SOCIETY FOR SIMULATION IN HEALTHCARE

A Hospital Based Simulation Programs Section, Patient Safety and Simulation Collaborative Affinity Group, and In Situ and Mobile Outreach Simulation Affinity Group Collaboration

Position Statement – Companion Document

This companion document provides detailed evidence-informed, practical recommendations for the detection, reporting, and mitigation of latent safety threats (LSTs) in healthcare through simulation. Through a three-tiered framework, these guidelines integrate recent and landmark research with current best practices to support simulation programs in systematically identifying and addressing LSTs. The statement aims to enhance patient safety, standardize LST processes, and empower simulation programs to effect meaningful organizational change.

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INTRODUCTION

Latent safety threats (LSTs) are the hidden system vulnerabilities embedded within workflows, environments, and organizational structures, and remain a significant source of risk and adverse events in healthcare. Unlike active errors, LSTs often go undetected until they align with other failures, resulting in adverse events. Simulation-based education (SBE), particularly in situ simulation (ISS) conducted within the clinical environment, has emerged as a proactive strategy to uncover LSTs before they impact patients. By replicating real-world care processes, ISS enables teams to stress-test systems, identify LSTs, and evaluate human–system interactions in context. Inconsistencies in LST classification, reporting, and follow-up remain barriers to process improvement and benchmarking. To address these challenges, a standardized framework for LST detection, categorization, and mitigation is needed.

Through a membership needs assessment conducted by the Hospital Based Simulation Programs Section, the collection and reporting of LSTs resonated as a topic of interest. Although ISS is recognized as a useful tool for LST recognition, members were unaware of any industry standards around their collection, reporting, or mitigation. The Section designated a workgroup to evaluate the identified problem and invited the Patient Safety and Simulation Collaborative and In Situ and Mobile Outreach Simulation Affinity Groups to collaborate. As such, the Latent Safety Threat Workgroup was formed. The group conducted a literature review which confirmed the lack of published standards. Surveys of Society for Simulation in Healthcare members who conduct ISS revealed a wide variation in practice around collection, reporting, and mitigation of LSTs, highlighting the need for standardization. Grounded in systems engineering and human factors principles and informed by best practices in SBE, this position statement outlines a systematic approach to enhance system resilience and process improvement though LST simulation, with the goal of improving patient outcomes.

This companion document has been developed to provide in-depth guidance for the detection, reporting, and mitigation of LSTs identified through ISS. It integrates evidence-based research with real-world experience to enhance system resilience, improve patient outcomes, and promote organizational change through standardized approaches.

The tiered recommendations within this guide are designed to be fluid and adaptable rather than prescriptive. Organizations are not expected to achieve every element within each tier, as implementation will naturally vary based on organizational context, resources, and maturity of simulation-based safety practices. Tiers may overlap, reflecting the dynamic and iterative

nature of system improvement. This document may also serve as an advocacy tool to support simulation and safety leaders in gaining organizational buy-in and advancing their programs toward higher levels of integration.

DOCUMENT ELEMENTS

The guidelines for each area are broken in different elements:

High-Level Description (in dark blue)			
	Foundational Readiness (Tier 1)	**Operational Integration (Tier 2)**	**Strategic Embedding (Tier 3)**
Individual Recommendations Title *Description (as needed)*	Establish the essential components required to begin identifying and reporting LSTs during simulation. Build informal mechanisms and basic accountability to create an awareness to detect and identify LSTs. Recommendations are suitable for programs in early stages or with limited resources. **Tier 1 Example.*	Builds on foundational practices by incorporating structured reporting, designated follow-up roles, and bi-directional feedback. LST processes are integrated into existing quality and safety systems. Recommendations are appropriate for maturing programs aiming to strengthen system responsiveness. **Tier 2 Example.*	Represents organizational alignment where simulation-driven LST detection is embedded into organizational strategy. Includes formalized reporting, interdisciplinary mitigation processes, repeat testing post-mitigation, and data-driven outcome tracking. Recommendations are characteristic of organizations with robust simulation infrastructure and high reliability culture. **Tier 3 Example.*

***Disclosure:**
Tiered examples reference specific frameworks, tools, and interventions to illustrate best practices. These examples are intended to demonstrate real-life scaffolding of system integration and simulation program involvement across tiers and are not intended to be prescriptive. Simulation programs may use alternative validated approaches that best fit their organizational context.

TERMINOLOGY

- **Bi-directional Feedback –** The process of collaboration between the simulation program and a group of individuals from the organization who provide oversight to their systems integration function.

- **Facilitator** – Individuals who design, conduct, or debrief simulation activities. This also refers to simulation faculty or staff.

- **Loop Closure** – "Closing the loop" ensures that all pertinent information requiring action is communicated to the right person, at the right time, through the right channel so it can be reviewed, reconciled, acted on, confirmed, and documented.

- **LST Detection Tool** – Any method or tool used to detect and identify LSTs.

- **Mitigation** – The process aimed at addressing identified LSTs which may include corrective action to reduce risk up to verified and sustained closure of a threat (*resolution*).

- **Organization** – The overarching entity that encompasses the simulation program. Because some programs are based within academic institutions rather than healthcare systems, their capacity to implement hospital- or system-wide changes may differ. May also refer to institution, hospital, facility, or hospital system.

- **Organizational Structure**
    - **Local Leadership** – Unit/department-based or site-specific leaders who oversee the immediate operational environment where simulations occur, or patient care is delivered. May include nurse managers, charge nurses, unit directors, or equivalent roles with responsibility for staff, workflow, and unit-level safety outcomes.
    - **Organizational Leadership –** Executive-level leaders, including chief officers, senior administrators, or equivalent leadership with organizational-wide responsibility for strategy, policy, resource allocation, and safety culture.
    - **Staff** – Individuals directly involved in patient care or operational processes who are not formal members of the simulation program. Includes clinical and non-clinical team members present during simulations or real-world processes.

- **Quality and Safety** – The structures and processes that support patient safety, quality improvement, and risk reduction within an organization. Represents the organizational functions that oversee event analysis, system evaluation, and process improvement related to clinical and operational performance. May refer to quality assurance, quality improvement, risk management, patient safety, etc.

- **Process Improvement** - An ongoing, cyclical approach to evaluating and enhancing healthcare systems. Encompasses mechanisms such as simulation-based testing, debriefing feedback loops, and outcome monitoring that contribute to organizational resilience. Emphasizes that LST work is iterative and embedded within a broader safety culture that evolves through reflection, adaptation, and re-testing. May also refer to continuous learning, continuous improvement, organizational learning, or system learning.

- **Simulation Program** - The collective body responsible for the design, facilitation, analysis, and integration of simulation-based activities. The scope may vary across organizations—ranging from a single educator-led initiative to a comprehensive simulation center—but the common goal is advancing system learning and patient safety through simulation. This may also refer to the simulation center, team, or team members.

Latent Safety Threats Detection, Reporting, and Mitigation Recommendations

A scaffolded three-tiered recommendation guide.

Latent Safety Threat Detection			
	Foundational Readiness (Tier 1)	**Operational Integration (Tier 2)**	**Strategic Embedding (Tier 3)**
LST Detection *Identification of LSTs using an LST detection tool*	• Establish a simple, basic method to detect and identify LSTs (e.g., checklist, structured debrief prompts, or simple reporting form). • Standardize documentation into a central log or spreadsheet. • Train facilitators to consistently ask, "Did we identify any latent safety threats?" during debriefs.	• Formalize LST detection tools by including structured fields such as LST description, LST taxonomy categorization, staff feedback, and follow-up plans. • Standardize training for facilitators on consistent use of the structured LST detection tool. • Utilize an established debriefing tool for	• Adopt a validated systems-focused simulation methodologies (e.g., published frameworks with evidence for reliability and validity [see Appendix B]). • Align simulation design for LST detection with organizational priorities, strategic safety goals, and existing risk assessment processes to ensure relevance, integration, and system-level impact. • Link information from LST detection tools to organizational

	• Introduce LST detection and identification as an important part of every ISS. *During a sepsis ISS debrief, a facilitator uses a simple checklist that includes the prompt "Did you notice any safety issues during today's simulation?" Any "Yes" responses are documented as potential LSTs and logged into a centralized Excel spreadsheet.*	systems-focused simulations (see Appendix A). • Continue to normalize LST detection and identification as part of every ISS. *All facilitators complete training on the organization's LST detection tool. During a sepsis ISS simulation debrief, a trained facilitator uses the Promoting Excellence and Reflective Learning in Simulation (PEARLS [see Appendix A]) framework to identify LSTs, which are then logged into a centralized Simulation Program recording system.*	safety dashboards and process improvement portfolios. • Use LST detection tool data for scholarly output and process improvement. • Strengthen LST detection and identification efforts by engaging teams to identify and address LSTs during simulation to support process improvement. *Reducing sepsis mortality is set as an organization's strategic priority. ISS is intentionally designed to identify LSTs using the Simulation-based Clinical Systems Testing (SbCST [see Appendix B]) framework. Following a sepsis ISS debrief, LST detection is directly mapped to the organization's annual patient safety goals. LST data feeds directly into the Sepsis Steering Committee and is integrated into the organization's High Reliability Organization metrics dashboard.*

LST Categorization *Use of a tool/process to categorize LSTs*	• Introduce simple and consistent taxonomies (e.g. equipment, process, communication, environment) or develop categories based on LST themes identified during a simulation. • Capture LSTs using a simple tool (spreadsheet or form) with minimal required fields: category, description, impacted system, etc. • Ensure generic categories align with organizational understanding and simplicity to facilitate early adoption. *During a medication administration ISS, staff discover that two look-alike saline vials are stored side by side. The facilitator documents the LST in a basic spreadsheet as an "equipment" and "process" concern. The*	• Apply a structured taxonomy aligning the organization (see Appendix C). • Link categorized LSTs to organizational reporting systems, if possible, to enable visibility and action. *During a medication administration ISS, staff discover that two look-alike saline vials are stored side by side. The LST is categorized using the Systems Engineering Initiative for Patient Safety (SEIPS [see Appendix C]) model to identify contributing factors within the task and environment domains. The LST is entered into the Simulation Program's reporting form, which links to the organizational reporting system. The categorization aligns with the organization's quality taxonomy, allowing*	• Adopt and integrate a validated tool to rank risk and prioritize LSTs and ensure organizational alignment (see Appendix D). • Train facilitators to apply structured debrief methods that use validated tools to categorize and prioritize LSTs. • Align LST categorization taxonomy with organization safety event taxonomy. *During a medication administration ISS, staff discover that two look-alike saline vials are stored side by side. The facilitator uses a validated tool, such as the Healthcare Performance Improvement (HPI [see Appendix C]) Failure Modes analysis, to prioritize the risk and categorize contributing factors. The LST is integrated directly into the organization's safety event taxonomy and automatically routed to Quality and Safety, pharmacy, and human factors teams. Categorization and prioritization outcomes are used to guide system-level redesign and support ongoing risk monitoring across units.*

	description, location, and impacted system are recorded, but no formal taxonomy is used.	*Quality and Safety teams to view and act on the issue.*	

Latent Safety Threat Reporting			
	Foundational Readiness (Tier 1)	**Operational Integration (Tier 2)**	**Strategic Embedding (Tier 3)**
Reporting	• Create an LST reporting form which may include data elements such as LST description, LST categorization, staff feedback, and minimum data elements/metrics that will be reported and/or tracked. • LSTs may be shared with local staff directly involved in the simulation activity. • Simulation program completes the LST reporting form and shares with local leadership, who may then	• Incorporate a structured taxonomy into a LST reporting form. • Develop a formal LST reporting system in conjunction with the simulation program, operational leaders, and quality and safety teams. • LSTs are shared with local staff (beyond those directly involved in the simulation) and local leadership.	• Establish a formal approach to include risk level and/or priority into LST reports. • Utilize an LST reporting system to share reports with appropriate leadership (e.g. simulation program, local, or organizational), staff, and quality and safety teams. • LST reporting is integrated into existing safety and quality systems, ensuring findings are tracked longitudinally and used to inform process improvements, policy updates, and broader safety initiatives.

	be responsible for sharing at other leadership levels. • Identify a process for local leadership to send summary communication, such as emails, to localized staff regarding lessons learned. • Initial steps toward linking LST reporting with existing quality and safety reporting systems may be explored. *During an ISS, staff find that the automated compression device repeatedly stops with a deployment error, reflecting lack of functional testing. The facilitator records this equipment LST on an LST reporting form, shares it with local leadership, and files it in the Simulation Program log. The report stays local and is not linked to quality and safety reporting systems.*	• Share the LST report with key stakeholders (e.g. cardiac arrest in situ information shared at a cardiac arrest committee meeting). • LST reporting may be integrated with existing quality and safety reporting systems. *During an ISS, staff find that the automated compression device repeatedly stops with a deployment error. The Simulation Program submits a structured LST report through the LST reporting system to key stakeholders (local leadership, Biomedical Engineering, Quality and Safety, and the resuscitation committee). The report is linked to the organization's safety event system and used to update local training and*	*During an ISS, staff find that the automated compression device repeatedly stops with a deployment error previously reported on other units. The episode is entered into the organization's LST reporting system, grouped with other deployment LSTs and reviewed by organizational leadership, Quality and Safety, and other key stakeholders, informing a system-wide revision of automated compression device training and functional-check procedures, with ongoing LST reporting used to monitor for recurrence.*

		daily checklists shared with all unit staff.	

Latent Safety Follow-Up			
	Foundational Readiness (Tier 1)	**Operational Integration (Tier 2)**	**Strategic Embedding (Tier 3)**
LST Follow-Up	• Responsibility for LST follow-up may vary depending on the situation or be assigned on a case-by-case basis. • Simulation program may be included in LST follow-up discussions. *During an ISS, it is found that the defibrillation pads are missing from the code cart. The facilitator notes the missing pads and verbally informs the Charge Nurse, who agrees to check the cart and replace the pads immediately. The Simulation Program may participate in follow-up*	• Define dedicated roles in simulation program and local leadership to share responsibility for LST follow-up, including quality and safety input. This may include recommended timelines. • Simulation program is included in LST follow-up discussions and bi-directional feedback with stakeholders, leaders, and quality and safety teams. • Provide regular updates so staff and local leadership	• Establish formal reporting and follow-up structures with assigned responsibility, loop closure, defined due dates, and organizational oversight of identified LSTs based on risk and priority ranking. • Simulation program is consistently included in LST follow-up discussions and bi-directional feedback with stakeholders, leaders, and quality and safety teams. • LST identification, reporting, and follow-up are embedded within organizational process improvement frameworks.

	discussion as defined by organizational protocol, but no formal tracking or timeline is established.	understand how reported LSTs are being addressed. • LST findings are used to inform local or organizational-level process improvement. *During an ISS, it is found that the defibrillation pads are missing from the code cart. The facilitator documents the LST in a shared spreadsheet and emails it to local leadership and the Quality and Safety representative. Local leadership assigns responsibility to the unit manager to ensure pads are stocked and checks are added to daily cart audits. The Simulation Program receives updates and shares them with staff during huddles. LST data is reviewed quarterly to identify trends.*	*During an ISS, it is found that the defibrillation pads are missing from the code cart. The facilitator enters the LST into the organization's safety event system. The Quality and Safety team assigns a risk priority (high risk as it impacts cardiac arrest response). The due date and responsible party are documented in the system and the oversight committee monitors progress. The Simulation Program is part of monthly safety review meetings and receives closure confirmation. The organization updates their policy regarding code cart contents and implements a standardized audit trail across all units.*
LST Mitigation *Includes resolution and mitigation.*	• Informal processes for tracking mitigation may exist with limited	• Develop a formal process to communicate mitigation of LSTs.	• Establish an infrastructure and process to rank, assign, and systematically mitigate LSTs in

	emphasis on LST mitigation. • LSTs may remain unresolved or mitigation status unknown. *During an ISS, staff find an empty oxygen tank on the crash cart. The facilitator notes it in a simple spreadsheet and informs the Charge Nurse, who replaces the tank, but no formal tracking occurs. Mitigation is not formally tracked, and the Simulation Program may not receive updates on resolution or closure.*	• Simulation program may track or is involved in bi-directional communication related to completed action items for LST mitigation. *Following an ISS, an empty oxygen tank identified during a mock code is submitted through the Simulation Program's reporting process, shared with local leadership and Quality and Safety, and tracked in a shared log. The Charge Nurse documents the replacement, and the Simulation Program receives confirmation and provides a brief update to unit staff.*	partnering with organizational leaders and quality and safety teams. • LST mitigation is tracked and verified to completion with accountability as outlined in the above bullet point. • Simulation program tracks and is involved in bi-directional communication related to completed action items for LST mitigation. *Following an ISS, the empty oxygen tank is entered into the organization's safety event system, risk-ranked, and assigned to a responsible leader. A systemwide audit of oxygen tank readiness is initiated, with all units documenting mitigation steps. Quality and Safety verifies closure, and the Simulation Program receives ongoing updates and communicates the outcome to stakeholders, local leadership, and staff.*

Simulation Validation *The use of simulation to verify LST mitigation.*	• Simulation may be used to validate LST mitigation, retest interventions, and ensure sustained mitigation or determine if further refinement is needed. • Introduce the need for integration of simulation into organizational safety and process improvement. *During an airway ISS, staff discover that the video laryngoscope battery is dead. After the battery is replaced, the facilitator later incorporates a brief airway check into a routine skills session to confirm the device powers on correctly. The validation is limited, informal, and not linked to broader safety processes.*	• Simulation is occasionally used to validate LST mitigation, retest interventions, and ensure sustained mitigation or determine if further refinement is needed. At a minimum, simulation is used on critical or high-risk LSTs as identified by a perceived need. • Strengthen the integration of simulation into organizational safety and process improvement. *During an airway ISS, staff discover that the video laryngoscope battery is dead. After replacing the battery, the Simulation Program schedules a focused ISS to verify that staff consistently perform pre-shift video laryngoscope checks. The results are documented in the LST tracking system and shared with local leadership and the*	• Simulation is routinely used to validate LST mitigation, retest interventions, and ensure sustained mitigation or determine if further refinement is needed. At a minimum, simulation is used on critical or high-risk LSTs as identified by risk and priority ranking tools. • Formalize the integration of simulation into organizational safety and process improvement. *During an airway ISS, staff discover that the video laryngoscope battery is dead. Following mitigation of the battery, the issue is incorporated into a formal validation cycle developed with Quality and Safety leaders. Simulation is used to test the entire readiness process, including equipment stocking workflows, battery charging routines, and escalation pathways when devices fail. Outcomes are integrated into organizational improvement systems, and sustained compliance is monitored in part through repeat scheduled validation simulations across units.*

		Quality and Safety team. Simulation is used regularly for validation, especially for higher-risk equipment issues identified through risk-ranking tools.	

For recommended implementation steps to attain Tier 3, see Appendix E.

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Appendix A

Examples of Simulation Methodologies and Debriefing Tools/Frameworks to Detect LSTs

Tool / Framework	Description	Application	Evidence
Summarize, Anchor, Facilitate, Explore, Elicit (SAFEE)	A structured debriefing approach to identify LSTs in simulation-based hospital design testing.	Centered on environmental and system factors, particularly used in early facility design stages to uncover design-related latent threats.	This tool was applied during the pre-construction phase of a new hospital and helped to uncover LSTs related to poor layout, workflow inefficiencies, or hazards in the built environment. The tool is grounded in systems engineering and human factors; however, it is not yet validated (Coleman, Dalpiaz, Walter, Chambers, & Hebbar, 2020).
Promoting Excellence and Reflective Learning in Simulation (PEARLS) for Systems Integration	A debriefing framework designed to identify system-level issues during systems-focused healthcare simulations.	To guide a structured debriefing to detect and identify LSTs before they impact patient care and safety.	This framework demonstrated positive identification of LSTs and improving system processes; validation is evolving (Dube et al., 2019).

Appendix B

Examples of Simulation Methodologies to Detect LSTs

Tool / Framework	Description	Application	Evidence
Simulation-based Clinical Systems Testing (SbCST)	Systems-focused healthcare simulation methodology to detect and identify LSTs. Integrates human factors and systems engineering principles to assess how teams, equipment, and environments interact under realistic conditions.	Enables interdisciplinary teams to stress-test systems in a simulated but authentic context, identify workflow hazards, and validate corrective actions prior to patient occupancy or go-live.	SbCST was implemented across multiple stages of hospital space development—from initial intake and workflow mapping to final testing. The study demonstrated that SbCST identified critical latent safety threats, such as poor equipment placement, communication breakdowns, and workflow inefficiencies, allowing for system redesign before patient care began (Coleman, Dalpiaz, Walter, Chambers, & Hebbar, 2020).
Simulation-based Hospital Design Testing (SbHDT)	A structured simulation approach used to evaluate hospital design and infrastructure during early planning or pre-occupancy stages. Focuses on identifying design-related latent safety threats, ergonomic challenges, and workflow inefficiencies.	Conducted during the pre-construction, mock-up, or commissioning phases of new healthcare facilities. Insights from simulation scenarios guide design modifications that enhance safety, efficiency, and user experience.	SbHDT was used in conjunction with the SAFEE debriefing tool to evaluate a new hospital design. Simulation revealed latent safety threats related to room layout, staff visibility, and equipment accessibility. The findings directly informed architectural modifications prior to facility opening, improving safety and workflow. (Coleman, Dalpiaz, Walter, Chambers, & Hebbar, 2020).

Appendix C

Examples of LST Categorization Taxonomies

Tool / Framework	Description	Application	Evidence
Systems Engineering Initiative for Patient Safety (SEIPS)	A human factors-based framework that models healthcare systems as interactions between people, tasks, tools/technologies, environment, and organizational conditions. Versions include SEIPS 1.0 (2006), 2.0 (2013), and 3.0 (2019).	Used to analyze and improve work systems and processes in healthcare. Applied in simulation debriefs and system assessments to identify LSTs by examining system components.	SEIPS has been used in national scale in situ simulations in operating theaters, demonstrating its utility in identifying LSTs and informing system redesigns. SEIPS 101 provides simplified tools for frontline use (Long, Webster, Holliday, Torrie, & Weller, 2022).
London Protocol	A structured method for analyzing clinical incidents using a systems approach. Focuses on understanding contributory factors across eight domains (e.g., task, individual, team, work environment).	Applied in incident investigations, simulation debriefs, and safety reviews. Adaptable for quick team-based reflections or in-depth analyses.	Widely used globally in hospitals, mental health, and community care. The 2024 update emphasizes patient/family engagement and system-level learning (Long, Webster, Holliday, Torrie, & Weller, 2022).
Joint Commission on Accreditation of Healthcare Organizations (JCAHO)	A standardized taxonomy for classifying patient safety events, including near misses and adverse events. Organized into five root nodes: impact,	Used in safety event reporting systems and root cause analyses to standardize data collection and facilitate learning across healthcare systems.	Developed through literature review and stakeholder input. Demonstrated utility in ICU safety reporting systems and sentinel event analyses (Chang, Schyve, Croteau, O'Leary, & Loeb, 2005).

	type, domain, cause, and prevention/mitigation.		
Agency for Healthcare Research & Quality (AHRQ) Common Formats	AHRQ-developed standardized definitions and formats for reporting patient safety events across care settings (hospitals, nursing homes, pharmacies). Includes Event Reporting and Surveillance formats.	Used by Patient Safety Organizations (PSOs) and healthcare providers to collect and submit standardized safety data to the Network of Patient Safety Databases (NPSD).	Enables national aggregation and analysis of safety data. Supports learning and improvement through consistent reporting and feedback mechanisms (AHRQ, 2025).
Press Ganey Healthcare Performance Improvement (HPI) Failure Modes Taxonomy	A taxonomy categorizing safety events into Individual and System Failure Modes. Includes Serious Safety Event Classification (SEC) and Serious Safety Event Rate (SSER) metrics.	Used in simulation debriefs and organizational safety programs to classify and trend LSTs. Supports proactive risk mitigation and performance benchmarking.	Adapted for simulation-based LST identification in Joint Commission studies. Demonstrated utility in tracking LST rates and informing safety interventions (PressGaney, 2023).

Appendix D

Examples of Risk and Priority Ranking Tools

Tool / Framework	Description	Application	Evidence of Validation
SAFER Matrix (Survey Analysis for Evaluating Risk)	Used to rank risk and prioritize latent safety threats (e.g., environment, communication), often following in-situ simulations with re-testing of mitigation.	Used after in-situ simulation and during reporting and follow-up to stratify latent threats by category and risk (e.g., Environment, Communication). LST mitigation or mitigation actions are implemented and may be re-simulated to confirm threat elimination.	Recent peer-reviewed application: in situ simulations using SAFER Matrix to prioritize LSTs before opening new care spaces, with successful reassessment showing threat reduction (Miller, Bloom, Kons & White, 2025).
FMEA (Failure Modes Effects Analysis) **HFMEA (Healthcare Failure Mode and Effect Analysis)**	Combines prospective failure mode analysis with simulation observation to identify and prioritize LSTs by risk priority number.	Prospective risk analysis where in situ simulations help observe and prioritize failure modes by likelihood, severity, and detectability—yielding risk priority numbers (RPNs).	Methodology validated in academic literature: using in situ simulations augmented with FMEA enhances detection and allows ranking by severity and likelihood (Nielsen, Dieckmann, Mohr, et al., 2014).

Appendix E

Recommended Tier 3 Implementation Steps

1. **Select Validated Frameworks/Tools**
    - Detection
    - Debriefing
    - Categorization Taxonomy
    - Risk/Prioritization
2. **Train Facilitators and Stakeholders**
   Provide formal training on the chosen framework, including its taxonomy, scoring (e.g., for FMEA), and structured debriefing protocol.
3. **Integrate into Organizational Governance**
   Embed the tool within safety leadership workflows—link outputs into safety dashboards, quality reports, and capital planning processes.
4. **Report with Structure and Impact**
    - Use the validated tool's framework to categorize and present LSTs clearly.
    - Include data-driven metrics (e.g., RPNs from FMEA, risk categories from SAFER).
    - Highlight reductions in repeat threats and system enhancements.
5. **Confirm Mitigation through Re-testing**
   Use simulation to re-assess mitigated LSTs, ensuring resilience of interventions.