Using a Root Cause Analysis Curriculum for Practice-Based Learning and Improvement in General Surgery Residency

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OBJECTIVE: To describe and evaluate a root cause analysis (RCA)—based educational curriculum for quality improvement (QI) practice-based learning and implementation in general surgery residency.

DESIGN: A QI curriculum was designed using RCA and spaced-learning approaches to education. The program included a didactic session about the RCA methodology. Resident teams comprising multiple postgraduate years then selected a personal complication, completed an RCA, and presented the findings to the Department of Surgery. Mixed methods consisting of quantitative assessment of performance and qualitative feedback about the program were used to assess the value, strengths, and limitations of the program.

SETTING: Urban tertiary academic medical center.

PARTICIPANTS: General surgery residents, faculty, and medical students.

RESULTS: An RCA was completed by 4 resident teams for the following 4 adverse outcomes: postoperative neck hematoma, suboptimal massive transfusion for trauma, venous thromboembolism, and decubitus ulcer complications. Quantitative peer assessment of their performance revealed proficiency in selecting an appropriate case, defining the central problem, identifying root causes, and proposing solutions. During the qualitative feedback assessment, residents noted value of the course, with the greatest limitation being time constraints and equal participation.

CONCLUSION: An RCA-based curriculum can provide general surgery residents with QI exposure and training that they value. Barriers to successful implementation include time restrictions and equal participation from all involved members. (J Surg 72:e286-e293. © 2015 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: quality improvement, patient safety, performance improvement, ACGME competencies, general surgery, residency

COMPETENCIES: Patient Care, Medical Knowledge, Professionalism, Interpersonal and Communication Skills, Practice-Based Learning and Improvement, Systems-Based Practice

INTRODUCTION

The extent of patient harm caused by medical errors was publically revealed in the 2000 Institute of Medicine report, "*To err is human*."[1] The report spurred initiatives to improve patient safety and improve quality through system-based interventions. Recognizing the need for future physicians to be well versed in issues of patient safety and quality improvement (QI), the Accreditation Council for Graduate Medical Education (ACGME) recently added practice-based learning and improvement (PBLI) as a core competency in residency training.[2,3]

The American College of Surgeons, Association for Surgical Education, and Association of Program Directors in Surgery have advocated teaching QI to learners early in their training. Recently, these associations have endorsed a new QI didactic module developed by the American College of Surgeons National Surgical Quality Improvement Program's Quality In-Training Initiative titled "*Practical QI: The basics of quality improvement*."[4-7] However, there remains no widely followed curriculum for experiential learning and implementation of PBLI principles within general surgery residency programs.

At the Virginia Commonwealth University Health System General Surgery residency, we implemented an educational program that involved didactic and experiential

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exposure to QI using the root cause analysis (RCA) methodology. The effectiveness of this program was assessed through a mixed methods approach using quantitative assessment of resident performance and qualitative feedback about the program. We hypothesized that QI principles can be effectively taught to general surgery residents through RCA.

MATERIAL AND METHODS

In this prospective study, surgical residents and faculty at the Virginia Commonwealth University Health System Department of Surgery were introduced to the RCA method through a didactic demonstration and experiential learning. The objectives of the program were to (1) understand the importance of patient safety and QI, (2) become familiar with the RCA methodology as a tool for QI, (3) identify an appropriate case for a RCA, (4) complete a RCA, and (5) present and lead a RCA.

The RCA program included a didactic demonstration of the methodology using a spaced-learning approach at the beginning of the academic year.[8] A 2-hour case-based interactive demonstration of the RCA approach was conducted by 2 faculty members and 1 resident who had completed the Institute for Healthcare Improvement (IHI) open school course for Root Cause and Systems Analysis and had prior experience with QI and RCA.[9] After this initial introduction, residents were divided into teams composed of a senior resident, a junior resident, and interns. The senior resident assumed the position of leader and each resident team had a faculty mentor as a facilitator. The teams were responsible for identifying a case that resulted in a complication. They were tasked with highlighting integral issues in patient care, as well as their personal experience with the clinical care of the patient in question. After identifying an appropriate case, the teams conducted a literature search pertaining to the complication and compared published best practices to the current practices at our institution. They were required to brainstorm potential solutions for the current problem. After brainstorming, the team was asked to perform a RCA of the case and present the RCA, as well as their evidence-based literature search, to the entire Department of Surgery. These presentations took the place of our weekly Grand Rounds and morbidity and mortality (M&M) conference quarterly throughout the course of the academic year.

The program was assessed using a mixed methods approach consisting of a quantitative assessment of resident performance and a qualitative assessment of resident perspectives of the program through interviews and focus groups. The mixed methods study was designed to quantitatively assess the ability of residents to perform an RCA and to qualitatively explore residents' perception of the value, barriers, and factors that hurt or improved the program. Exemption from review was obtained from the Virginia Commonwealth University Institutional Review Board.

RCA Demonstration

The QI program began with an introduction to RCA and the mechanics of how to perform an RCA. This demonstration was held during Grand Rounds and M&M conference time, which is mandatory protected education time for surgical residents. The audience for the demonstration included the

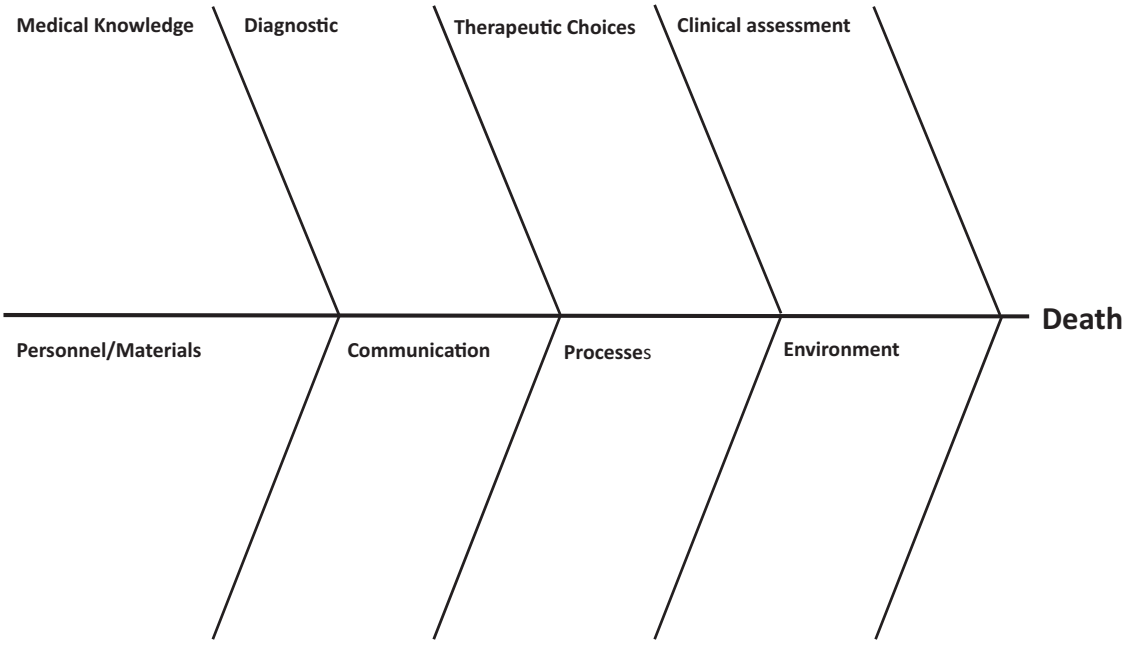

FIGURE 1. Cause-and-effect diagram used for identifying factors related to the adverse event. (Adapted with permission from Institute for Healthcare Improvement open school course for Root Cause and Systems Analysis.[9])

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