

Resilient Healthcare and the Safety-I and Safety-II Frameworks

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Resilient healthcare applies [resilient engineering](#) methods and concepts to the healthcare setting. Adopted across various industries, including aviation and manufacturing, resilient engineering acknowledges system complexity and the need for systems to adjust to unanticipated and inevitable change. In healthcare, resilient engineering focuses on the everyday work of healthcare staff who successfully manage conditions that may necessitate adaptation. Resilient healthcare reflects the capacity of the entire healthcare system to adjust to challenges and changes while maintaining high-quality care.¹

For some healthcare delivery processes, when best practices are well-established and resources are stable, compliance with rigid protocols may be appropriate. However, in many circumstances safe healthcare must be delivered under dynamic conditions. Those conditions include the unpredictable occurrence of emergencies, the inability to “pause” necessary treatment despite incomplete information or inadequate resources, the ad hoc formation of teams with variable and diverse membership, the incorporation of rapidly evolving innovations, and pressure to conserve resources. All these situations happen while considering the conditions, capabilities, and preferences of individual patients.

As healthcare delivery grows more complex, resilient healthcare methods can be applied to support patient safety and maintain high-quality care. By focusing on developing capacities that enable care teams to respond to emergent problems, resilient healthcare can improve how systems adapt. Instead of focusing on adherence to protocols and individual failures, resilient healthcare sees healthcare professionals as the necessary and creative assets of the healthcare system that can address safety gaps.²

Resilient healthcare also acknowledges that healthcare delivery is complex and dynamic as the components—and the relationships between these components—constantly evolve. Given this evolution, it is not possible to have a complete understanding of the entire system. When viewing the relationships between two components, many outcomes are neither bimodal nor understandable using simple cause and effect perspectives. Outcomes emerge from the confluence of numerous contributory factors.

The four classic capacities of a resilient healthcare system are the capacities to respond, learn, anticipate, and monitor. These capacities are inter-related and inform each other. Resilient systems respond to unanticipated work situations or events and use these capacities to adjust, adapt, and succeed. Resilient systems learn from both successful and unsuccessful outcomes, seeking to understand what worked and why, as well as what didn't work.³ Recent discussions among resilience engineering thought leaders have considered how collaboration is necessary also.

Safety-I and Safety-II: Defining Safety

Traditional views define safety as a state in which as few things as possible go wrong and focus on minimizing adverse outcomes. This perspective, also termed Safety-I, uses tools such as [root-cause analysis](#) to identify the causes and factors that contribute to an adverse outcome. A root-cause analysis is typically triggered after an adverse event or mishap. The goal is to understand the causes of errors to prevent the future occurrence of a similar event. The typical outcome of this analysis is to standardize and adjust a linear process to remove variability, including the variation caused by human behavior.² While [studies](#) have shown that these tools improve patient safety for certain types of hazards, there is still an [identified need](#) to move beyond cause-effect models to approaches that account for the nonlinear complexity of healthcare delivery.

Researchers studying resilient healthcare have identified another approach to patient safety called Safety-II. Safety-I and Safety-II frameworks should be viewed as complementary perspectives in which the context of care often determines the appropriate approach. Safety-II provides a distinct perspective to define safety and promote safe care. This novel outlook inverts the Safety-I paradigm and seeks to understand what is going well, as opposed to what went wrong. Safety occurs when as many things as possible go right. As opposed to Safety-I, Safety-II focuses on understanding why most healthcare delivery processes are successful and how they are performed correctly in high-performing units rather than why they fail.

[Safety-II](#) recognizes that healthcare delivery systems are complex and adaptive, and views human behavior as an important source of creativity to manage that complexity as opposed to being a dangerous source of variation that requires control. In complex work environments, healthcare professionals adapt standard processes and create informal processes that allow flexibility to accomplish desired outcomes. Providers adjust their interventions when standard processes are not appropriate or when required resources such as equipment, medications, staff, protocols, and so on are not available for the patient who needs care at that moment. This skill is apparent in environments such as (a) emergency departments, where it may be difficult to predict the flow and acuity of patients arriving, or (b) during the recent COVID-19 pandemic, when knowledge of optimal treatment was evolving and resource availability varied over time. In these settings, staff are skilled in adjusting their own work to meet the changing needs of patients.²

Understanding Work-as-Done

Historically, Safety-I has been the dominant paradigm within healthcare, but its [limitations for addressing the challenges](#) presented by contemporary nonlinear, complex systems have led some to argue that a paradigm shift is necessary to improve safety. Work processes are typically studied and created based on what people imagine work to be like at the frontline, but work-as-imagined is rarely the same as how work is actually done.⁴ While it is important to have a high-level, conceptual overview of work processes, it is

also important to incorporate learning from both unsuccessful and especially successful frontline care experiences to refine that overview. For this reason, researchers purport that the Safety-II view helps us understand the value of variability in processes. This shift toward Safety-II is a shift from a reactive and constraining approach to one that is more proactive and appreciative of the complexity of the delivery system.³ In 2015, [Hollnagel, Wears, and Braithwaite](#)⁴ stated that the transition to a Safety-II perspective should begin by looking for what goes right, and the greatest benefit may arise from focusing on events that happen regularly.

Continued Applications and Research on Resilient Healthcare

Healthcare organizations [continue to explore and research strategies](#) that use resilience engineering to understand its effectiveness on safety. Studies on resilient healthcare are being conducted as researchers work to determine how these approaches are applied in countries such as Australia, Japan, the Netherlands, Norway, Switzerland, and the UK.¹ United States–based healthcare systems, such as [Nationwide Children's Hospital](#), have conducted research on spreading and sharing Safety-II concepts in intensive care units. [Nationwide Children's Hospital also developed tools](#) to further operationalize Safety-II in healthcare settings.

While uptake and applications are increasing, we expect that ongoing research and education in resilient healthcare will help ensure our healthcare delivery systems continue to learn and adapt. Many organizations are applying resilient healthcare principles informally as they study and understand their processes of care. By formally researching resilient systems and the adaptive capacity of healthcare professionals, we can improve the safety of the care we deliver.

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