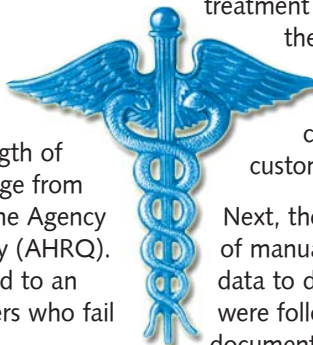
During the Define and Measure phases of the project, the team used several Six Sigma tools to document the current NPU prevention and treatment process. A fishbone diagram helped the team brainstorm potential causes of failure. Eschete also used a cause-and-effect matrix to identify eight critical inputs to the process from the customer's point of view.

Next, the team undertook the laborious task of manually reviewing the hospital's historical data to determine how well process protocols were followed. It found that much of the documentation was incomplete, or inconsistent from unit to unit, highlighting a definite area for improvement.

In addition to the documentation issues, a Gage R&R study pointed out unacceptable deviation between staff nurses and the wound-care specialist nurse when recording the results of a risk-assessment tool known as the "Braden Scale." This tool is used by hospital staff to identify patients at risk for developing pressure ulcers. The team knew it had to find ways to make Braden Scale interpretation less subjective and more repeatable.

In addition to the Braden Scale, the project team investigated four other areas related to treatment of NPUs: heel protectors, incontinence, bed type and "Q2 turning" (the process of turning affected patients every two hours). At the beginning of the project, many people believed that Q2 turning was to blame for the increased rate of NPUs.

(continued)



Key Tools Used

Define

- Threats/Opportunities Matrix
- Stakeholder Analysis
- SIPOC Analysis

Measure

- C&E Matrix
- Process Flow Diagram
- Detailed Process Map
- Fishbone Diagram
- Gage R&R
- Paired t-test
- Capability Analysis

Analyze

- FMEA
- One-proportion Test
- Two-proportion Test
- Pareto Chart
- Chi-Square
- Analysis of Means
- Binary Logistic Regression
- Sample Size

Improve

- Updated FMEA
- Updated Process Flow Diagram

Control

- Control Plan
- Two-proportion Test
- Gage R&R
- Attribute Agreement Analysis

Even the documentation showed that patients were not always turned regularly.

During the Analyze phase, however, a different theory came to light. The team continued to use a variety of Six Sigma tools to investigate the critical X's, or process inputs. Eschete ran a hypothesis test on two populations — patients who had developed NPUs and “at risk” patients who had not. A startling discovery resulted from the test: when the Braden Scale was performed during admittance, those patients who developed NPUs later were initially determined to be at lower risk! The hospital's policy had been to repeat the Braden Scale every seven days. This finding suggested that some NPUs could be prevented if the assessments were simply done more often.

Eschete puts the discovery into perspective: “If someone comes in, walking on their own, and they're admitted that way, it's kind of assumed that they're going to stay that way, and that we don't need to worry about them developing pressure ulcers. But if they don't recover quickly from surgery, then that changes their status. They would be more at risk and they should receive all the preventative measures.”

To further investigate the new theory, Eschete performed a binary logistic regression on data from the patient population that had developed NPUs.

“I had to run the test several times,” Eschete says. “I was looking at it trying to make Q2 turning the most critical X until I realized what it was saying. Out of all the patients that developed pressure ulcers, the common defect was that the Braden Scale was not performed timely enough to identify them as being at risk.”

With so many of the test results pointing to the Braden Scale as the most critical input to the process, with the largest margin for improvement, the team proposed increasing the frequency of

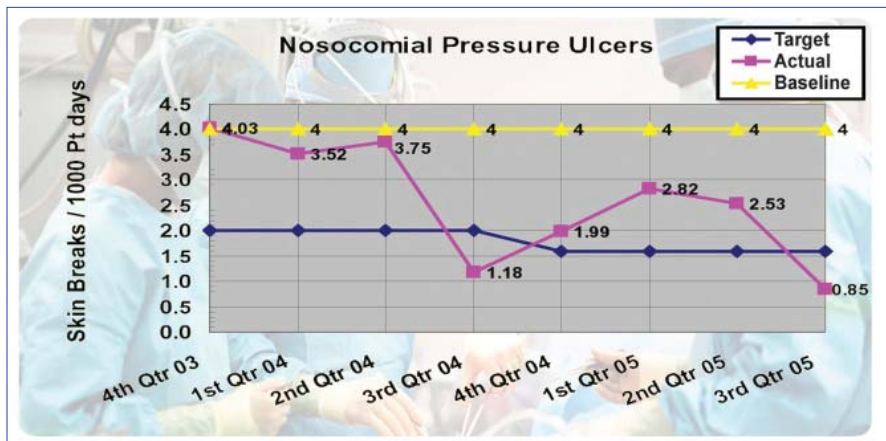
this assessment to every five days, in addition to admittance. Eschete says that the frequency was determined based on the need to more quickly identify patients at risk, while not unduly overburdening the nursing staff.

Many other improvements were identified and put in place by the team during the project's Improve phase. To make Braden Scale interpretation more repeatable, the team added standardized response category definitions to the computer system where nurses record their results. In addition, a computer glitch discovered during the project was fixed, allowing nurses to receive correct and timely reminders when a Braden Scale assessment is due. The team provided additional training on these and other improvements, and a Braden Scale competency measurement was added to the nurses' annual performance reviews.

The Results

Since the project's close, Eschete has documented a 79 percent decrease in NPU rate (including elimination of stage three and four NPUs) due to the increased Braden Scale frequency, as well as improvements in prevention and treatment protocols. Based on the success of this project, one of her colleagues is leading a spin-off project with the goal of decreasing the rate of facial skin issues due to non-invasive ventilation therapy.

Although the NPU project appears to be on track for meeting its financial cost avoidance goals, Eschete is also proud of it for other reasons. “One thing that was identified was that, in the big picture, when you're dealing with very sick people, skin is not a high priority,” she admits. “With this project, skin was identified as a priority in patient care. By following the correct procedures and protocol we are improving our total quality of care for the patient.” ■



Before the project, NPUs occurred at a rate of 4.03 per 1000 patient days. After implementing improvements, the rate has decreased to as low as 0.85 per 1000 patient days.