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## Interpersonal And Organizational Dynamics Are Key Drivers Of Failure To Rescue

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### Abstract

Failure to rescue—mortality following a major surgical complication—is a key driver of variation in postoperative mortality. However, little is known about the impact of interpersonal and organizational dynamics, or microsystem factors, on failure to rescue. In a qualitative study of providers from hospitals with high and low rescue rates, we identified five key factors that providers believe influence the successful rescue of surgical patients: teamwork, action taking, psychological safety, recognition of complications, and communication. Near-uniform agreement existed on two targets for improvement: delayed recognition of developing complications and poor interprofessional communication and inability to express clinical concerns. To improve perioperative outcomes, hospitals and payers should shift their attention to improving early detection and effective communication of major complications.

### Keywords

Failure to Rescue; Surgery; Mortality; Patient Safety; Interpersonal and Organizational Factors

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Failure to rescue, defined as mortality following a major surgical complication, drives much of the variation in postoperative mortality following surgery in the United States.<sup>1</sup> Initially described in 1991,<sup>2</sup> failure to rescue garnered significant attention in 2009 after a landmark study in the *New England Journal of Medicine* found that variation in postoperative mortality was driven by differences in failure to rescue, not differences in the development

of postoperative complications.<sup>1</sup> Subsequent endorsement of surgical rescue by the National Quality Forum resulted in public reporting of failure-to-rescue rates by both the National Surgical Quality Improvement Program and by the Centers for Medicare and Medicaid Services' Hospital Compare. In the past decade the impact of failure to rescue has been studied across multiple surgical operations, varied hospital settings, and diverse patient populations, and findings have been consistent.<sup>3-5</sup> However, unlike other publicly reported quality measures, surgical rescue measures have no best-practice guidelines for improvement.

Despite the well-established relationship between failure to rescue and postoperative mortality, attempts to identify hospital, provider, and patient characteristics that influence rescue have yielded little actionable insight. Previous work associated rescue with static, macrosystem organizational attributes such as nurse-to-patient ratio, hospital technology level, and hospital teaching status.<sup>6-8</sup> However, these factors are often inflexible because of financial constraints, and they explain only about a third of the variation in hospital rescue rates.<sup>9</sup> Furthermore, attempts at altering macrosystem attributes, such as staffing in the intensive care unit (ICU), revealed that mere adoption of these specific attributes does not improve mortality rates,<sup>10</sup> which highlights the need for a more thorough understanding of the rescue process. Rescuing a surgical patient is an intricate, experiential, and very human process that hinges on continuous interpersonal interactions. These features cannot be captured in database-driven research. Instead, they require engaging stakeholders to understand the interpersonal and organizational dynamics, such as hospital microsystem factors, associated with effective rescue.

In this context, we sought to understand the impact of microsystem factors on failure to rescue and identify potential levers for improvement within existing hospital infrastructure. Using data from the Michigan Surgical Quality Collaborative, we identified hospitals along the continuum of rescue proficiency. We then conducted semistructured interviews with clinicians to evaluate their perceptions of care that contributes to the effective rescue of surgical patients.

## Study Data And Methods

### Sample Description And Recruitment

The research team conducted semistructured interviews with health care providers from five hospitals in Michigan in the period July–December 2016. The interviews focused on providers' perceptions of organizational dynamics and interpersonal factors that affect the rescue of surgical patients following a complication. Hospitals were recruited through their participation in the Michigan Surgical Quality Collaborative, a quality improvement organization funded by Blue Cross and Blue Shield of Michigan.<sup>11</sup> The collaborative includes seventy-three community and academic hospitals and prospectively collects patient characteristics, intraoperative data, and thirty-day postoperative outcomes for patients who undergo specific general surgery and vascular operations. Data on the latter were abstracted from all participating hospitals' medical records. To compare hospitals' failure-to-rescue rates, thirty-day case-mix and reliability adjusted complication and mortality rates were generated, as described in detail in previous work.<sup>12</sup> We sampled five hospitals and included

centers with both high and low rates of failure to rescue (the rates ranged from 15.2 percent to 46.6 percent). We sampled hospitals with varying rates to explore variation in practices and elucidate a broad range of behaviors and perceptions. While our team sampled hospitals from across the spectrum of rates, given the focus of the study we did not explicitly compare findings between higher- and lower-performing hospitals. We interviewed fifty providers—with approximately ten individuals interviewed at each hospital—to ensure a diverse sample of providers and sufficient sample size for attaining thematic saturation.<sup>13</sup> Interviewees within each hospital varied in clinical specialty and years of experience. (Details regarding the participants' specialties and years of experience at each hospital are in supplementary exhibit 1 in the online appendix.)<sup>14</sup> Interviewees and the research team were unaware of each hospital's failure-to-rescue ranking within the collaborative when the interviews were conducted. Approval was obtained from the University of Michigan Institutional Review Board and the Institutional Review Boards of each hospital visited.

## Interviews

The research team discussed concepts of failure to rescue, team dynamics, and care processes and constructed a preliminary interview guide that was informed by these discussions and based in part on previously published work.<sup>15</sup> These concepts included perceptions of high-quality postoperative care and attitudes and practice patterns related to provider interactions, communication, resources, and barriers to effective rescue. The interview guide was pretested to confirm content validity and was revised as needed throughout the data collection period in accordance with preliminary findings and standard qualitative methods. (Details on the interview guide are in supplementary exhibit 2 in the appendix.)<sup>14</sup>

We began the interviews by defining the purpose of the study: “to assess the key elements necessary for effective rescue from major postsurgical complications and to shed light on how health care organizations can be engaged to better respond to the unexpected and challenging demands presented by the clinical deteriorating postsurgical patient with life-threatening complications.” Providers were first asked to describe their daily work flow and patient care responsibilities. We then focused on the management of a patient with a postoperative complication and instructed participants to include information from experiences in which patients were successfully rescued and from those with adverse outcomes. Next, interviews elicited providers' perceptions of care processes at their hospital and their attitudes toward communication, provider interactions, and barriers to and facilitators of effective care. We then introduced the concept of failure to rescue and defined it as “a health care team failing to recognize and treat a patient after a complication, resulting in death.” Investigators encouraged participants to describe their hospital's approach to and success in rescue and to recommend specific factors to focus on for improvement. Interviews lasted thirty to sixty minutes and were generally conducted by two team members. Each interview was digitally recorded.

## Qualitative Analysis

Interview audiotapes were transcribed verbatim. At least two members of the research team independently coded each transcript. Coding reports were discussed using a consensus-based

team approach to identify major themes. Some of the codes were derived deductively from the study's conceptual framework, while others were generated de novo. (A complete list of codes and code definitions is in supplementary exhibit 3 in the appendix.)<sup>14</sup> All coding disagreements were resolved by group discussion, and consensus was reached through collaborative discussions. Common themes were identified by ongoing review, and rigor was established through team discussions during weekly meetings. The team included people from diverse backgrounds (both clinical and nonclinical) and clinical disciplines (for example, nurses and surgeons), which promoted in-depth discussions and understanding of the data.

The qualitative research software NVivo, version 11, was used for storage, searching, and coding data.

### Limitations

Our study had several limitations. First, this was a qualitative study to assess microsystem factors that influence failure to rescue, and the semistructured interviews had the potential for response bias. To minimize this bias, we included providers from diverse clinical backgrounds to provide varying perspectives on the rescue process.

Second, we studied only five hospitals, all of which were in Michigan. Additional factors might have been identified if more hospitals or hospitals from other states had been studied.

Third, we specifically assessed providers' individual perceptions of failure to rescue. It is possible that the identified factors might not have a causal effect on failure to rescue and that other unrecognized factors may drive this process. However, given the near-unanimous identification of deficits in early recognition and communication, it is unlikely that these domains are unrelated to the rescue of surgical patients.

Finally, the same team members did not conduct all of the interviews, and the interviews may have varied in the depth of questioning. However, a consistent interview guide was used in all interviews to minimize variation in questioning.

### Study Results

Our qualitative analysis identified five key factors believed to influence successful rescue of surgical patients: teamwork; action taking; psychological safety; recognition of developing complications; and communication access, tools, and process (exhibit 1). Clinicians consistently reported that in their experience, providers work together to deliver comprehensive care in moments of crisis (teamwork), that swift action occurs following identification of a complication (action taking), and that clinicians comfortably express objective concerns up and down the clinical hierarchy (psychological safety). Near-uniform agreement existed on targets to improve rescue of surgical patients. Specifically, providers described an inconsistent ability to recognize developing complications, poor interprofessional communication, and a lack of confidence or structured process for providers to express their subjective concerns ("clinical intuition"). Below, we provide

examples of each factor and discuss potential strategies to address identified areas for improvement.

### **Teamwork**

Providers' rallying together to assist each other during episodes of patient deterioration was perceived to be a key element of effective rescue. Interviewees at all sites referred to the need for cooperative interprofessional teams. For example, a hospitalist described "a collaborative approach to patient care" as essential for effective rescue, and a respiratory therapist answered, "working together as a team" when asked to identify the most important component of a hospital that responds well to complications. Nearly all providers believed that their teams collectively provided comprehensive care in moments of crisis. For example, a rapid response team member stated, "We do a really good job collaborating and taking care of [critically ill] patients."

Providers expanded on the importance of teamwork and observed that developing teams with cognitive diversity and abolishing traditional clinical hierarchies promoted successful teamwork in the rescue process. An advanced-practice provider described working in a collaborative environment during successful patient rescue, explaining that "it feels like you're part of a team. There's not this hierarchical order." A surgical house officer further expressed the importance of interprofessional teams in moments of clinical deterioration, describing successful rescue events in which "all of the ancillary staff respond[ed], including respiratory therapy, ICU nurses, all of the nurses on the floor that [were] available to help, [and] another resident team."

### **Action Taking**

Providers identified swift action taking as a key factor in effective rescue and stressed that decisive diagnostic and therapeutic action should be taken immediately after the identification of an issue. The importance of this element was consistently highlighted, with one advanced-practice provider stating, "I think a lot of the barriers can be avoided if you move to action soon." Nearly all providers stated that once a complication was identified, immediate action to treat the patient was initiated. For example, one surgeon explained, "If we see an issue and recognize it, we get to work on it."

### **Psychological Safety**

Psychological safety in the rescue process refers to providers' feeling comfortable in speaking up, questioning others, reporting mistakes, and crossing clinical hierarchies to express concerns. Providers regularly described psychological safety as a key component of a hospital microsystem that fosters successful rescue. One surgeon explained that "for patients with complications, it is important [that] anybody who's involved willingly brings that [concern] forward without worrying that highlighting it would have an adverse effect on their role in the system." Across the study hospitals, nearly all interviewees reported working in psychologically safe environments in which it was "really encouraged...to call for help and to question... Nobody is afraid to say, 'this just isn't right.'" This perception was echoed at the novice level, with a junior house officer stating that in situations where there was concern about a patient's status, they "never thought twice about calling a senior

resident.” An attending physician agreed that in general, “nobody’s going to be critical or you’re not going to get in trouble if you’re [raising concerns].”

## Recognition

The inability to recognize developing complications results in delayed care and patient deterioration and may lead to failure to rescue. Providers consistently described the necessity of identifying complications early in the continuum of care and identified early recognition as a key driver of effective rescue. One surgeon stated, “I think early recognition is probably the most important thing.”

Providers frequently reported poor performance in early recognition, highlighting this as a perceived limitation to effective rescue. One surgeon said that his hospital does “a pretty decent job once we’ve identified [the issue], but I think identification could be better.” Similarly, a nurse stated, “I don’t think we spot those complications early enough.”

The process of identifying complications early is complex and involves integrating multiple variables and subtle clinical changes. One attending physician underscored the complexity of this process and explained that “it can be easy for individuals to miss things, especially when they [patients] start going south early. Just noticing tachycardia or a little bit of tachypnea—it may not seem like much in a postoperative patient early on, but when you start looking back at the whole picture, it is.”

## Communication

At each hospital, providers identified communication as critical to the rescue process. They reported that the effective management of a patient requires all health care team members to have a shared understanding of the patient’s status and to communicate their concerns readily. Providers consistently described timely and effective communication as an essential area for improvement.

One barrier to timely communication is an inability to contact providers (communication access). This was depicted as a circuitous process with excessive steps and delays in responses, leaving providers frustrated and less likely to attempt future communication. For example, a nurse stated, “We’ve all spent time sitting at a desk waiting for a callback, [when] we could be moving forward.”

Bedside providers repeatedly listed ineffective communication as a barrier to rescue. Interviewees discussed a lack of effective tools or processes to communicate early concerns or their “clinical intuition” that a patient was beginning to deteriorate. One nurse offered a scenario, explaining that “you keep calling and saying this is going on...and they don’t do anything. And you call back again, [saying] ‘OK, this is what is going on,’ and it’s like, ‘Come on, get moving.’ They kind of blow you off [when you think]...no, there’s really something going on.” Alternatively, attending physicians experienced frustration and difficulty in assessing the significance of other providers’ concerns when they were communicated in a vague and purely subjective manner. A surgeon explained, “If [providers] see a problem, it doesn’t necessarily help [me] if you don’t know what [information to communicate].”

Direct communication in a consistent format was perceived as critical to effective care. An attending surgeon stated that “doctor-to-doctor communication and immediate response and attention to the patient are key to stabilizing...the patient [and giving them] the best chance.” However, the most frequent communication deficiency identified was poor interprofessional communication, particularly in complex cases involving multiple consulting physicians. Across all of the hospitals, providers reported the failure to communicate consistently, leading to “care that is sometimes fragmented” and preventing providers from having a uniform understanding or mental model of a patient’s clinical status.

## Discussion

Developing a clearer understanding of the process by which clinical care teams respond to crises after surgery has the potential to dramatically lower mortality rates. Our study identified five microsystem characteristics perceived to be critical to successful rescue of surgical patients: teamwork, action taking, psychological safety, recognition of developing complications, and communication (including communication tools, access, and processes). At all five of the hospitals we studied, respondents conveyed confidence in the first three, but they described poor performance in the latter two. The best-performing hospital in the cohort failed to rescue 15 percent of patients, which highlights the need for improvement at all institutions. Given the perceived lack of effective communication and poor early recognition, these microsystem factors may be important domains warranting more focused attention to improve the rescue of surgical patients.

The majority of work on improving perioperative outcomes has focused on preventing complications. However, it is impractical to expect these efforts to prevent all morbidity. Parallel attention must be placed on rescuing patients who experience these complications. Despite having a well-established effect on postoperative mortality, previous attempts to identify modifiable factors that contribute to failure to rescue have yielded little actionable insight. These studies focused on macrosystem attributes that are often inflexible and explain only a small portion of the variation in hospitals’ failure-to-rescue rates.<sup>7,9,16</sup> The microsystem level appears to be more promising. Rescuing a surgical patient is a dynamic process that involves interpreting and exchanging complex information and numerous interpersonal interactions. These components appear in two distinct places along the continuum of postoperative rescue. First, complications must be recognized early, before significant clinical deterioration. Second, once recognized, complications must be managed effectively. Both steps are highly dependent on individual knowledge, communication, collaboration, and confidence on the part of providers. Thus, previous work has advocated for hospital microsystem factors as more suitable targets for large-scale interventions.<sup>15,17</sup>

Based on our findings, we recommend that targets for improvement within hospital microsystems include processes that identify subtle variations in patient status (trend recognition), improve communication or translation of providers’ early concerns (clinical intuition) into actionable information, and standardize interprofessional information exchange. To drive change in these domains, policy makers and health care systems can take several relevant actions.

Within individual hospitals, quality improvement efforts should shift to focus on early detection of major complications. The majority of interventions—such as simulations that train providers to respond to a cardiac arrest—concentrate on activities that occur later in the rescue process, long after a complication develops. While management of critically ill patients is important, our results highlight a perceived deficiency in recognizing problems earlier in the rescue process, before serious clinical compromise occurs. This is also when rescue attempts are more likely to be successful. Therefore, to decrease failure to rescue, hospital systems should implement strategies that increase providers' competence with trend recognition and their communication of early concerns in an effective and actionable manner.

### **Trend Recognition**

To target trend recognition, interventions should focus on improving providers' ability to differentiate a normal patient postoperative course from an abnormal one. Regardless of a provider's experience, they should anticipate each step in an expected postoperative course and rapidly identify patients who deviate from expectations. Development and dissemination of expected postoperative milestone timelines to all providers could improve their recognition of early departures from the normal course. Currently, clinical changes are most commonly identified when physiologic measurements fall outside the normal range. However, significant information and potential early detection of complications can be gleaned from variations within the normal range. For example, interventions should concentrate on enhanced recognition of subtle trends, such as vital signs and laboratory values. Strategies could include conducting multidisciplinary daily review of high-risk patients or ensuring that handoffs include reviews of recent values, preoperative baseline values, and subtle changes in the past forty-eight hours. Technological adjuncts to these processes may also provide significant value. While technology such as wireless monitoring of vital signs is increasingly available, these tools are used to alert providers when values are outside predetermined ranges. This technology does not recognize clinically significant changes that may occur within preset normal ranges. Combining these monitors with more advanced signal processing, such as machine learning, may provide useful feedback or warnings of subtle changes undetectable by the human eye.

### **Effective Communication**

Given our compelling findings about communication challenges, hospitals should direct their attention to establishing competence in communicating early findings and develop novel strategies to strengthen communication across providers. Results of previous efforts to improve communication through structured communication processes, such as the Situation, Background, Assessment, and Recommendation (SBAR) tool, are mixed.<sup>18,19</sup> However, strategies that generate shared mental models or shared clinical understanding through daily, patient-specific contingency planning for common complications could help translate a bedside provider's "clinical intuition" into objective and actionable information. This may require the use of consistent vocabulary or terminology across providers to communicate information regarding patient deterioration; deviations from clinical pathways; and subtle changes or trends in vital signs, laboratory values, or physical exams. Furthermore, metrics to quantify improvement in communication and recognition are necessary. Tools such as the



Safety Attitudes Questionnaire capture an aggregate snapshot of culture within a hospital.<sup>20</sup> However, because effective rescue requires interdisciplinary and cross-unit response to crisis, an accurate barometer of safety attitudes and competence within and among units is needed.

### **Information And Knowledge Exchange**

Clinicians build clinical skills and competence through their years of experience. The staffing realities at many hospitals mean that junior house officers and less experienced nurses are commonly the front-line providers at night, which potentially leads to a less competent workforce during this vulnerable time period. To improve rescue, health systems must reevaluate workforce development to give novice providers the knowledge and ability to provide effective care within current staffing and training constraints. The American Medical Association has recently highlighted the necessity of educating providers to optimize care in complex systems, adding a third pillar, health systems science, to medical student education.<sup>21</sup> Health professions schools must train providers to function in interprofessional teams and communicate effectively across multiple media; schools must also help them develop the ability to make a difference in patient care with action, advocacy, and professionalism. These efforts should apply not only to physicians but also to nurses, respiratory therapists, physical therapists, and others who provide direct care and are may be the first to detect changes in patients' condition that could signal a complication. To foster these skills, health professions educators should employ in situ simulation across disciplines, incorporating clinical knowledge and competence in navigating complex health care teams. Hospital interventions focused on early recognition and communication, combined with health system interventions that target interprofessional collaboration, could lead to improved team functioning, shared mental models, and decreased fragmentation of care.

### **Conclusion**

As providers and policy makers seek to improve the safety and quality of patient care, their efforts must focus on the rescue of surgical patients who develop a complication. The key drivers of failure to rescue have been poorly understood, and static macrosystem factors explain only a portion of the variation in hospitals' rates of failure to rescue in the United States. Our findings highlight five microsystem factors perceived to influence the rescue process. Deficiencies in the early recognition of developing complications and interprofessional communication are potential targets for novel interventions to decrease failure to rescue. Investment in interventions aimed at improving these facets of care should be emphasized across key stakeholders, including patients, providers, health systems, and policy makers.

### **Supplementary Material**

Refer to Web version on PubMed Central for supplementary material.

### **Acknowledgment**

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**Exhibit 1:**

## Thematic analysis of factors influencing failure to rescue

<b>Factor</b>	<b>Sample quotes</b>
Teamwork	We show up as fast as we can. There are two of us, and usually we're good about responding together. So we have two brains working on one patient. (Advanced-practice provider)
	If I am having an issue, I'm not the only one handling [it]. Usually one of my coworkers is there with me. (Nurse)
Action taking	I think we're pretty good at that.... When issues arise we seem to respond appropriately. (Rapid response team nurse)
	I think quite frankly, we do a really good job when we identify the patient issue and where they need to be. (Intensivist)
Psychological safety	The [staff] feel really comfortably talking to any of the providers.... There's not this culture of "you can't call us." (Surgeon)
	We have no problem going to a doctor, and if we don't agree we'll have a good discussion about it. (Nurse)
Recognition	Most of the cases that I've seen the patient clinically deteriorate rapidly [in were] due to a [complication], and we just aren't spotting those. (Rapid response team nurse)
	Keep focused on the issue of what can happen to the patient.. At least look for it so it doesn't get too far down [to] where you cannot reverse it. (Surgeon)
Communication	When you are trying to play catch-up in these patients that are ill and their disease process is worsening, it's entirely different than when you're kind of on board at the get-go. I think communication among services [is number one]. (House officer)
	If we keep the nurse and the doctor on the same boat, on the same focus of one thing, then it will be easier to communicate with the doctor when the nurse has a problem. (Surgeon)

SOURCE Authors' analysis of qualitative interviews with health care providers from five hospitals in Michigan in the period July–December 2016.