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Improving communication at handover and transfer reduces retained swabs in maternity services

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ABSTRACT

Objective: To reduce the incidence of retained vaginal swabs and near misses.
Study design: A review of previous retained swab incidents and near misses in a large maternity unit identified handovers and transfers as a key point of vulnerability. Interventions were introduced to improve communication at handover from the delivery suite to theatre and from theatre to the high dependency unit. Process data was collected to monitor compliance. The outcome measures were the incidence of retained swab never events and the incidence of near misses. Chi-squared analysis was used to test the significance of the results.
Results: For transfers from delivery suite to theatre, verbal handover significantly increased from 28.8% to 75.6% ($p < 0.0001$), and written handover significantly increased from 4.4% to 62.9% ($p < 0.0001$). There were 291 transfers to theatre post-intervention: in 88 (30.2%) of these transfers a vaginal swab was already in situ. In 70/88 (79.5%) of cases the presence of the swab was communicated to theatre staff in three ways (verbally, written and transfer of opened swab packets) according to the new policy. In the post-intervention period there were 56 women transferred from theatre to the high-dependency unit with a vaginal pack in situ: 52 (92.9%) of these women had a sticker in place serving as a constant reminder of the presence of the vaginal pack to staff. Following a baseline of four near misses in two months, there has been only one near miss in the 15 months since the interventions were implemented, (33.3% vs. 1.1%, $p< 0.0001$). There have been no retained swab incidents since the project commenced.
Conclusions: Simple interventions to improve communication at handover and transfer can reduce the incidence of retained vaginal swabs and near misses. Further work is needed to raise the profile of swab counting in maternity settings: swab counting needs to be the responsibility of all disciplines, not just the responsibility of theatre staff.

Introduction

Obstetricians and midwives use swabs to absorb blood during vaginal birth and perineal suturing; on rare occasions, these are unintentionally left in situ. Retained foreign objects (swabs, sponges, needles and instruments) are a major patient safety concern in surgical procedures of all types [1]. In a large study of retained objects post-surgery, vaginal sponges and swabs accounted for 12 of the 54 incidents [2]. In the UK retained swabs after vaginal birth and perineal suturing have to be reported and are classed as "never events" [3]. Vaginal swabs accounted for 33 of the 107 retained foreign object incidents reported in 2015/2016 [4]. Retained vaginal swabs were more common than surgical swabs or any other category of foreign object [4].

The impact of retained vaginal swabs can be severe. Women may experience serious physical and psychological complications including infection, secondary post-partum haemorrhage, sepsis, depression, lack of bonding and loss of trust in the NHS [5]. Box 1 illustrates an example patient story. The experience of harming a woman is distressing for staff and the reputation of the organisation concerned may suffer [6,7]. A retained swab can also be expensive in terms of additional resources and time in hospital; where a claim is involved in addition, the average cost of compensation and legal fees in the UK is £16,000 [8].

In surgical procedures of all types, it is standard practice for counts to be performed before and after to reduce the risk of retained foreign objects. A retrospective analysis of retained

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Box 1. Example patient story

Ten days post-partum following an instrumental birth and third degree tear repair, a first-time mother noted an offensive blood loss and visited her GP. The GP obtained a sample of vaginal discharge for culture and sensitivity and prescribed antibiotics. The woman continued to feel generally unwell and went back to the GP several times who changed her antibiotics on two occasions. On day 21 post-partum the woman passed a large blood clot which was found to contain a swab. She lost a further 1000 millilitres of blood and was admitted to hospital via ambulance. Upon arrival she had a raised lactate and was treated for sepsis. Following a course of intravenous fluids and antibiotics, she was discharged home six days later on oral antibiotics and iron therapy.

foreign objects revealed that counts had not been recorded at the time in a third of cases, and in cases where counts were performed, they were wrongly reported as correct at the time in 88% of incidents [2]. The reasons for incorrect or missing counts vary from case to case but common themes include system factors such as time pressure and multiple distractions; and cultural factors such as staff not engaging with swab count policies [2,9–11]. The involvement of multiple teams also introduces additional complexity with potential for failures of communication at handover [9,10]. Interventions such as the World Health Organization (WHO) Surgical Safety Checklist have helped to reduce the incidence of retained swabs in surgical settings [12].

There are very few interventions reported in the literature to reduce retained swabs specifically in maternity settings, although maternity-specific guidelines do exist [13]. The use of a sponge-count sheet, documentation of the accuracy of sponge counts and communication training has been shown to improve compliance with sponge counting procedures in maternity [14]. A large hospital-wide study which included maternity settings reported a reduction in incidence of retained foreign objects from one incident every 16 days, to one incident every 69 days [15]. The interventions included a review of previous incidents of retained foreign objects and institutional policies; an awareness and communication phase; and a monitoring and control phase which included auditing of compliance and rapid investigations following incidents and near misses. Reducing retained swabs is more complex than it initially seems, and is not simply a matter of counting correctly [16].

This paper describes a maternity specific intervention to reduce the incidence of retained swabs in a large maternity unit in the UK. The project was initiated in response to two retained vaginal swab never events.

Method

Setting

The project was undertaken in a large UK maternity unit with 13 birthing rooms, three theatres and a high-dependency unit. There are over 600 births a month in the unit. Approximately 48 women a month are transferred to theatre for suturing, manual removal of placenta or examinations under anaesthetic; approximately five women a month are transferred with swabs already in the vagina. The unit manages higher risk pregnancies for the region. Low-risk pregnancies are typically managed elsewhere in midwifery-led units.

Developing the intervention

A multidisciplinary project team was brought together in September 2015: the team included senior and junior midwifery staff, clinical governance and practice development midwives, theatre staff and an advanced maternity support worker. An analysis of incident reports for two retained swab never events, defined as retained swabs detected post-discharge, and three near misses, defined as retained swabs detected by staff pre-discharge, over the past four years (2012–2015) was conducted. Detailed incident reports for the two never events were reviewed as well as patient notes and the original incident report forms for the three near misses. A common theme in the incidents was transfers and handovers suggesting that these were points of particular vulnerability in the care process (Box 2). All of the near misses highlighted failures of communication between professionals.

A process map was created by the multidisciplinary team which highlighted the role of distraction and interruptions in the counting process, failures of communication during handover to theatre and to the high-dependency unit, lack of staff to conduct second counts and inconsistencies in how and where counts were recorded. The lack of an agreed standardised method for notifying staff about the presence of vaginal swabs in situ was a clear weak point. Fig. 1 shows a simplified version of this map.

Improving handover from delivery suite to theatre

The local swab policy was reviewed and amendments made to the section on handover of women transferred to theatre from delivery suite. The first key policy change was that if a swab was placed in the vagina in the delivery suite, all other swabs and strings had to accompany the woman upon transfer to theatre. A paper bag was introduced into the delivery packs to facilitate this. Swabs come in packs of five with one red string per pack; red strings and unused swabs are an important part of the counting process in theatre handover.

The second key policy change for women transferred to theatre with swabs already in situ, was that the swabs needed to be counted and signed for in the patient notes by both the primary midwife and theatre staff at handover (see Fig. 2). If there are no swabs in situ, the policy changes required the midwife to tick “N”

Box 2. Timing of handover and transfers of care in previous retained swab never events and near misses

1. Transfer from delivery suite to theatre for third degree tear repairs
2. Transfer from delivery suite to theatre for forceps delivery
3. Handover from midwife to delivery suite co-ordinator for additional suturing of a second degree tear
4. Transfer from midwifery led unit to high-dependency unit for post-partum haemorrhage and then to delivery suite for additional suturing

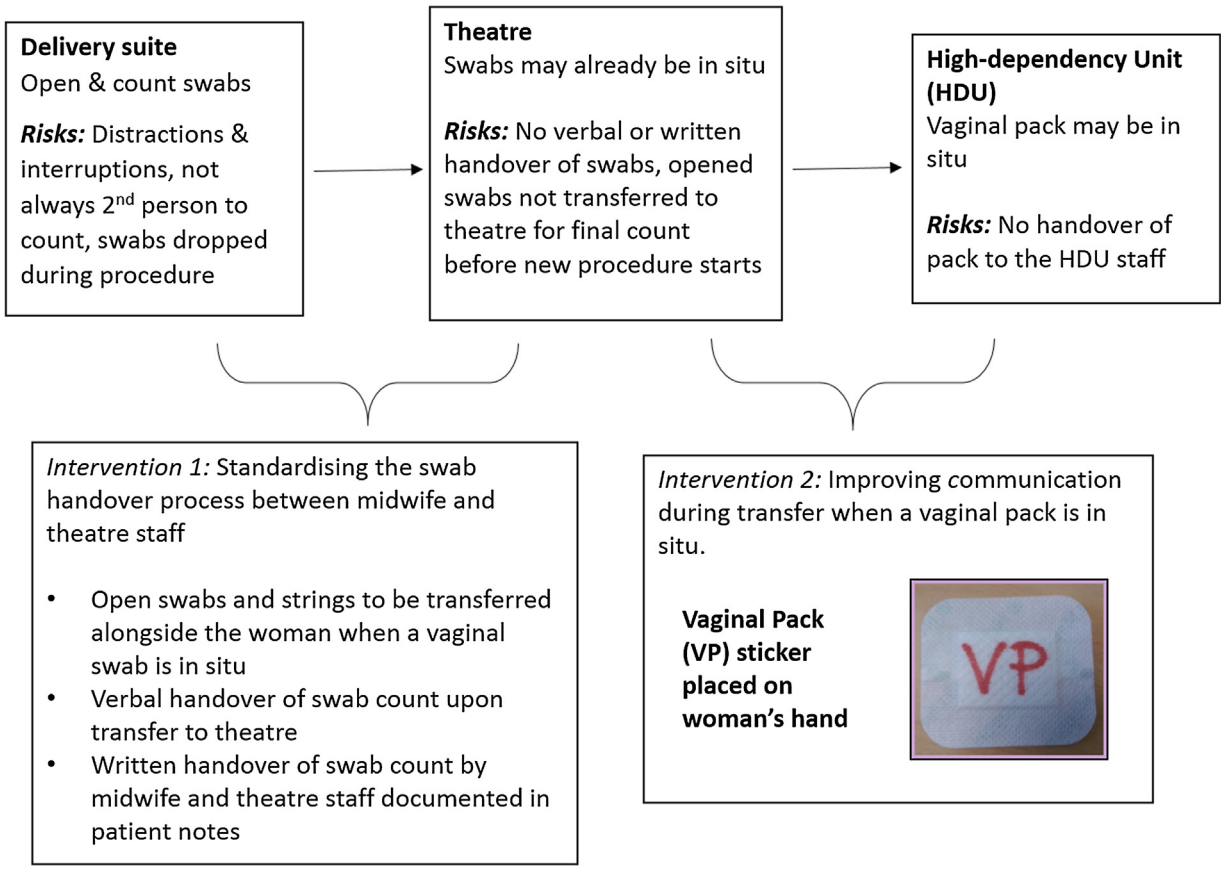

Fig. 1. Process map highlighting points of vulnerability in the swab counting process.

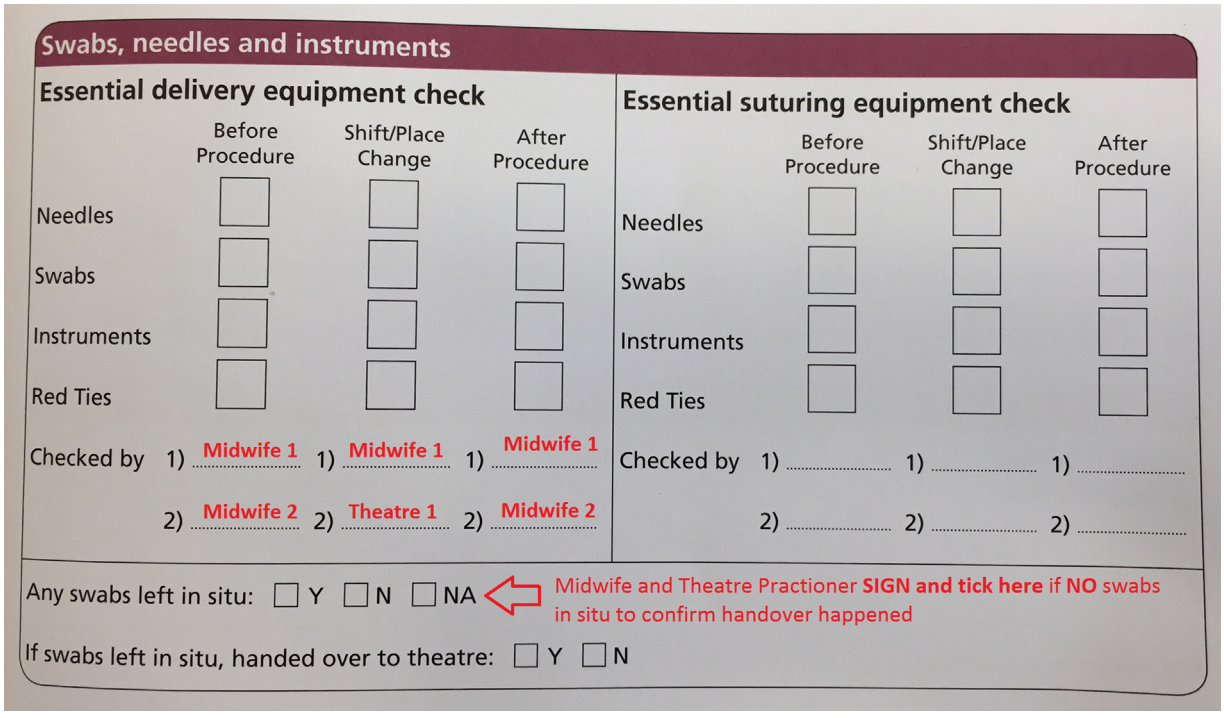

Fig. 2. Swab count documentation highlighting how the swab check should be signed.

and sign their swab and instrument count (see Fig. 2). There were no changes to the verbal handover aspect of the policy, but education and training were introduced to improve compliance. The policy amendments were introduced in February 2016.

Improving handover from theatre to high-dependency unit

Women are sometimes transferred from theatre to the high-dependency unit with a vaginal pack in situ. The local swab policy was amended requiring a sticker with "VP" printed on it to be placed on the hand of all women with a pack in situ for the duration in which the pack remains in place. The sticker served as a constant reminder of the presence of the pack to staff; a method of communication which transcends staff disciplines, locations and shift changes. The intervention was implemented in December 2016.

Communication and education of staff

Communication about the new procedures was challenging: staff work irregular shift patterns, junior staff are on six-monthly rotation between specialties and emails are checked on a sporadic basis. A range of communication strategies were used to educate staff about the policy changes, including posters, newsletters and a topic of the month board in clinical areas. A senior theatre nurse in the project team led communication with theatre staff including anaesthetists, and a delivery suite co-ordinator led communication with obstetricians and midwives.

Measures and analyses

Process measures for the interventions were collected to assess compliance with the policy changes. For the first intervention (improving handover from delivery suite to theatre), compliance with i) verbal handover, ii) written handover and iii) transfer of opened swabs was audited weekly for all women transferred to theatre for manual removal of placenta (MROP), suturing or examination under anaesthetic (EUA). For the second intervention (improving communication upon transfer to the high-dependency unit), compliance with use of vaginal pack (VP) stickers was audited. A full description of all the process measures and how they were collected is given in Table 1.

The two outcome measures were i) retained swab never events and ii) near misses. Incident reports are not intended to be used as measures of rates of frequency of incidents [17]. However, incident reports were the only data source available for quantifying the

Table 1
Description of process and outcomes measures and data collection process.

Measures	Description	Data source and analysis
Process measures		
1. Percentage of verbal handover of swab count from delivery suite to theatre	Verbal handover is recorded by theatre staff as yes/no depending whether the midwife transferring the woman to theatre verbally informs theatre staff of the presence or absence of swabs in the vagina.	• Paper data collection sheet completed by theatre staff for all women transferred to theatre, whether or not a swab is in situ upon transfer • A sample of five random patients is taken each week • A percentage is calculated and plotted in a statistical process control (SPC) chart
2. Percentage of signed handover of swabs from delivery suite to theatres	Signed handover is recorded by theatre staff as yes/no depending whether the relevant sections of the swabs, needles and instruments count in the patient notes (see Fig. 2) are completed upon transfer to theatre.	• Paper data collection sheet completed by theatre staff for all women transferred to theatre, whether or not a swab is in situ upon transfer • A sample of five random patients is taken each week • A percentage is calculated and plotted in an SPC chart for regular monitoring
3. Percentage adherence to all three aspects of policy for handovers where a *swab is in situ* (verbal and written handover, opened swab packets transferred)	Swabs come in packets of five with a red string: any opened packets and strings needs to be transferred to theatre alongside the woman for final counts in theatre. Verbal and written handover also need to be undertaken for all three aspects to be complete.	• Data collection sheet completed by theatre staff for all women with a swab in situ upon transfer. • A weekly percentage is calculated and plotted in an SPC chart. All patients transferred with a swab in situ are included.
4. Percentage of women with a vaginal pack in situ upon transfer to high dependency unit who had a "VP" sticker in place on handover	Women transferred to the high dependency unit need to have a "VP" sticker on their hand at transfer.	• Data collection sheet completed by midwives in the high dependency unit • For all women transferred with a known vaginal pack in situ, HDU staff note whether or not the woman has a VP sticker on their hand at transfer. This is recorded as yes or no. • A weekly percentage is calculated and plotted in an SPC chart. All women transferred with a known vaginal pack in situ are included.
Outcome measures		
1. Days between retained swab never events	Retained swab never events are when a swab is found in situ by the woman or clinician following a procedure and there is no clear documentation that it has been intentionally left in place.	• Incident reports are recorded in the local incident reporting system • Four years of baseline data was collected retrospectively.
2. Near misses	A near miss is when a swab is in situ upon transfer to theatre, theatre staff discover the swab(s) unexpectedly. There was no verbal or written handover and opened swab packets and strings were not transferred to theatre.	• Near misses are calculated from the data collection sheet in theatre for the process measures. • A near miss is recorded if i) the woman was transferred to theatre with a swab in situ AND ii) there was no verbal handover, no written handover and any opened packets of swabs were not transferred with the woman.

number of retained swabs discovered post-discharge in the community (never events). It was feasible, however to develop a more accurate measure for near misses, rather than relying on incident reports. Theatre were already collecting process data on i) verbal handover, ii) a written handover and iii) transfer of open swab packets. A near miss was defined as a woman transferred to theatre with a swab in situ where there was no verbal handover, no written handover and no transfer of swab packets.

Results

Compliance with swab procedures

Table 2 shows baseline and post intervention data for all process measures. There were 45 transfers to theatre in the baseline period of two months and 291 transfers in the 15 months post-intervention. There was a significant increase in verbal handover compliance from 28.8% at baseline to 75.6% post intervention ($p < 0.0001$). Written handover also significantly increased, from 4.4% at baseline to 62.9% post intervention ($p < 0.0001$).

During the post-intervention period, 88/291 (30.2%) of transfers to theatre were for women who already had a vaginal swab in situ. Table 3 shows full data on compliance with the three aspects of the swab policy for women transferred to theatre with swabs already in situ. In 70/88 (79.5%) of these transfers, all three aspects of the swab policy were followed. In 85/88 (96.6%) of cases two or more aspects of the swab policy were followed.

The second intervention, vaginal pack stickers, was introduced in December 2015. In the seven month post-intervention period, 56 women were transferred from theatre to high-dependency unit with vaginal packs in situ: 52 (92.9%) of these women had "VP" stickers in place upon transfer.

Incidents of retained swabs and near misses

There were four near misses in the two months baseline period (December 2015–January 2016). Post-intervention there has been one near miss in 15 months (see Table 3). There was a significant reduction in near misses for women transferred to theatre with swabs in situ from a baseline of 33.3% (4/12) to 1.1% (1/88) post-intervention ($p < 0.0001$).

There were two retained swab never events in the four years preceding the project (January 2012–January 2016), one in March 2012 and another in September 2013. There have been no retained swab never events in the 15 months since the project began.

Comment

Retained swabs in maternity are a major patient safety concern [5]. This project identified handovers and transfers as a key point of vulnerability in the swab counting process. Clear policies for communication at handover and transfer were introduced and compliance audited weekly. During baseline there were four near misses over two months; following the interventions there has been only one near miss in 15 months and no retained swab reported.

Whilst fastidious counting of instruments, swabs and needles is now embedded in the culture of theatre staff including in maternity services, this project demonstrates that vulnerabilities remain in swab counting procedures especially when women are transferred to or from theatre with swabs in situ. Raising the profile of swab count procedures amongst midwives was a key factor in the success of the project. The most important practice change is that midwives now transfer all opened swabs and strings to theatre for a final count whenever a swab is in situ.

There is much discussion in the wider surgical literature on technological solutions for swab counts. The two main devices are a handheld device that detects retained swabs using radio frequency and bar code scanning of swabs [18,19]. Both of these technologies are susceptible to user error [18,19], however impressive outcomes have been demonstrated in a large trial [20]. An institution-wide implementation of a Data-Matrix coded sponge counting (including labour and delivery areas) led to an reduction from one retained swab every 64 days, to 558 days incident free [20]. Whilst there is significant potential to reduce retained swabs through technological solutions, such solutions are expensive and complex to implement. Technology may ultimately prove to be a faster and more effective way to reduce the incidence of retained swabs in maternity settings but simple low cost interventions can be effective in the meantime and will always be needed in resource poor settings.

Strengths and limitations

A major strength of the project was the multidisciplinary approach both in diagnosing the risks and vulnerabilities in the swab counting process, and in ensuring the policy changes were adhered to. Clinical leadership from both the delivery suite co-ordinator and from the senior theatre nurse was crucial to ensuring that all staff were aware of the policy changes. One limitation is that only a sample of transfers to theatre were included in the data collection (approximately one third of transfers). Ideally, all transfers would be included in the data collection. A second limitation is the relatively short time period for collecting outcome data on retained swab never events: because of the rarity of these events, it is difficult to directly assess the impact of these interventions on the incidence of retained swabs. However, the incidence of near misses has clearly reduced.

Further improvements are needed to sustain and improve verbal and written handover to theatre. One possible way to address this is to adapt the organisation's WHO checklist for

Table 2
Summary of baseline and post-intervention means for all process measures.

Intervention	Process measure	Date implemented	Baseline[a]	Post-intervention[b]	*p*
1. New policy for swab handover from delivery suite to theatre	Completed verbal handover for all transfers to theatre	8/2/16	13/45 (28.8%)	227/291 (75.6%)	$p < 0.0001$
	Completed signed handover for all transfers to theatre	8/2/16	2/45 (4.4%)	183/291 (62.9%)	$p < 0.0001$
	Three aspects of swab policy followed when swabs are in situ upon transfer	8/2/16	N/A	70/88 (79.5%)	–
2. Improve communication for transfer of a vaginal pack	Percentage of women with a vaginal pack in situ who had a "VP" sticker in place on handover	5/12/16	N/A	52/56 (92.9%)	–

[a] Baseline data is take from the 30/11/2015–7/2/2016.
[b] Post-intervention data is taken from the date of implementation to 30/06/2017.

Table 3
Compliance with the three aspects of the swab policy for women transferred to theatre with swabs already in situ.

Date	All three aspects complete	Two aspects complete	One aspect complete	Near miss: no aspects complete	Total no. of transfers with swabs in situ	% with three aspects complete	% with two or more aspects
Dec-15[a]	N/A	1	2	1	4	0%	25%
Jan-16[a]	N/A	1	4	3	8	0%	13%
Feb-16	3	0	0	0	3	100%	100%
Mar-16	2	3	0	0	5	40%	100%
Apr-16	4	1	0	0	5	80%	100%
May-16	5	0	0	0	5	100%	100%
Jun-16	3	0	1	0	4	75%	75%
Jul-16	3	1	0	0	4	75%	100%
Aug-16	2	1	0	0	3	67%	100%
Sep-16	7	0	0	0	7	100%	100%
Oct-16	3	0	0	0	3	100%	100%
Nov-16	5	1	0	0	6	83%	100%
Dec-16	5	2	1	0	8	63%	88%
Jan-17	5	0	0	0	5	100%	100%
Feb-17	5	0	0	0	5	100%	100%
Mar-17	7	2	0	0	9	78%	100%
Apr-17	4	0	0	0	4	100%	100%
May-17	5	4	0	0	9	56%	100%
Jun-17	2	0	0	1	3	67%	67%

[a] The baseline period was Dec-15 and Jan-16.

maternity cases [21] to include midwife handover of swabs in the "sign in" section: this would embed swab handovers in an existing process, ensuring midwives report the presence or absence of swabs at transfer. Currently swab checks are only part of the "sign out" section of the WHO checklist which is carried out at the end of the procedure. Further work is needed to raise the profile of swab counting in maternity settings: swab counting needs to be the responsibility of all disciplines in maternity, not just the responsibility of theatre staff. As Bolton [2017,p.142] concludes in her editorial on retained vaginal swabs and sponges, "until perineal suturing is afforded the same status as other surgical procedures, the problem [of retained swabs] is likely to remain" [6].

Conflicts of interest

None.

Authorship & contributorship

Katie Lean conceived the study, participated in its design and coordinated the project. Bethan Page drafted the manuscript and performed the statistical analysis. Katie Lean and Charles Vincent critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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