

Opened “Just In Case”: How Uncertainty Shapes Equipment Decisions in Surgery

A proposed simulation-based behavioural study using the SUSTAIN operating-theatre laboratory
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The dilemma: be prepared or avoid waste?

Operating theatres account for roughly 30% to 70% of total hospital waste in the UK National Health Service (NHS), making them one of the most resource-intensive environments in healthcare. They are dependent on **sterile equipment, single-use products and complex preparation processes**.

During surgery, teams may open sterile equipment before they know whether it will be needed.



Having it ready can help them respond quickly if plans change.



However, once opened, an unused item may have to be discarded, **creating waste and cost**.

What don't we know?

Research Gap: Existing waste audits to mitigate waste tell us which items went unused but rarely explain why they were opened in the first place. Was someone expecting a change in the procedure? Was equipment hard to access? Was a request unclear? To reduce waste safely, **we first need to understand the circumstances behind these decisions**.

Our research question

How do operating-theatre staff make decisions about opening sterile equipment during surgical procedure setup under conditions of uncertainty?

The idea behind the study

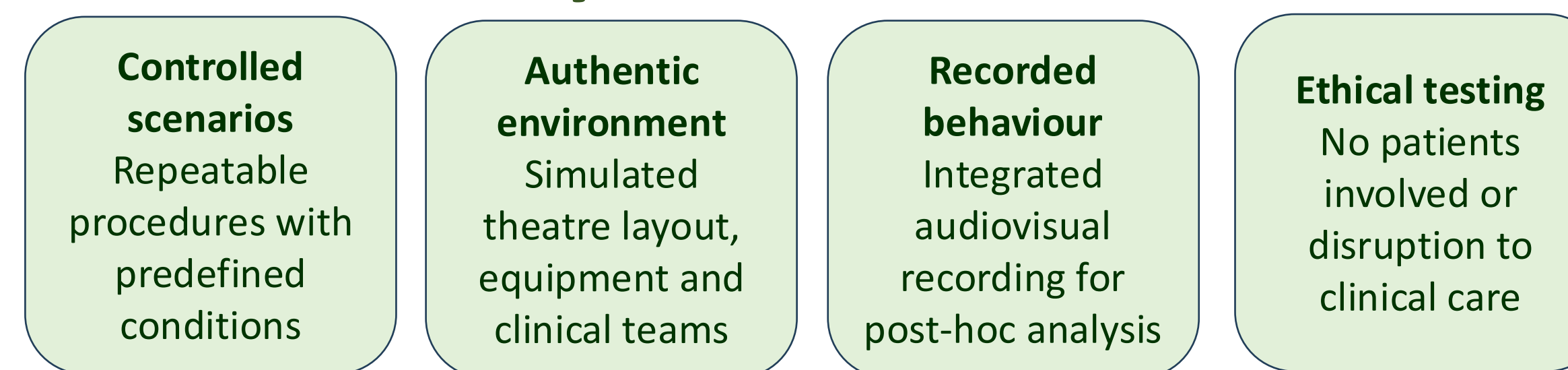


By following each step, we can understand what led to an item being opened – not just whether it was used.

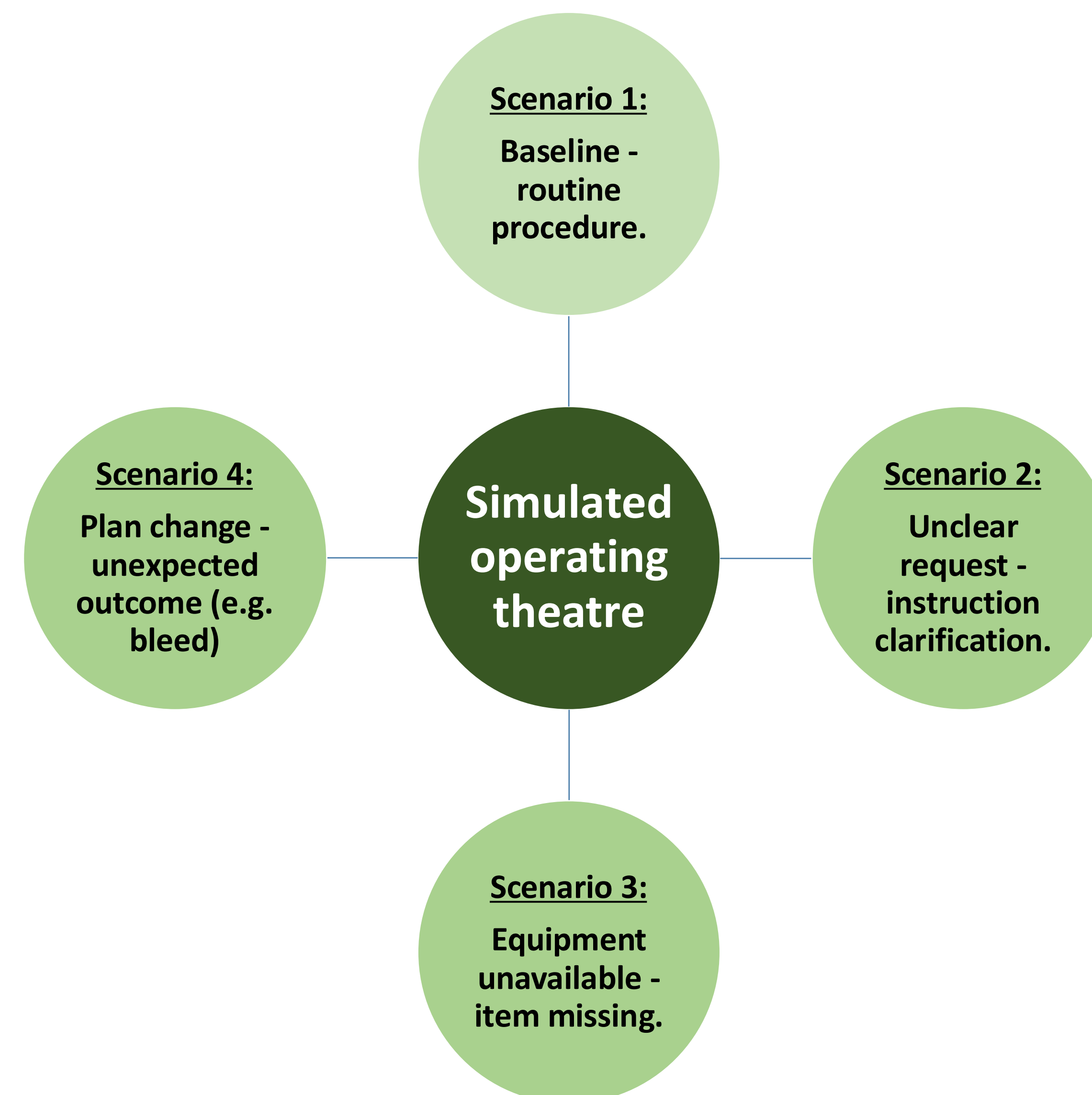
How will we study these decisions?

We propose observing multidisciplinary surgical teams in **SUSTAIN, a simulated operating theatre at the University of Leeds**.

Why use SUSTAIN?



What will teams encounter?



What will we observe?

For each equipment decision, we will record:

- **The trigger:** What happened just before the decision?
- **The response:** Who decided to open, wait, or seek clarification?
- **The outcome:** Was the item used or left unused?

We will also record preparation time and invite team members to explain their reasoning in a short debrief.

How will we make sense of the data?

Quantitative data: What happened?

- Count how many items were opened and how many went unused in each scenario.
- Compare when items were opened and whether staff opened them in anticipation or after a request.

Qualitative data: Why did it happen?

- Review observations and team debriefs with qualitative coding to understand what staff were responding to, how they communicated and why opening an item felt necessary at the time.

Mixed-methods integration: Quantitative patterns and qualitative explanations will be combined to determine what occurred and why.

The **COM-B and sociotechnical systems theory** will help us consider both individual behaviour and the conditions shaping it, such as communication, team roles, and equipment access.

From Evidence to Possible Solutions

If we understand why equipment is opened early, we can identify changes that support teams when uncertainty arises. The study could point towards:

Uncertainty identified	Potential intervention pathway
Unclear requests	Confirm what is needed before opening equipment.
Difficulty locating equipment	Improve stock visibility and access.
Changing procedural plans	Agree on when additional equipment should be prepared.
Unclear team roles	Clarify who requests and who opens them.

Key Takeaway

“Uncertainty is unavoidable in surgical care. However, unnecessary waste does not have to be.”

By understanding why teams open equipment “just in case,” we can identify ways to reduce avoidable waste while keeping them prepared for the unexpected.

Project status: Proposed simulation study informed by formative methodological observation; no patient-level findings are reported.



References

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