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PATIENT SAFETY NETWORK

Failure to Rescue

January 29, 2025
Tokareva I, Romano P. Failure to Rescue. PSNet [internet]. 2025.
https://psnet.ahrq.gov/primer/failure-rescue

Updated in January 2025 by Irina Tokareva RN, BSN, MAS, CPHQ and Patrick Romano, MD, MPH. PSNet primers are regularly reviewed and updated to ensure that they reflect current research and practice in the patient safety field.

Background and Theory

The concept of failure-to-rescue (FTR) captures the idea that many complications of medical care are not preventable, but health care systems should be able to rapidly identify and treat complications when they occur. As with many key concepts in patient safety, this one began with work outside of health care, including Reason's organizational accident theory, Perrow's normal accident theory, and other foundational work in human factors and complex systems. Weick and others articulated the notion of high reliability organizations (HROs) and identified resilience as a defining characteristic of HROs. Please refer to the Primer on High Reliability for additional information on HRO characteristics.

In the late 1980s, early leaders in patient safety in anesthesiology, including Gaba and Runciman, adapted these concepts to their field. For example, Gaba described most anesthetic accidents as evolving from small errors and system failures that interact to produce more serious consequences, and he noted that there are often multiple opportunities to interrupt the "evolutionary cascade" that results in an adverse event. Throughout the 1990s, anesthesiologists led efforts to promote the capacity to detect and respond to evolving and unpredictable situations through improved crisis management strategies and sophisticated simulation training, and this work continues today.

From an HRO perspective, the capacity for organizational resilience is based on understanding that the unexpected is inevitable, and therefore no amount of planning and anticipation will prevent all complications. Resilience has been defined as “the intrinsic ability of a system or organization to adjust its functioning prior to, during, or following changes, disturbances, and opportunities so that it can sustain required operations under both expected and unexpected conditions.” For example, resilient capacities may be required to successfully manage postoperative deterioration after emergency surgery. The monitoring and analysis functions involved in recognizing and responding to such a challenge - or

accomplishing usual tasks - can be articulated using the Functional Resonance Analysis Method (FRAM).[1]

Viewed conceptually through the lens of resilience, failure-to-rescue occurs when a clinical team is unable to adequately anticipate, identify, and thereby mitigate the consequences of an event or condition involving patient harm. As a safety and quality measure, FTR has been defined as the inability to prevent death after development of a complication. For example, a woman with no known comorbid conditions undergoes an abdominal hysterectomy and develops difficulty breathing and tachycardia on the second postoperative day. The failure to anticipate and identify these symptoms and signs as being consistent with pulmonary embolism, leading to an inadequate response manifested by failure to perform appropriate testing and delayed treatment for an ultimately fatal complication, is consistent with the concept of FTR.

Causes and Prevention of Failure-to-Rescue

Previous research has described three critical stages that lead to FTR – failure to recognize complications, failure to relay information regarding complications, and failure to react in a timely and appropriate manner. A 2022 systematic review described this paradigm as the 3Rs (recognize, relay and react) underpinning FTR. The authors identified six types of interventions that can improve FTR rates within healthcare organizations:

Recognize

1. Staffing levels and education, including establishing appropriate minimum physician and nurse staffing levels, improving work environments, encouraging and facilitating advanced training of nurses, and reducing voids in care due to patient flow or turnover.
2. Detection, early warning systems (EWS), and checklists, including formal teaching on effective utilization of EWS.
3. Surveillance, communication, and electronic monitoring, including patient-centric communication styles and training, and implementing electronic EWS systems.
4. Medical emergency and rapid response teams (RRTs), including nurse-led teams with intensivist physician availability.

Relay

1. Implement escalation protocols, SBAR (situation, background, assessment, recommendations), allied handover tools, and multidisciplinary teams on ward rounds to improve information transfer and communication.

React

1. Timely reaction and response to deteriorating patients, including implementing agreed response times based on clinical severity and scenario-based team simulations.

Artificial intelligence (AI)-based prediction models have been developed and tested to detect patient deterioration and support timely RRT activation in hospitalized, non-ICU patients,[2] predict ICU mortality,[3] improve workflows and team communication, and decrease mortality.[4] Despite these benefits, studies have

identified implementation challenges and limitations such as the need for external model validation to ensure generalizability.[3]

Recent research has also described the role of the patient, family members, and caregivers in identifying early signs of clinical deterioration in acute care settings. Patient-facing interventions and multi-component programs to increase engagement in care escalation have been found to improve patient and family knowledge about signs of deterioration and care escalation.[5] However, equity in the use of patient-led notification systems and infrastructure remain key challenges that justify further research in broader settings and systems.[5] Studies are also investigating the impact of patient-activated RRTs and other approaches to patient- and family-led escalation.

Hospital and Patient Characteristics Affecting Failure-to-Rescue

A 2015 systematic review identified several hospital characteristics associated with delayed escalation of care and higher rates of FTR, including lower hospital volume, lower nurse staffing, and non-teaching status. Other publications have highlighted the relationship between other hospital characteristics and lower risk of FTR, including higher surgeon volume, intensive care unit (ICU) presence and specialist staffing, strong safety culture, and high technology capabilities.[6,7,8] In a 2019 systematic review, hospitals with low rates of FTR had greater proportions of board-certified intensivists and were more likely to have closed model ICUs than hospitals with high rates of FTR. Hospitals with low rates of FTR also reported more inpatient support, higher rates of employing hospitalists and residents, and greater use of nurse practitioners and physician assistants. Hospitals with low rates of FTR also reported higher rates of overnight coverage and RRTs than hospitals with high rates of FTR.[9]

Detailed analyses of failure-to-rescue rates for specific types of surgery have yielded more granular information about the types of cases with the highest risk of death given complications, which may provide new opportunities for quality improvement in clinical microsystems.[8] These opportunities include reducing the number of patients per nurse; increasing nursing surveillance; and improving safety culture, communication, and teamwork to promote early identification of clinical deterioration and timely rescue.

Certain patient characteristics (e.g., advanced age, lower socioeconomic status, comorbidities, frailty) as well as the type of surgery and type of complication also increase the likelihood of failure-to-rescue after serious complications.[6,7,8] For example, uninsured patients have been found to be more likely to die after emergency surgery than patients with private insurance.[5] Other studies have identified racial disparities in failure-to-rescue in pediatric surgery and obstetric care.[11,12] These studies and others have highlighted the importance of carefully selecting appropriate risk factors to minimize confounding when comparing failure-to-rescue rates across hospitals. In most cases, socioeconomic factors are omitted from these risk adjustment models to better highlight inequities in care.

Measuring Failure-to-Rescue: Current Context

Measuring FTR as a quality indicator in health care was first proposed in 1992 by Silber and colleagues, who hypothesized that death following complications of common operations would be more strongly

associated with hospital quality than the postoperative complication rate.[13] Their research suggested that high quality hospitals are better able to prevent death after complications, even when they serve higher risk patients, because the ability to rescue patients reflects the hospital's resources and preparedness, or its resiliency in the face of disturbances such as complications. Multiple studies have since shown that hospitals can have low complication rates but high failure-to-rescue rates, and vice versa. One explanation for this phenomenon may be that hospitals with higher complication rates have more experience recognizing and responding to complications when they develop, whereas hospitals with low complication rates have fewer opportunities to hone their rescue skills.

Needleman and Buerhaus subsequently developed a measure of FTR from readily available administrative data, focusing on selected complications and integrating exclusion rules to eliminate cases in which that complication was likely to be present on admission or before surgery. This measure, sometimes referred to as "failure-to-rescue—nursing," was shown to be associated with nurse staffing and skill mix, and was ultimately endorsed by the National Quality Forum as a nurse-sensitive quality measure. In 2003, AHRQ adopted a similar approach to measuring FTR for the Patient Safety Indicators (PSI 04).

Although the Centers for Medicare & Medicaid Services (CMS) and the Leapfrog Group embraced PSI 04 (Death Rate among Surgical Inpatients with Serious Treatable Complications) as a publicly reported quality measure, controversies about the detailed specifications of these measures continued over the subsequent decade. Stakeholders voiced concerns about counting deaths from complications that started before the index procedure or before transfer to the index hospital, and questioned the inclusion of patients with very high-risk surgery (e.g., trauma or burn surgery, organ transplants, intracranial hemorrhage) and very low-risk surgery (e.g., eye, ear, urolithiasis). Mean length of stay and the prevalence of early discharge to post-acute facilities vary widely across hospitals, causing potential bias in comparing performance across hospitals in different communities, even after risk-adjustment. CMS respecified PSI 04 to address these concerns, creating a more homogenous denominator population, excluding patients whose only qualifying complication was diagnosed before admission, and capturing all deaths within 30 days after the first eligible operation. This new measure, retitled as "Thirty-day Risk-Standardized Death Rate among Surgical Inpatients with Complications (Failure-to-rescue)," was endorsed by the Partnership for Quality Measurement (PQM) and recently adopted for Hospital Inpatient Quality Reporting for the FY 2027 payment determination (using data from July 2023 through June 2025). The implementation of this new measure of failure-to-rescue, which is better aligned with Silber and colleagues' original construct, may refocus attention on the value of this concept for driving safety improvement and highlighting organizational resiliency.

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References

1. Hollnagel, E. (2012). FRAM: The Functional Resonance Analysis Method: Modelling Complex Socio-technical Systems (1st ed.). CRC Press. [Free full text]
2. Hatchimonji JS, Kaufman EJ, Sharoky CE, et al. Failure to rescue in surgical patients: a review for acute care surgeons. *J Trauma Acute Care Surg*. 2019;87(3):699-706. [Free full text]
3. Rosero EB, Romito BT, Joshi GP. Failure to rescue: a quality indicator for postoperative care. *Best Pract Res Clin Anaesthesiol*. 2021;35(4):575-589. [Available at]
4. Sheetz KH, Dimick JB, Ghaferi AA. Impact of hospital characteristics on failure-to-rescue following major surgery. *Ann Surg*. 2016;263(4):692-697. [Free full text]
5. Metcalfe D, Castillo-Angeles M, Olufajo OA, et al. Failure-to-rescue and disparities in emergency general surgery. *J Surg Res*. 2018;231:62-68. [Free full text]
6. Guglielminotti J, Wong CA, Friedman AM, et al. Racial and ethnic disparities in death associated with severe maternal morbidity in the United States: failure to rescue. *Obstet Gynecol*. 2021;137(5):791-800. [Free full text]
7. Willer BL, Mpody C, Tobias JD, et al. Racial disparities in failure-to-rescue following unplanned reoperation in pediatric surgery. *Anesth Analg*. 2021;132(3):679-685. [Free full text]
8. Mackintosh NJ, Davis RE, Easter A, et al. Interventions to increase patient and family involvement in escalation of care for acute life-threatening illness in community health and hospital settings. *Cochrane Database Syst Rev*. 2020;12(12):CD012829. [Free full text]
9. Silber JH, Williams SV, Krakauer H, et al. Hospital and patient characteristics associated with death after surgery- a study of adverse occurrence and failure-to-rescue. *Med Care*. 1992;30(7):615-629. [Free full text]
10. Ward ST, Dimick JB, Zhang W, et al. Association between hospital staffing models and failure-to-rescue. *Ann Surg*. 2019;270(1):91-94. [Free full text]
11. Veldhuis LI, Woittiez NJC, Nanayakkara PWB, et al. Artificial intelligence for the prediction of in-hospital clinical deterioration: a systematic review. *Crit Care Explor*. 2022;4(9):e0744. [Free full text]
12. Barboi C, Tzavelis A, Muhammad LN. Comparison of severity of illness scores and artificial intelligence models that are predictive of intensive care unit mortality: meta-analysis and review of the literature. *JMIR Med Inform*. 2022;10(5):e35293. [Free full text]
13. van der Vegt AH, Campbell V, Mitchell I, et al. Systematic review and longitudinal analysis of implementing Artificial Intelligence to predict clinical deterioration in adult hospitals: what is known and what remains uncertain. *J Am Med Inform Assoc*. 2024;31(2):509-524. [Free full text]