iCount

A Human-Centred Swab Counting Innovation With High User Confidence and Demonstrated Time-Saving Compared With Traditional Counts – A Step Towards Reducing Retained Swabs in Maternity

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Introduction: The Problem

Retained swabs remain the most common retained surgical item globally, with a significant number retained vaginally after childbirth in the UK.
NHS England classifies these as "Never Events".
Despite protocols, these events continue due to factors like distraction, confirmation bias, and cognitive overload during emergencies.

Inspired by need

After a series of incidents in the region and nationally where the patients went through sepsis, other complications and mortality, a team was formed to reflect and try to address -(Year 2017-18)

Hierarchy of Controls

Development : The Human Factors – Ergonomics Approach
was deemed essential

- One of the authors enrolled on a University MSc programme and did a qualification.
- Human Factors Analysis done using SEIPS, Hierarchical task Analysis, and Bow-Tie diagrams.

- HSSIB investigation 2019 made the same recommendations :
Design of tools and task in addition to Education and Training
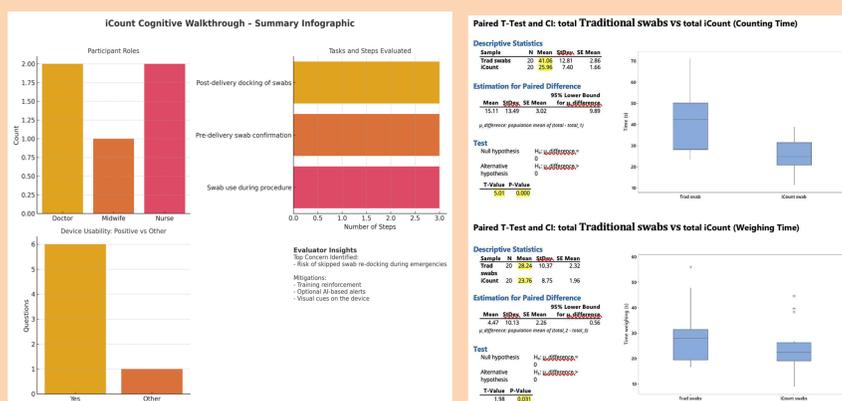
Cognitive Walkthrough feedback (2024)
Comb-like slot design makes swab use and re-docking intuitive, with built-in visual cues to minimise error. Usability is high in simulated conditions, with a critical emphasis on training and post-use swab reinsertion.

Simulation Evaluation (2023)
· 36.8% reduction in swab counting time (from 41.06s to 25.96s, p < 0.001)
• 15.9% reduction in blood loss weighing time (p =0.031)
• 100% of users reported increased confidence in identifying missing swabs

Conflict of interest
Initial 1-year development was NHS-led; later development required an SME spin-out for Innovate UK funding eligibility.
Authors are shareholders.

Aims & Objectives
To design and implement a practical, human-factors-engineered intervention that
Makes it easy to count surgical swabs and surgical tampons accurately

What is iCount?
A sterile, single-use docking clip that anchors swab tapes visibly
• Reinforces swab counting through visual and tactile feedback
• Works as a standalone tool or integrates with optional AI software
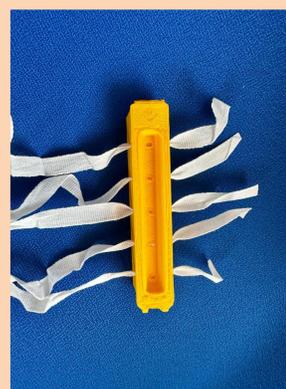
Human Factors Design Impact as a Physical checklist
• Docking slots act as real-time visual cues for missing swabs
• Intuitive use validated through cognitive walkthroughs
• Promotes shared team awareness and error detection

Digital Integration as a Connected (IoT) Device
• Optional mobile app with AI verifies counts and alerts mismatches
• Example:
5 swabs docked pre-op vs 4 detected post-op triggers alert
• Photo documentation of timestamps for data support digital audit trail

Scan for Resources and more info

Iterative design developed with human factors expertise and patient public involvement
17 Simulation cycles and cognitive walkthrough with users
18 prototypes with user feedback at every stage

Conclusion
iCount supports the workforce in delivering safer care and is designed to mitigate the risk of swab retention.
Combining human-factors engineering with user-centred design, it strengthens vigilance, aligning with NHS safety strategies.

Next steps
• Clinical adoption via Kimal Maternity - September 2025
• NHS pilot studies and wider feedback

AI-Computer vision software
• Integration with Electronic Medical Records

References

1. **NHS England** – NatSSIPs 2 standards – *NHS England*, 2023
2. **Steelman** – Retained surgical sponges study – *AORN J*, 2018
3. **HSIB** – Retained swab after vaginal birth – *HSIB Report*, 2020
4. **AORN** –Importance and case for Adjunct technology – *AORN*, 2024
5. **Gawande** – Checklist Manifesto (book) – *Profile Books*, 2010
6. **Elgharably**– iCount system to reduce swab retention – *BMJ Innov*, 2024