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Critical differences between elective and emergency surgery: identifying domains for quality improvement in emergency general surgery

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ABSTRACT

Objective. The objective of our study was to characterize providers' impressions of factors contributing to disproportionate rates of morbidity and mortality in emergency general surgery to identify targets for care quality improvement.

Background. Emergency general surgery is characterized by a high-cost burden and disproportionate morbidity and mortality. Factors contributing to these observed disparities are not comprehensively understood and targets for quality improvement have not been formally developed.

Methods. Using a grounded theory approach, emergency general surgery providers were recruited through purposive-criterion-based sampling to participate in semi-structured interviews and focus groups. Participants were asked to identify contributors to emergency general surgery outcomes, to define effective care for EGS patients, and to describe operating room team structure. Interviews were performed to thematic saturation. Transcripts were iteratively coded and analyzed within and across cases to identify emergent themes. Member checking was performed to establish credibility of the findings.

Results. A total of 40 participants from 5 academic hospitals participated in either individual interviews (n = 25 [9 anesthesia, 12 surgery, 4 nursing]) or focus groups (n = 2 [15 nursing]). Emergency general surgery was characterized by an exceptionally high level of variability, which can be subcategorized as patient-variability (acute physiology and comorbidities) and system-variability (operating room resources and workforce). Multidisciplinary communication is identified as a modifier to variability in emergency general surgery; however, nursing is often left out of early communication exchanges.

Conclusion. Critical variability in emergency general surgery may impact outcomes. Patient-variability and system-variability, with focus on multidisciplinary communication, represent potential domains for quality improvement in this field.

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Introduction

In 2006, the Institute of Medicine emergency care in the United States to be in a state of "crisis."¹ More than a decade since this declaration, the hospital burden of emergency general surgery (EGS) has only continued to grow. In 2010, an estimated 2.6 million hospital admissions and 8.7 million procedures for EGS conditions

occurred in the US,^{2,3} constituting more EGS hospital admissions than for new diagnoses of diabetes or cancer.³ EGS is associated with increased rates of medical errors, complications, and deaths as compared with elective procedures.⁴⁻¹² EGS patients are up to 6 times more likely to die in the post-operative period and 50% of survivors will experience a post-operative complication.¹¹ Variations in provider decision making between elective and emergency procedures contribute to worse outcomes in the latter,¹³ but specific influences on practice differences have yet to be examined. Little is known about which combinations of factors render EGS so morbid and lethal when compared with elective surgery.

The medical community's dedication to development of evidence-based metrics for quality improvement has positively impacted patient safety in a wide variety of specialized fields.¹⁴ When applied to non-emergent perioperative settings, data-derived interventions,

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- 1) Please tell me about your work as an EGS provider.
- 2) Who are the people with whom you work most closely?
 - 1) Who would you call your team in the operating room?
- 3) Is EGS different from NEGS? Why or why not?
- 4) Please tell me about a time in which you and your team cared for an EGS patient effectively.
 - 1) Probe: What technical factors made it so that you could care for your patient effectively?
 - 2) Probe: What non-technical factors made it so that you could care for your patient effectively?
- 5) Please tell me about a time in which, in spite of your and your team's efforts, you were unable to save a patient.
 - 1) Probe: What factors do you think were most influential in this patient's outcome?
 - 2) Probe: What technical factors were influential to this patient's care?
 - 3) Probe: What non-technical factors were influential to this patient's care?
- 6) What factors most strongly contribute to post-operative morbidity and mortality in EGS patients?
- 7) In your opinion, what can be done to improve patient safety related to the factors you mentioned in the previous question?

Fig. 1. Interview guide.

such as the Agency for Healthcare Research and Quality (AHRQ)'s Team Strategies and Tools to Enhance Performance in Patient Safety (Team STEPPS) and the World Health Organization (WHO)'s Surgical Safety Checklist, have been shown to improve communication practices and care quality.^{15,16} To date, development of metrics necessary for targeted quality improvement in EGS has been hindered by a lack of evidence on the factors most important to creating disparities in this population's morbidity and mortality.

To begin to address this important knowledge gap and to better understand root causes of variations in care patterns between EGS and elective, or non-EGS (NEGS), surgeries, we sought to explore the perspectives of a multidisciplinary group of EGS providers in a novel fashion through qualitative methods. By examining providers' perceptions of factors that contribute to EGS outcomes, we set out to identify modifiable elements of patient care that could serve as interventional targets for further studies in quality improvement.

Methods

Study subjects

To examine overarching themes consistent across hospital systems and geographic regions, a purposive-criterion-based sampling technique was used to identify a multidisciplinary group of EGS operating room (OR) providers, inclusive of anesthesiologists, operative nurses, and surgeons, from academic hospitals in all four US census regions (Midwest, Northeast, South, West). This method of sampling is defined as qualification-based identification of a cohort experienced with a topic of interest.¹⁷ Recruitment was limited exclusively to academic centers to limit variability attributable to institution type. Eligible providers were actively practicing EGS patient care at the time of participation; trainees were excluded from recruitment. Initially, hospital centers were identified by census region. Staff were contacted *via* an informational e-mail that described the goal of our study and were asked whether they would be willing to participate in an interview lasting approximately 30 minutes. Nonrespondents were sent an additional e-mail 1 week after the initial email was sent and, if still unresponsive, were no longer contacted. Informed consent was obtained verbally at the commencement of each encounter.

Data collection

We designed a semi-structured interview guide with 7 open-ended questions that aimed to probe participants' impressions of factors that might contribute to EGS patient outcomes. In designing our interview guide, we intended to allow for broad exploration of participants' perspectives on EGS care. Our interview guide was

based on literature review of factors that have previously been identified to contribute to operative outcomes, inclusive of operative team dynamics, but was not meant to be limited to these topics.^{15,16} Preliminary drafts of our interview guide were screened iteratively by our research team until consensus had been reached, yielding a final interview guide (Fig 1). Before interview commencement, regardless of interview delivery format, all participants were asked to contemplate EGS as a set of intra-abdominal conditions that require emergency intervention (Fig S1).⁴ Participants were asked about their impressions of their hospital work environment, intra-operative team dynamics, effective patient care, and factors that might contribute to morbidity and mortality in the EGS patient population. Refinement of interview questions based on concurrent analysis of interview data followed by an iterative process occurred throughout the data gathering process.

Anesthesiologists and surgeons from all sites were interviewed one-on-one in person, or *via* telephone. Nurses were interviewed either one-on-one in person, one-on-one *via* telephone, or in person within a focus group. Scheduling and interview-delivery format was determined based on participant availability and geographic proximity to our research team.

All one-on-one interviews were conducted by a single member of the research team (ABC). One of two nursing focus groups was led jointly by two research team members (ABC and AFH) while the other nursing focus group was led by a senior research faculty member (MAM). All interviewers were trained in qualitative interview techniques. All interviews, regardless of delivery format, followed the interview script and guide. All interviews were audio recorded and were transcribed verbatim. Interviewer field notes, written by hand during and after interview, were incorporated as data at the end of each transcript.

After preliminary data analysis, study participants were engaged in a member-checking process to establish credibility of the findings. An e-mail containing emergent themes was sent to all participants. For each theme, participants were asked to indicate their agreement with the findings and to describe their reasoning. Member-checking results were incorporated into our final analysis.

Analysis

Grounded-theory analysis was used to allow for inductive emergence of prominent themes. Three members of our research team (ABC, MAM, and AFH) coded all transcripts. Members of the research team first independently reviewed the transcripts, inductively identifying codes. The researchers then met to discuss their codes, collaboratively develop a preliminary codebook, and apply the codes to an initial transcript. Next, the researchers independently applied the codebook to two additional transcripts. The researchers then

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