



Health Services Safety  
Investigations Body

## Interim report

# Retained swabs following invasive procedures: themes identified from a review of NHS serious incident reports

**Date Published:**

16/04/2024

**Theme:**

Medical devices,Checking,Surgical

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## Contents

[About this interim report](#)

[Introduction and background](#)

[Purpose of this interim report](#)

[Overview of retained swab events](#)

[Impact on patients](#)

[Thematic analysis](#)

[How retained swab events are currently investigated](#)

[Characteristics of retained swab events](#)

[Who is responsible for the reconciliation of swabs?](#)

[How is information about swabs communicated?](#)

[How visible is a swab?](#)

[Who is in the team?](#)

[When did the swab count occur?](#)

[What was the type and duration of procedure?](#)

[What was the impact of professional culture and practice?](#)

[Were there any distractions or interruptions?](#)

[Were there any competing tasks?](#)

[Was there time pressure or perceived time pressure?](#)

[What time of day did the procedure take place?](#)

[How clear are policies and guidance?](#)

[Next steps](#)

[References](#)

## **About this interim report**

This interim report contains facts which have been determined up to the time of issue. It is published to inform healthcare organisations and the public of the general circumstances of events and incidents and should be regarded as tentative and subject to alteration and correction if additional evidence becomes available.

This is a legacy investigation completed by the Health Services Safety Investigations Body (HSSIB) under the NHS England (Healthcare Safety Investigation Branch) Directions 2022.

## **Introduction and background**

### **Purpose of this interim report**

The Health Services Safety Investigations Body (HSSIB) is conducting an investigation into events involving retained swabs following invasive procedures. Swabs are sterile pieces of gauze which are used to absorb bodily fluids such as

blood during an invasive procedure. An invasive procedure is ‘a procedure that is performed where a hole or incision is made or via a patient orifice and usually where a documented consent is required’ (Centre for Perioperative Care, 2023). A retained swab event is when a swab is unintentionally left inside a patient’s body after an invasive procedure.

To explore this issue, the investigation used a real patient safety incident involving a patient who had undergone heart surgery. Following their surgery, a chest X-ray identified that a surgical swab had been retained. The patient returned to the operating theatre and the swab was removed. Later, a chest X-ray identified another surgical swab in the same location within the patient’s chest. The patient went back to the operating theatre and the second swab was removed.

As part of the wider investigation, HSSIB analysed and identified common themes in 31 serious incident reports (investigation reports by local trusts into healthcare safety incidents) that had been conducted between September 2019 and September 2022, where a swab was unintentionally retained following an invasive procedure.

The investigation excluded serious incident report events related to retained vaginal swabs, which often occur in maternity settings. Although retained vaginal swabs are the most common foreign object to be unintentionally retained, the Healthcare Safety Investigation Branch (HSIB) has already investigated this type of event ([Healthcare Safety investigation Branch, 2019](#)).

This interim report presents the findings of the themes identified in the trust serious incidents reports. Some themes will be explored further as part of the investigation. The aim of this report is to share current understanding of where and how retained swab events occur, and to help healthcare organisations to take a proactive, systems-based approach to understanding and seeking to address this persistent patient safety concern.

## **Overview of retained swab events**

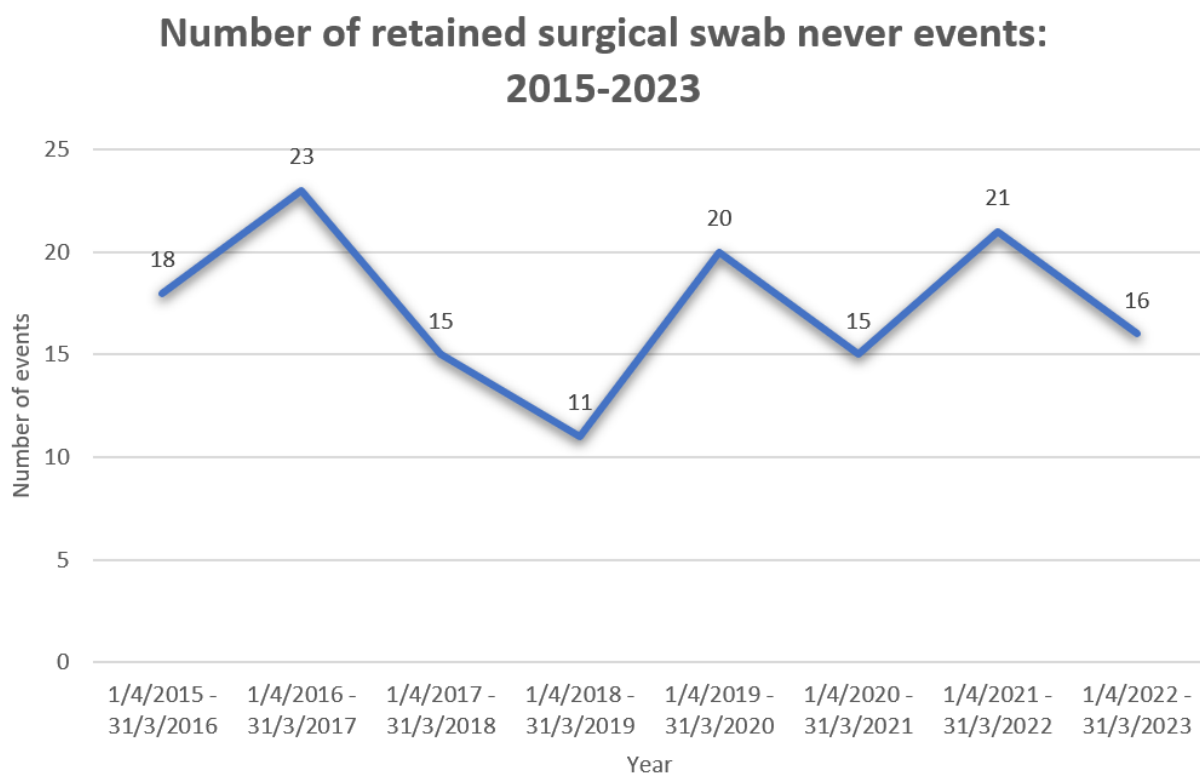
Incidents involving the retention of a swab following an invasive procedure that were not intended to be retained are a sub-type of ‘retained foreign object post procedure’ and so are classed as ‘Never Events’. The NHS defines Never Events as ‘patient safety incidents that are wholly preventable where guidance or safety recommendations that provide strong systemic protective barriers are available at national level and have been implemented by healthcare providers’ (NHS Improvement, 2018).

Never Event data from NHS England (2022) shows that the number of retained swab incidents varies each year, occurring between 11 and 23 times a year since 2015 (see figure 1).

A report called 'Opening the door to change' (Care Quality Commission, 2018) stated that for some Never Events, the strength of the barriers (the controls put in place to prevent them) is variable and potentially not as strong as originally thought.

The Never Event data in figure 1 only shows part of the wider picture - that is, it only captures incidents that were identified, reported and investigated.

**Figure 1 Number of retained surgical swab Never Events, 2015 to 2023**



The current process to prevent the unintended retention of a swab is to count the swabs that enter and exit the surgical field (the sterile area where the surgeon is operating) (Centre for Perioperative Care, 2023). The swabs are reconciled (that is, ensuring all the swabs are accounted for) before the closure of each layer within the cavity. At the end of the procedure, the World Health Organisation (WHO) (2009) surgical safety checklist confirms with staff that the swab and instrument count is correct.

It should be noted that the National Safety Standard for Invasive Procedures (NatSSIPs) (NHS England, 2015) were applicable at the time when the incidents analysed in the review of the trust serious incidents reports occurred. This guidance has since been updated with NatSSIPs2 (Centre for Perioperative Care, 2023).

## **Impact on patients**

The serious incidents reports reviewed by the investigation included comments made by patients and families who had experienced a retained swab following an invasive procedure. They talked about feeling distressed, worried, anxious, feeling frightened by what had or could have happened to them, and having issues sleeping as a result.

**‘This event has had a huge impact on me and my family. We have found it extremely upsetting and distressing. I have had to take time off work due to the anxiety I am experiencing.’**

The most common impact on patients was that they had to have further surgery to retrieve the swab. The retained swab following an invasive procedure event meant that some patients had prolonged hospital stays and had to take extended time off work.

## **Thematic analysis**

To understand the current themes and trends in retained swab serious incidents, HSSIB searched the Strategic Executive Information System, which is a national database for reporting serious safety incidents in healthcare. The search identified 59 serious incidents relating to retained swabs following an invasive procedure across 44 trusts between September 2019 and September 2022.

Attempts were made to contact all the trusts that had reported retained swab following an invasive procedure incidents and 31 relevant serious incident reports were made available to HSSIB.

The investigation analysed these reports using a recognised, structured approach (Braun and Clarke, 2006) to identify common themes and factors that contributed to the retained swab incidents.

The thematic analysis was based on trust serious incident investigation reports; the quality and depth of these investigations varied. Due to the nature of the incidents, some of the serious incident investigations were not able to identify exactly how and when the swab was unintentionally retained, and/or why it was not removed.

## **How retained swab events are currently investigated**

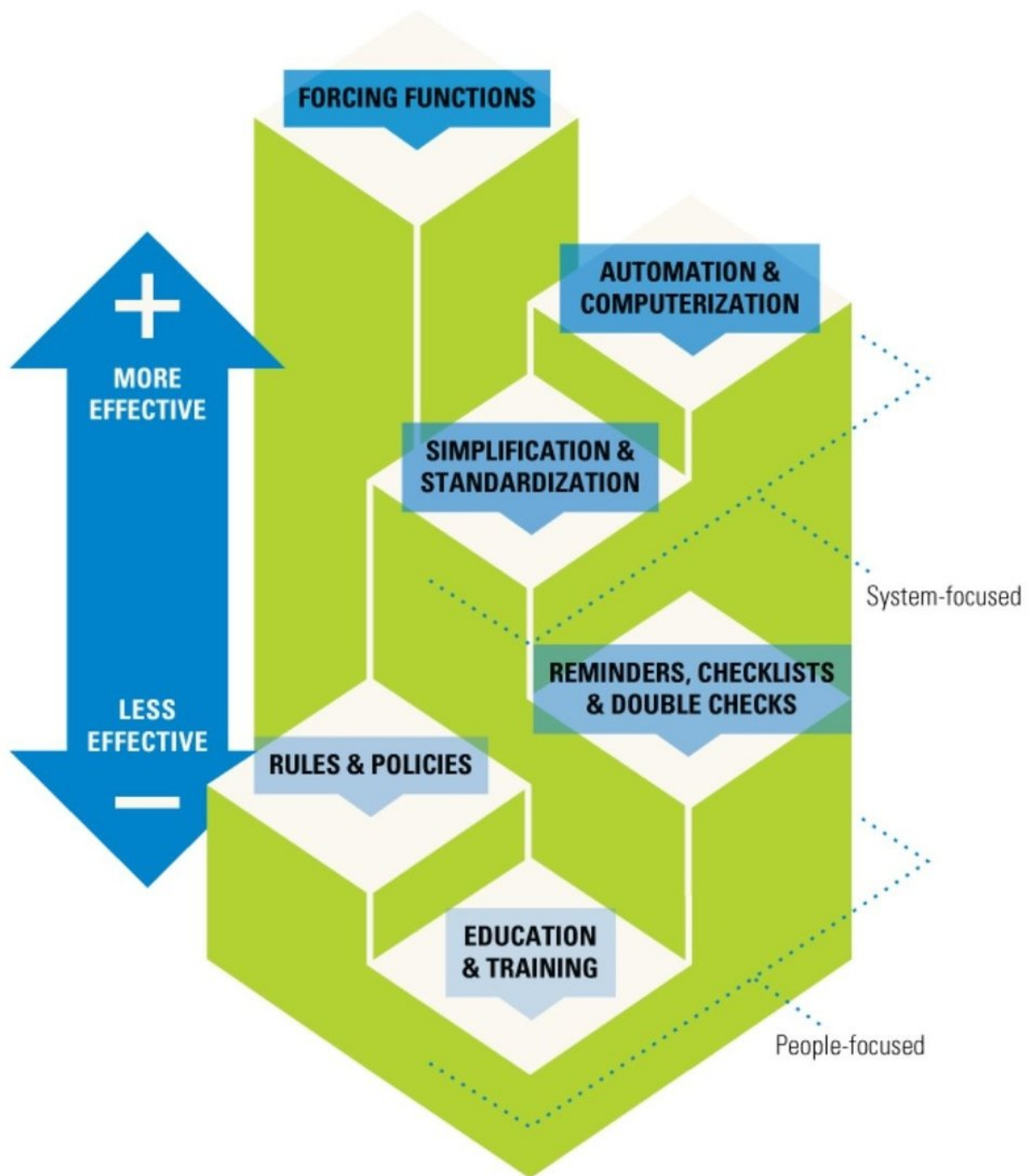
Many of the serious incident investigations reviewed were limited in their application of a systems-based approach. A systems-based investigation approach is based on the idea that safety incidents or accidents cannot be attributed to the behaviour of an individual component of the system and behaviour should only be considered within the context of the whole system. This is a 'way of thinking of the world in systems, emphasising interactions and relationships, multiple perspectives, and patterns of cause and effect' (Read et al, 2021). For example, a systems-based approach might consider the interrelationships between factors such as task complexity, technology, stress, fatigue, culture, organisation influences, equipment and environment.

The serious incident reports tended to focus on the actions of clinical staff. They included limited exploration of why things happened or consideration of the context in which the retained swab event took place, what made sense to staff at the time and the wider system factors that influenced the event. As such, many of the serious incident reports implied blame on individual staff members.

A summary of the recommendations made in the serious incident reports analysed can be seen in table 1. The investigation assessed each recommendation to determine whether it was people-focused or focused on another element of the system, with reference to the hierarchy of intervention effectiveness (Cafazzo and St-Cyr, 2012).

**Figure 2 Hierarchy of intervention effectiveness (Image from Cafazzo and St-Cyr, 2012)**

# The Hierarchy of Intervention Effectiveness



The hierarchy is a tool for ranking the effectiveness of measures used to reduce the risk of a safety event. Measures that rely on people are considered to be less effective.

## Table 1 Recommendations from serious incidents reports

<b>Recommendation</b>	<b>Number of reports</b>	<b>Focus on people or other system element?</b>
Remind staff to adhere to procedure	24	People
Staff training	24	People
Audit staff adherence to procedure	18	People
Review the process or policy	16	People
Improve communication	11	People
Make specific changes to policy	11	People
Make specific adjustment to procedural process	10	People
Staff reflection	8	People
Make adjustment to training	7	People
Minimise distractions to staff during swab count	7	People
Assess staff competency	6	People
Improve teamwork and culture	5	People
Change composition of team	4	People
Have a 'stop' moment for the count	4	People
Increase supervision	3	People
Standardise count board	3	System - equipment
Have a debrief with the team	3	People
Review and improve environment	2	People
Creating operating theatre standards of behaviours and expectations	2	People
Conduct risk assessment for certain cases	2	People / System - organisational
Not to have swabs in the operating theatre that are not detectable on X-ray	2	System - equipment
Standardise process	2	System - organisation
Use swab with tag to make them more visible	1	System - equipment
Improve time management	1	People
Improve leadership	1	People



<b>Recommendation</b>	<b>Number of reports</b>	<b>Focus on people or other system element?</b>
Improve family engagement	1	People
Change shift pattern	1	System - organisation
Reduce number of swabs provided in procedural pack	1	System - equipment
Surgeon to be involved in final swab count	1	People
Improved human factors integration into service reconfiguration, transformation and development of new tasks, policies and ways of working	1	System - organisation
Exploring the option of using technology to reduce counting errors, for example barcoding, radio-frequency identification (RFID) tags and other technology	1	System - technology
Review alternative swab receptacles to help visualise count	1	System - equipment
Provide development to staff	1	People
Radiologist to report on imaging	1	People
Use incident to raise awareness among staff	1	People

Most recommendations made in the serious incident reports were people-focused and very few recommendations were made that tackled other system factors and their interrelationships. The investigation also noted that recommendations such as staff training and assessing staff competency were often made when no issues in staff training, competence or awareness of swab count procedures were identified as part of the trust serious incident investigation.

There is evidence in the serious incident reports that there are factors such as equipment design, culture, roster management and pressures related to patient flow through operating theatres that could be explored further, and that more effective system-focused recommendations could be made. Without understanding the underlying system-wide factors, the recommendations made are unlikely to tackle the underlying issues to reduce the likelihood of retained swab events occurring.

The investigation notes that since the publication of the serious incident reports, NHS England has started to implement the Patient Safety Incident Response Framework (PSIRF). PSIRF 'sets out the NHS's approach to developing and maintaining effective systems and processes for responding to patient safety incidents for the purpose of learning and improving patient safety' (NHS England, 2022). It encourages the application of a range of system-based approaches to learning from patient safety incidents, considering multiple interacting contributory factors across the care system. Organisations should have completed their transition to PSIRF by autumn 2023 (NHS England, n.d.).

NatSSIPs (NHS England, 2015) has also been updated since the publication of the serious incident reports reviewed in the thematic analysis. NatSSIPs2 (Centre for Perioperative Care, 2023) are the new approved standards that are to be implemented and embedded into organisations. NatSSIPs2 includes organisational standards for embedding the changes necessary into normal practice and sequential standards to empower each member of staff to know the approved way of dealing with swabs and the reconciliation of items.

## **Characteristics of retained swab events**

The thematic analysis identified some common characteristics of retained swab following invasive procedure events, reported in trust serious incident reports. These included:

- responsibility for swab counts
- communication of information about swabs
- visibility of swabs
- the make-up of the operating theatre team
- the timing of the count and its confirmation at Sign Out
- the type and duration of the surgical procedure
- professional culture and practice
- distractions and interruptions
- competing tasks
- time pressure
- time of day
- clarity of policies and procedures.

These characteristics are explored in more detail in this section. They were not all seen in every event, but each factor was seen in a minimum of 10% (3) of the investigations, with some factors being seen in up to 78% of the investigations (24).

In most reports, surgical swab counts had been perceived to be correct when in fact they were not. This finding indicates that the current practice of encouraging two people to complete a swab count is not a reliable barrier to prevent the retention of swabs.

The characteristics are presented below as prompts to help NHS staff and organisations to proactively consider a range of factors that can contribute to retained swab events occurring.

HSSIB encourages healthcare organisations and patient safety teams to consider these characteristics when seeking to identify why retained swab events occur, and when planning interventions aimed at reducing the risk of these events.

## **Who is responsible for the reconciliation of swabs?**

There was confusion about who was responsible for the reconciliation of items including surgical swabs. Evidence from the thematic analysis indicated that the view was that it was the scrub practitioner's responsibility to reconcile the swabs and that the surgeon was responsible for ensuring all items that enter the surgical field (including swabs, instruments and any other ancillary items) are returned to the scrub practitioner to be counted. However, in some reports more emphasis seemed to be placed on the surgeon being responsible.

The HSSIB investigation is exploring the standards for the prevention of retained foreign objects (such as surgical instruments and swabs) and it is apparent that there was, and continues to be, a lack of clarity about where responsibility lies for the reconciliation of surgical swabs.

The 'Standards and recommendations for safe perioperative practice' state:

**'... although it is the responsibility of the operating surgeon to return all items, it is recognised that the perioperative practitioner is accountable for implementing a checking procedure in order to be able to state categorically to the operating surgeon that all items are accounted for and, on the final count, have been returned'** (Association for Perioperative Practice, 2022).

While the 'National Safety Standards for Invasive Procedures' (NatSSIPs) (NHS England, 2015) are not explicit about responsibilities, the revised version, NatSSIPs 2 (Centre for Perioperative Care, 2023), states that the prevention of retained foreign objects is a shared responsibility and that staff completing the swab count should be General Medical Council (GMC), General Dental Council (GDC), Nursing and Midwifery Council (NMC) or Health and Care Professions Council (HCPC) registered; any unregistered staff should be assessed as competent.

The Association for Perioperative Practice's standards are applicable to operating theatre departments, whereas NatSSIPs 2 are applicable to all invasive procedures where swabs are used. These include procedures undertaken in operating theatres, labour suite rooms and emergency departments, interventional radiology hybrid procedures, pacemaker insertion, and where the procedure involves an open cavity in the patient's body that is large enough to retain an instrument or swab.

The investigation will continue to explore the standards, responsibility and accountability for swab reconciliation. Therefore, HSSIB makes the following safety observation:

### **HSSIB makes the following safety observation**

#### **Safety observation O/2023/009:**

Organisations can improve patient safety by using consistent terminology in national and local guidance when describing the responsibility for the reconciliation of items used in surgery and invasive areas, including swabs.

### **How is information about swabs communicated?**

Challenges in communication between operating theatre team members were frequently highlighted in the serious incident reports. For example, there were incidents where:

- Surgeons had not informed the scrub practitioner when the surgical swab had been inserted into the patient. However, this was often due to other safety critical and/or role-related tasks being conducted at the time the surgical swab was inserted, such as controlling a bleed.
- Swabs that had been inserted into the patient were not always documented on the count board (a whiteboard within the theatre where the swab count was

documented). Reports described this happening when information had either not been verbalised (spoken out loud), had not been heard, had not been noticed by the rest of the operating theatre team or where there was no dedicated space on the count board to record the information.

Additional challenges reported included:

- communication about the count being misunderstood among the operating theatre team
- communication not being acknowledged or being ignored
- the confidence of staff to speak up
- high noise levels in the operating theatre from the laminar flow (a ventilation system used in operating theatres)
- personal protective equipment, such as masks, visors and/or a surgical hood, making it difficult to see or hear communication.

The communication challenges meant that staff could have different perceptions of what was happening, which then influenced their actions.

It was not always clear in the serious incident reports what contributed to some of the communication challenges. Some of the reports mentioned issues in the culture where some team members may not feel comfortable speaking up. Others reported that the nursing staff did not feel listened to.

**‘... the theatre staff stated that they felt ignored by the surgical operators when raising their concerns.’**

It was evident from the thematic analysis that there can be issues relating to junior staff challenging more senior staff.

**‘... more junior theatre staff are not fully confident in proactively speaking out against unsafe or potentially unsafe practice ...’**

**‘The circulating nurse knew this was not correct procedure, however she was under her preceptorship process [a structured start for newly qualified practitioners] and the scrub nurse was her supervisor.’**

Some trusts had implemented innovations to enhance the culture of patient safety and the ability of staff to speak up. These innovations included ‘pause for gauze’, or a ‘HALT’ moment. The aim of these innovations was to allow staff to speak up, using

terminology that can be understood by the whole operating theatre team, to allow time and minimise disruptions while the swab count was being conducted. A 'STOP I have a concern' phrase was also used to empower staff to speak up.

However, it was evident in the serious incident reports that these new practices were not always being used or were not always successful in their aim. It was unclear from the serious incident reports why this was the case as the investigations only reported what staff did not do, rather than considering the influence of context and system factors.

**'The scrub nurse repeated this several times asking for everything to stop whilst the count was performed again and an attempt made to locate the swab. No verbal recognition of the information given to the surgical team was made.'**

**'... there was no "pause for the gauze".'**

**'... there was a missed opportunity for staff to call a HALT moment.'**

The current swab reconciliation process relies on effective communication. However, the thematic analysis showed there are many ways in which communication can break down in the operating theatre environment.

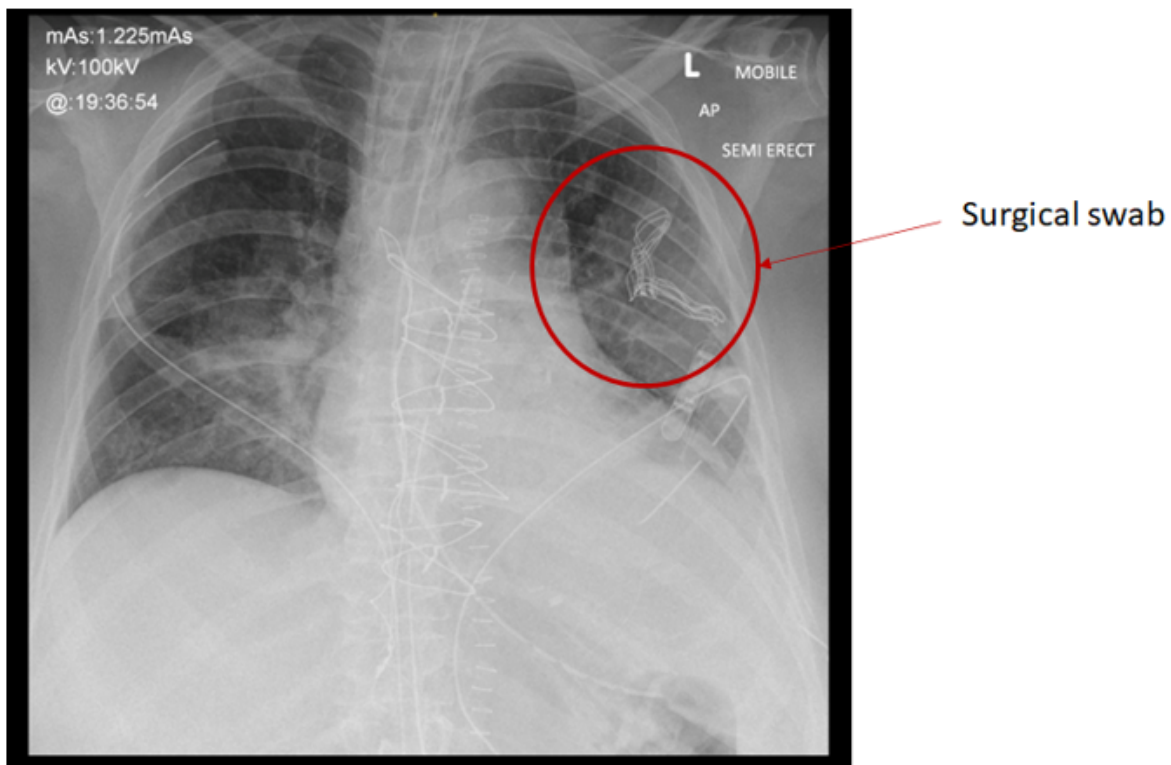
## **How visible is a swab?**

The position of a swab in a patient's body meant that it may not always be in direct line of sight. In other instances, the scrub practitioner could not see where swabs were because the surgeon was standing in a position that blocked their view. Staff also commented that smaller swabs were more difficult to see.

Although not highlighted in the thematic analysis, the investigation is aware of another factor that can limit the visibility of swabs: when they absorb blood, the visual contrast with the surrounding tissue is reduced. This was identified as part of an investigation into the ['Detection of retained vaginal swabs and tampons following childbirth'](#) (Healthcare Safety Investigation Branch, 2019). NatSSIPs (NHS England, 2015) states that 'all swabs used for invasive procedures should contain radio opaque markers' (markers that show up on an X-ray) as they can be used to detect retained swabs. NatSSIPs2 continues to endorse the use of radio opaque markers (Centre for Perioperative Care, 2023).

The radio opaque strip within a swab appears as lines on an X-ray (see figure 2). There can be many other similar looking lines depicting other items or features on an X-ray image. Therefore, the retained swab may not stand out to the person reviewing the X-ray. In addition, when attention is focused on one object or task, it can be at the expense of noticing and attending to other available information (Mack, 2003). This means that when an X-ray is performed for reasons other than detecting a retained swab, such as a suspected collapsed lung, the person reviewing it will be focused on looking for signs of a collapsed lung and may therefore miss something that indicates a swab. This type of occurrence was noted in another investigation into the placement of nasogastric tubes ([Healthcare Safety Investigation Branch, 2020](#)), where a misplaced nasogastric tube was not initially detected.

**Figure 2 Chest X-ray showing one retained swab**



### **Who is in the team?**

The analysis of the serious incident reports identified that changes to the team during a procedure or that different teams were conducting the swab count were considered as contributory factors. When there is a change of team, NatSSIPs (NHS England, 2015) suggested that a swabs, sharps and instrument count should be conducted between the outgoing and on-coming scrub practitioners. On a few occasions, this count had not occurred. Reasons for the counts not being conducted

included tension in working relationships between operating theatre staff, or seeing other colleagues conducting a count and feeling that their assistance was not required.

Reports discussed the risk caused by shift changes during invasive procedures and the impact this has on the continuity of staff and, in turn, the impact on tasks such as swab counting. NatSSIPs 2 (Centre for Perioperative Care, 2023) has made it more explicit that a count should be performed if there is a changeover of either the scrub practitioner or circulating practitioner.

In addition, the reports commented on challenges created because of limited numbers of staff being available on the day. Limited staffing meant the team skill mix for the day was not optimal, that there was not a scrub practitioner available for the count, or that staff were required to work a longer day to ensure there were enough staff to cover a procedure.

## **When did the swab count occur?**

In some of the reports reviewed, the skin had been closed before the final swab count had been completed. The reports offer explanations for this, including a lack of clear communication between the surgical team and the scrub team, or where the surgeon perceived the final count was correct as they had been handed instruments for closure.

'Sign Out' (a checklist performed at the end of an invasive procedure) was also seen to be completed before the count was finalised. Reasons given for this included:

- to complete the case efficiently to enable the operating theatre to be made ready for the next patient
- the scrub practitioner and circulating nurse perceiving that they knew where all the swabs were and thought the count would (when conducted) be correct.

In some cases swabs were still being used while the count was being conducted. This was because the swab was required to absorb liquid or blood at the surgical site.



## **What was the type and duration of procedure?**

Retained swab events were most common during invasive procedures of the abdomen, such as a laparotomy (a surgical cut into the abdominal cavity). Retained swab events were also more common during colorectal (lower intestinal tract) invasive procedures and gynaecological invasive procedures.

Retained swabs events occurred in all lengths of invasive procedure but were most common in procedures that lasted more than 4 hours or procedures that were less than 1 hour in duration.

## **What was the impact of professional culture and practice?**

There was evidence in some reports of a culture of practice among consultant surgeons of leaving the operating theatre before a procedure was completed. Reports described how the consultant surgeon would perform most of the procedure but hand over to their surgical assistant or registrar (who had often been present for the procedure) to conduct the skin closure. The consultant surgeon would then leave the operating theatre to write up their surgical notes, continue their ward round or see their next patient.

This meant that the consultant surgeon was not present when the final swab count was completed, or for the World Health Organization (WHO) surgical safety checklist (World Health Organization, 2009) 'Sign Out', when it is confirmed that the swab, instrument and needle counts are complete.

Surgeons had also informed the scrub practitioner or anaesthetist that they had inserted a swab temporarily but subsequently left the operating theatre, leaving other members of the theatre team (for example a more junior surgeon) to complete the procedure.

Surgeons had been noted to take swabs and/or equipment directly from the scrub practitioner's trolley without informing them. This had led to surgeons using swabs without the scrub practitioner being aware of this, sometimes after swab counts had been completed.

## **Were there any distractions or interruptions?**

There was evidence throughout the serious incident reports that staff were distracted, interrupted or their attention was focused elsewhere. This was considered to negatively affect the swab count or staff's ability to track swabs. Distractions and interruptions in the operating theatre environment included

questions or requests from other staff members, the movement of other staff members, conversations, noise, and awareness that the end of the shift was approaching.

### **Were there any competing tasks?**

Those involved in the swab count could be required to conduct multiple tasks at the same time. Evidence indicates that some multi-tasking may be beneficial to performance. However, too much multi-tasking, especially when tasks are difficult, can be detrimental to performance (Adler and Benbunan-Fich, 2012).

### **Was there time pressure or perceived time pressure?**

Time pressure meant that tasks could be rushed or missed. Factors contributing to the perception of time pressure included awareness of other cases, including emergency procedures, that were waiting to come into the operating theatre, the surgeon needing to see other patients, a mismatch in the speed at which tasks were being completed between the surgical and scrub teams, and awareness that the shift was coming to an end or had ended.

### **What time of day did the procedure take place?**

Incidents were more common in procedures that finished in the afternoon and early evening, especially between 14:00 hours and 19:00 hours. Considering the length of the procedures and that retained swab events are more common in the afternoon and evening, it would be beneficial to consider whether fatigue was a contributory factor.

However, only one of the serious incident reports reviewed by the investigation considered fatigue. Without further data, it is difficult to draw conclusions from the information provided in the serious incident reports.

Previous Healthcare Safety Investigation Branch investigations have found fatigue to be a contributory factor in safety incidents, including '[Detection of retained vaginal swabs and tampons following childbirth](#)' (Healthcare Safety Investigation Branch, 2019). Fatigue may be subject of future Health Services Safety Investigations Body investigations ([Healthcare Safety investigation Branch, 2023](#)).

## How clear are policies and guidance?

Several reports cited that written policies and procedures may be unclear. This included:

- not specifying times at which counts are to be performed
- not specifying how counts should be recorded
- not stating that surgeons should verbalise when they place a swab into, or take one out of, a cavity.

Initial findings from this thematic analysis suggest that there are multiple factors that may contribute to the occurrence of a retained swab event and although they are categorised as Never Events under 'retained foreign objects' there are currently no 'strong systemic barriers' available to prevent them.

### HSSIB makes the following safety recommendation

#### **Safety recommendation R/2023/012:**

HSSIB recommends that NHS England incorporates the findings of this interim report into its review of the Never Events policy, with specific focus on considering removing retained surgical swabs as a sub-set of retained foreign object Never Events.

### Local-level learning

Healthcare providers can improve patient safety by using the findings of this report to consider potential challenges in their own systems and processes for unintentionally retained swabs following invasive procedures. This can help organisations to understand what people focused and system focused barriers may be implemented to help further mitigate against retained swab events.

## Next steps

The HSSIB investigation will continue to explore responsibility and accountability in relation to swab reconciliation, and how technology could reduce the likelihood of retaining a swab. Additional findings and safety learning in relation to retained swab

events will be presented in the final investigation report. If you would like to share any experience or have further information that may be relevant, please contact [enquiries@HSSIB.org.uk](mailto:enquiries@HSSIB.org.uk).

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