Application of CAST in Site Identification Safety in Interventional Radiology (IR)

September 23rd, 2024

Jasmine Ghorbani, Melissa Marquez, Patrick Samedy

Division of Quality & Safety

Memorial Sloan Kettering Cancer Center

Initial Introduction

Overview

Background

Wrong site procedures are known as preventable “never events” that occur in very low volumes, requiring the need to sustain a highly resilient system. Site identification is a key element of prevention of wrong site procedures.

Goal

Address site identification related issues with a novel approach:
a **Systems Analysis** that incorporates **Human Factors** principles

If successful, transfer what is learned in IR into other procedures involving site identification.

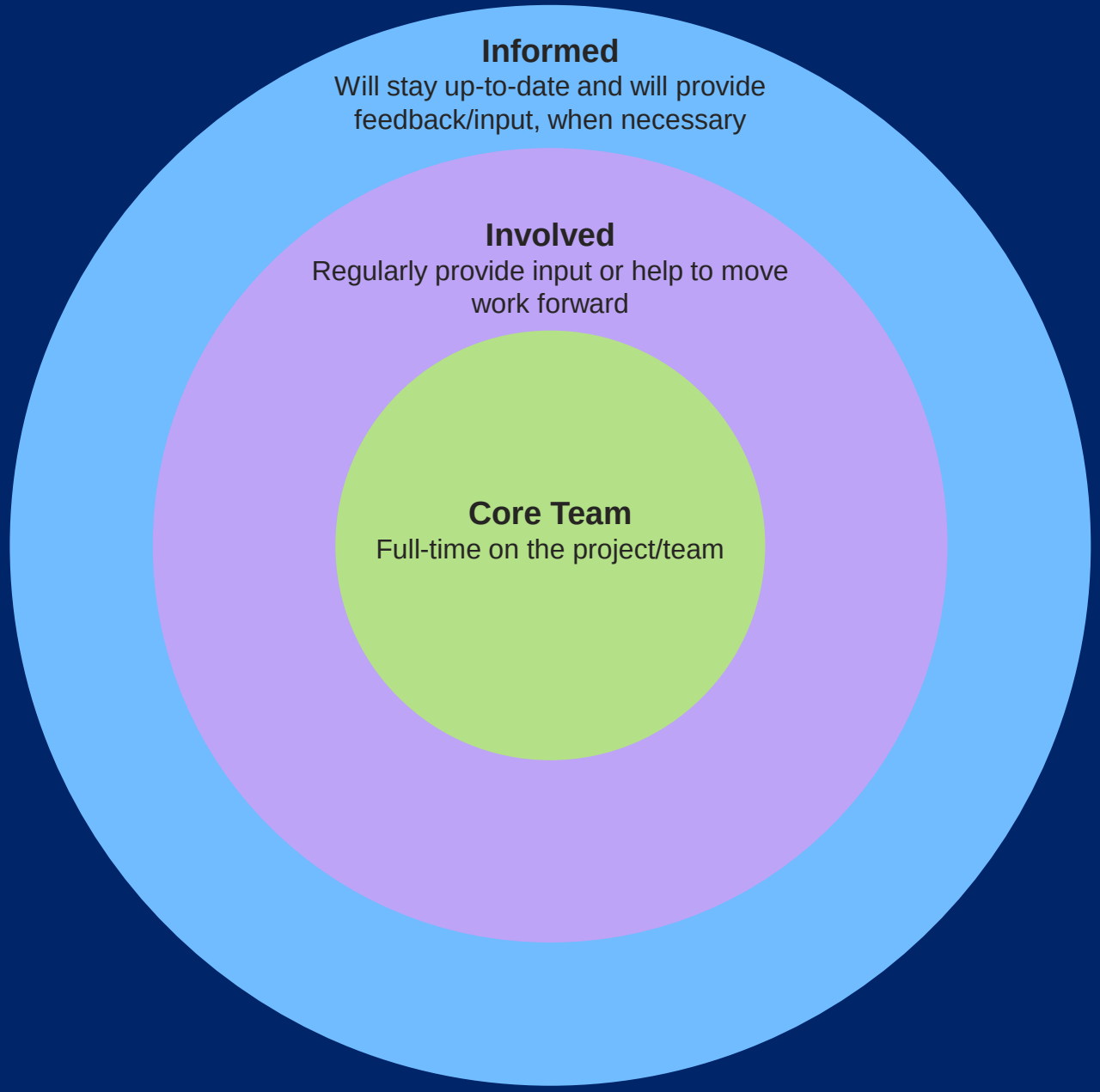
Wrong Site Surgery made up **8%** of all sentinel events reviewed by the Joint Commission in 2023 [1]

The Joint Commission. (2024). The Joint Commission Sentinel Event Data 2023 Annual Review. https://www.jointcommission.org/-/media/tjc/documents/resources/patient-safety-topics/sentinel-event/2024/2024_sentinel-event-_annual-review_published-2024.pdf

Project Management

Methods

- DMAIC* Process
- Stakeholder Analysis
- Project Charter
- Change Coalition Diagram
- Project Dashboard
- Monthly Project Updates



*DMAIC= Define, Measure, Analyze, Improve, Control

Project Management

Stakeholder Analysis & Management

"Core Team"

Project Managers/Engineers
- *Facilitate meetings*
- *Perform systems safety analysis and make recommendations*
- *Send project communications*

Project Champions
- *Provide project credibility, department perspective, and project guidance*
- *Facilitate support among department members*

IR Quality & Safety Representative
- *Participate in interviews & provide feedback*
- *Provide relevant event/trend information*

"Involved"

Subject Matter Experts (IR Clinical Roles)
- *Participate in interviews*
- *Provide feedback and confirmation of workflows*
- *Provide relevant resources*
- *Attend recurring meetings, as needed*

"Informed"

Project Sponsors
- *Identify strategic priorities*
- *Provide departmental support and resources*
- *Escalate key project matters to appropriate department/roles*
- *Authorize the implementation of recommendations*

Project Management

DMAIC Project Timeline

Define

- Identify project scope, goals, and stakeholders
- Kickoff Meeting with project team

Measure

- Collect baseline data to assess current state
- Pre-Project Survey
- Conduct on-site observations, interviews, and focus group sessions with IR frontline staff

Analyze

- Human Factors SEIPS
- Culture Focus Groups
- CAST Analysis

Improve

- Prioritize recommendations with project team
- Re-engage staff through Frontline Implementation Team meetings
- Create & maintain a Recommendation Tracker
- Implement recommendations

Control

- Monitor impact of implementations by tracking project metrics
- Post-Project Survey
- Check in with project team and staff for feedback

Project Indicators

Baseline Metrics

Lagging Indicators:

- No. of events that reached the patient
- No. of days since last event

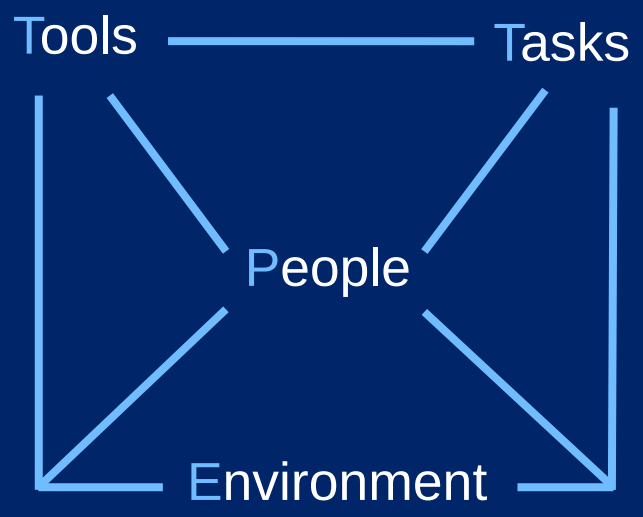
Leading Indicators:

- No. of near-misses
- No. of orders that had updated laterality
  - Right to Left
  - Left to Right
- Patient Safety Culture survey responses

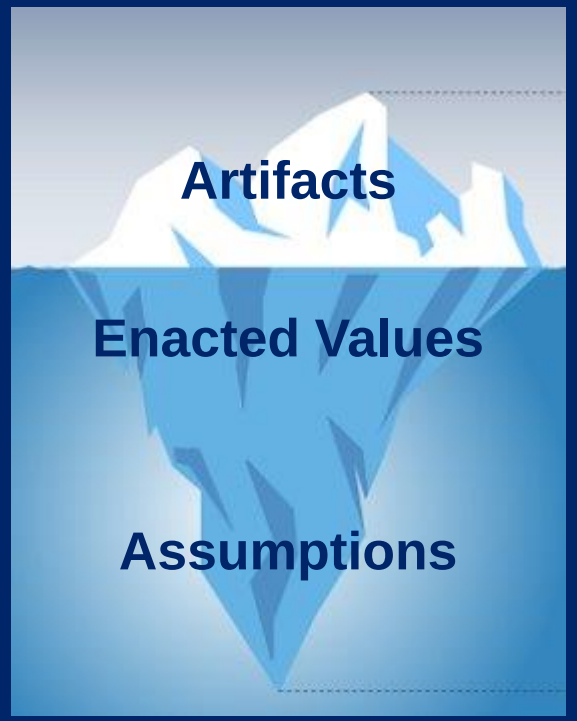
Analysis Approach

Methods

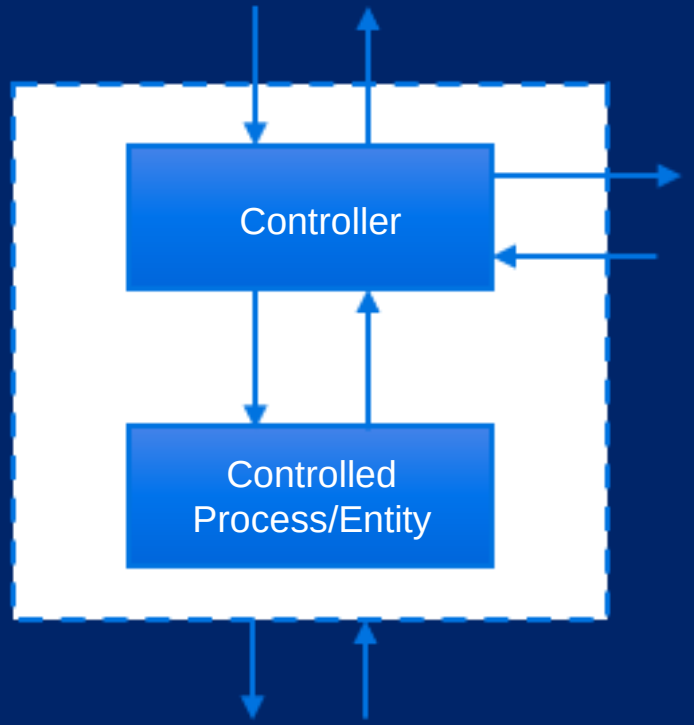
Human Factors SEIPS Analysis



Safety Culture Assessment



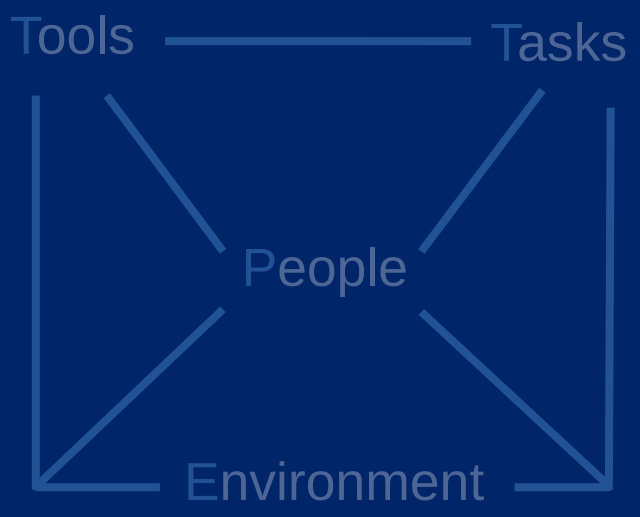
Systems Safety CAST Analysis



Analysis Approach

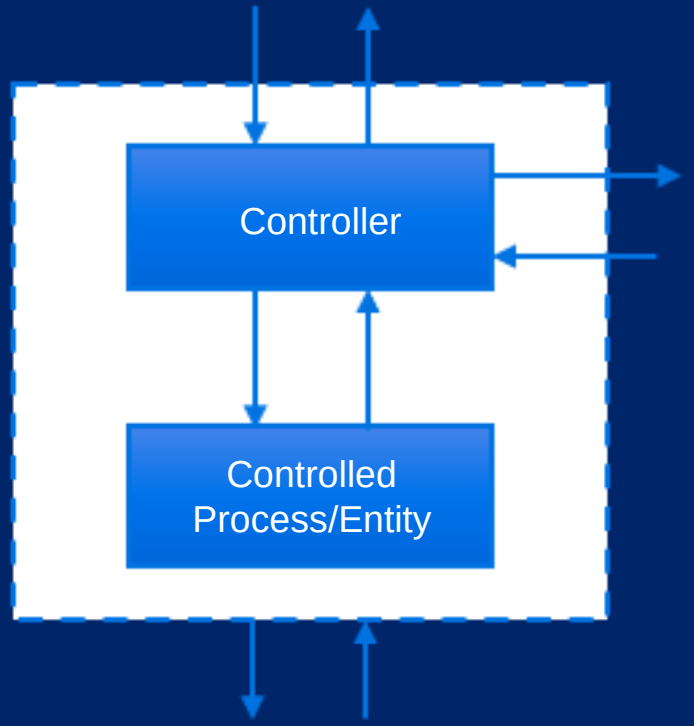
Methods

Human Factors SEIPS Analysis



Safety Culture Assessment

Systems Safety CAST Analysis



CAST Analysis

Approach

Data Sources

- Multiple patient safety events and near misses:
  - Voluntary reporting system
  - Internal Quality Review Reports
  - State Reportable RCA Reports
  - Observations & Interviews

Analysis Team

- Systems Engineers:
  - Analysis leads
- Subject Matter Experts:
  - System details, validation
- Clinical Quality Manager:
  - Past analysis/event details, validation

Platforms

- Apps:
  - MS Excel spreadsheet
  - Miro
- Learning material:
  - CAST Handbook
  - CAST Tutorial videos
  - Publications

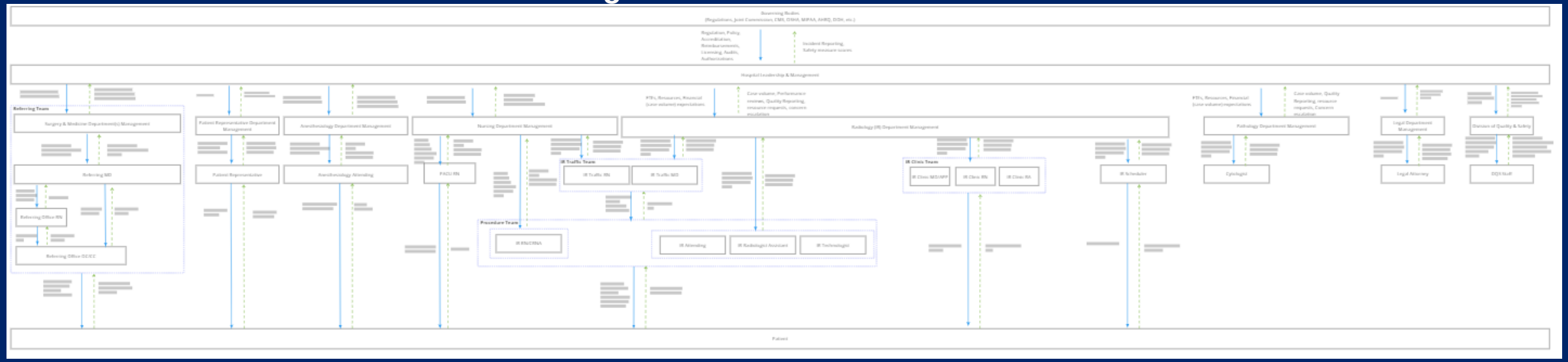
Average Hours per CAST Step*

*Performed among multiple projects and engagements

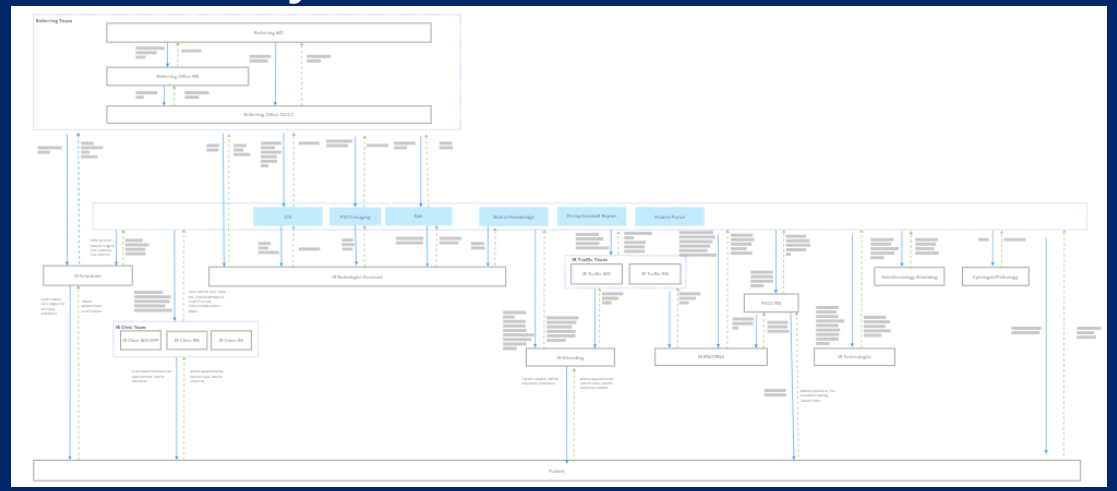
CAST Analysis

Multi-Level Control Structures

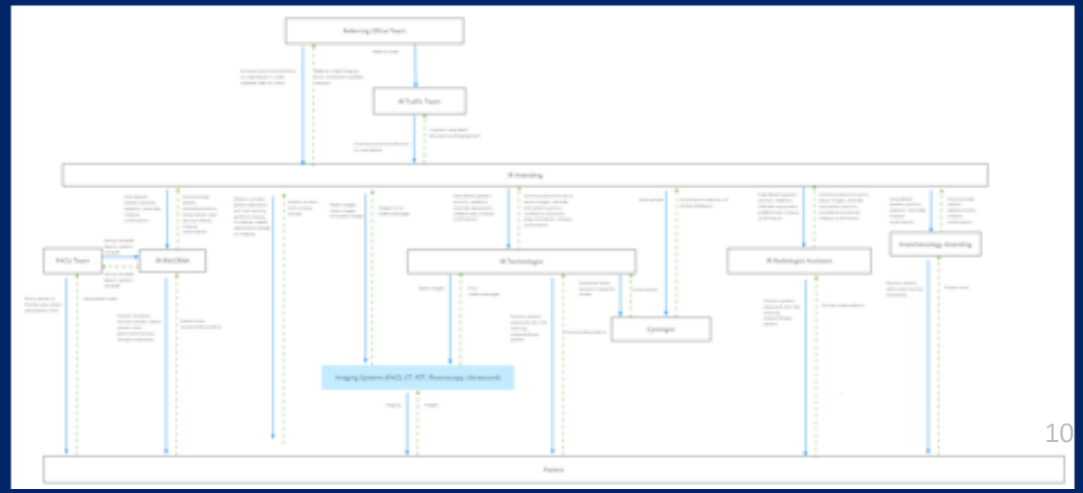
High-Level Control Structure



Systems Control Structure



Procedure Control Structure



CAST Analysis

Controllers

No.	Controllers
C-1	Referring MD
C-2	Referring Office
C-3	IR MD
C-4	IR Traffic Team
C-5	IR Radiologist Assistant
C-6	IR Nurse
C-7	IR Technologist
C-8	IR Anesthesiologist
C-9	IR Scheduler
C-10	Patient
C-11	Surgery
C-12	Radiation Oncology
C-13	Pathology
C-14	Patient Representative
C-15	Diagnostic Radiology
C-16	Pre-Surgical Care Nurse
C-17	Post-Anesthesia Care Unit Nurse
C-18	Governing Bodies
C-19	Hospital Leadership & Management
C-20	Department-level Management
C-21	Legal Department
C-22	Division of Quality and Safety
C-23	Pharmacy
C-24	External Vendors
C-25	IR Clinic MD/NP/PA
C-26	IR Clinic RN
C-27	IR Clinic RA
C-28	Imaging systems
C-29	EHR
C-30	Scheduling
C-31	Patient Portal
C-32	Perioperative Handoff Report

CAST Analysis

Systems Losses & Hazards

No.	System Losses
L-1	Loss of life or harm due to incorrect site biopsy
L-2	Loss of life or harm due to lack of biopsy
L-3	Loss of life or harm due to untimely biopsy/diagnosis
L-4	Loss of patient satisfaction
L-5	Damage to organization’s reputability
L-6	Loss of data integrity
L-7	Loss of resources (Procedure time slot, medication/equipment, staff)
L-8	Legal repercussions

No.	Hazards
H-1	Inaccurate/incomplete biopsy referral order
H-2	Inaccurate/incomplete clinical documentation
H-3	Wrong side/site biopsied
H-4	Insufficient side/site(s) biopsied
H-5	Incorrect equipment utilized
H-6	Incomplete timeout
H-7	Delay in biopsy/diagnosis
H-8	Insufficient appointment/rooms
H-9	Incorrect patient postioning
H-10	Incorrect site marking
H-11	Lack of/poor communication between procedure room staff
H-12	Miscommunication between care team

CAST Analysis

Safety Constraints

No.	Safety Constraints
SC-1.1	Referring Office must ensure accurate/complete biopsy referral order entry
SC-1.2	There must be a reconciliation process to confirm referral order accuracy and completeness
SC-1.3	EHR Referral Order must re-entered when update is needed
SC-2	Clinical documentation (Case details, Clinical notes, etc.) must be accurate and complete
SC-3.1	Correct site and side must be biopsied
SC-3.2	Measures must be taken to reduce repeat biopsies
SC-3.3	Consenting process to review procedure site/side with patient
SC-4	All intended sites and sides must be biopsied
SC-5	The appropriate equipment must be utilized
SC-6	Timeouts must be performed completely, with all necessary roles present
SC-7	Timely biopsies/diagnoses
SC-8	Appropriate case prioritization by traffic team
SC-9.1	Patient must be properly positioned prior to start of procedure
SC-9.2	There must be agreement/consensus regarding patient positioning prior to procedure prep
SC-10	Correct and effective site marking must be performed
SC-11	Effective communication between procedure room staff
SC-12	Effective communication between care team
SC-13	There must be sufficient and properly allocated resources

CAST Analysis

Event Analysis Template

No.	Year	Actual or Near Miss?	Short Description	Event Description	Losses	Hazards	Controller(s)	Safety-Related Responsibilities	Role in Event/ Contributions (UCAs)	Questions	Process (Mental) Model Flaws	Questions	Contextual Factors	Questions	System Flaws	Questions

CAST vs. RCA

Comparison

	RCA	CAST
Approach	**Linear** approach that looks to identify **the root cause** following an event	**Holistic** approach that looks to identify lack of **system controls** with surrounding processes that could contribute to similar events happening
Tools/Methods	**Ambiguous** analysis process including potential use of tools such as Fishbone diagram, 5 Whys, etc.	**Structured 5-step analysis process** using systems theory and control structures with feedback loops
Outcomes	Often over-simplified, **single root cause statement**	Robust **list of system-wide contributions** to the event

Project Management

Implementation & Tracking

1. **Documentation of Findings**
   - CAST Spreadsheet
   - CAST Control Structure
   - Risk Register
2. **Implementation Phase**
   - Stakeholder Involvement in Prioritization
   - Frontline Implementation Teams
   - Delegation of Action Items
   - Recurring Project Update Meetings
   - Pre-Implementation Survey
3. **Project Tracking**
   - Post-Implementation Survey
   - Post-Patient Safety Culture Survey
   - Project Dashboard
   - Metrics Dashboard

Key Takeaways

1. CAST is a **valuable approach** to review patient safety events **holistically** and **comprehensively**

2. A **multi-event approach** to CAST is feasible and insightful
   - Recommend applying CAST or preparing CAST-specific questions to events as soon as they happen

3. CAST analysis has proven to generate **unique findings** outside of other analysis methods
   - RCA, SEIPS, Culture Analysis, Contextual Inquiry
   - Identified seemingly innocuous risks within the system

4. **Frontline insights** and **involvement** are **essential** to form an understanding of the system to perform CAST
   - Engage stakeholders early
   - Spend time to earn Frontline trust
   - Observations, interviews, focus groups are invaluable data sources
   - Involve in implementation process

Thank You