

# Reducing SSI rates for women birthing by caesarean section

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Surgical site infections (SSIs) are the most common type of nosocomial infection, accounting for up to 20% of all hospital-acquired infections in Europe (European Centre for Disease Prevention and Control [ECDC], 2013). There are varying SSI rates reported across the UK. In 2016, Public Health Wales reported an overall 14-day SSI rate for women undergoing caesarean section of 4.35% — 83% of which were superficial infections and 92.5% were detected after discharge (PHW, 2016). From 2015–2016, Aneurin Bevan University Health Board (ABUHB) services experienced an increase in the SSI rate for women birthing by caesarean section from 3.07% to 5.86% respectively. Therefore, a multifaceted approach to quality improvement (ABUHB organisational method) was adopted throughout the duration of 2017, with a view to implement by 2018. The aim was to reduce SSIs for women birthing by caesarean section in ABUHB. Interventions included the use of evidence-based practice and guidelines, education and engagement among clinicians, patients and staff, and the gradual implementation of Leukomed® Sorbact® (Essity) post-operative dressings.

## KEYWORDS:

- Surgical site infection ■ Caesarean section ■ Interventions
- Education ■ Leukomed® Sorbact®

**S**urgical site infection (SSI) refers to an infection occurring at a part of the body (superficial or deep tissue) where surgery has taken place within 30 days of a procedure (Stanirowski et al, 2019). Wound healing is a complex and dynamic series of events. If pathogenic bacteria enter wound sites, infection can occur, hindering the healing process.

Subsequently, this leads to physiological, psychosocial and financial complications for patients and their families, for example:

- ▶ Physiological — pain

- ▶ Psychosocial — anxiety and also lack of bonding with the baby, as the mother may be unable to lift and care fully for the new born or others within the household
- ▶ Financial — due to loss of earnings for the patient and potentially their partner if they are required to take unpaid leave to care for the baby/family.

Furthermore, it has been estimated that it can cost the NHS up to £3,976 per SSI episode (Jenks et al, 2014).

There are varying SSI rates reported across the UK. In 2016, Public Health Wales (PHW, 2016) reported an overall 14-day SSI rate for women undergoing caesarean section of 4.35% — 83% of which were superficial infections and 92.5% were detected after discharge. Aneurin Bevan University Health

Board (ABUHB) maternity services experienced a rise in SSI rate for women birthing by caesarean section between 2015 and the end of 2016. The annual average SSI rate rose from 3.07% in 2015 to 5.86% in 2016. Thus, the authors explored factors for the increase.

An earlier evaluation of acuity levels using the Birthrate Plus workforce acuity tool (National Institute for Health and Care Excellence [NICE], 2015) highlighted changes in the complexity of women's needs within the health board. A national focus on sepsis and the importance of early recognition of infection with the potential to lead to sepsis may have increased awareness of SSI among midwives caring for women in the community setting. Eagerness to treat and a readiness to report any wound where inflammation or exudate was present before confirmation from swab results had been realised in some cases.

Additionally, a new maternity database had been introduced a couple of years before the 2015/16 rise in SSI. Following its introduction, a gradual rise in SSI was noted in the couple of years preceding 2015. The database was designed to be more robust in relation to data collection. The SSI information was embedded in the electronic data collected at birth and on discharge from maternity care, which enabled midwives to complete the SSI data electronically, rather than on separate paper forms, which increased compliance to well above the Welsh national average.

It has also been noted that patient demographics can increase the risk of complications during pregnancy and birth (Stanirowski, 2016a, b). These can include gestational

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diabetes, preeclampsia, haemorrhage, stillbirth, congenital anomaly (Leddy et al, 2008; Heslehurst, 2011), which can increase incidence of birth by caesarean section with a subsequent 2–3-fold increase in SSI (Conner et al, 2014).

When assessing available evidence, a recent Cochrane review suggested that there was evidence to support the use of antibiotic prophylaxis to reduce SSIs following caesarian section and hernia repairs (Liu et al, 2018). Another Cochrane review reported that there was no evidence to suggest that any dressings available at that time were more effective than any other (Dumville et al, 2016). Recent studies have, however, reported the efficacy of a bacteria-binding dressing (coated with dialkylcarbamoyl chloride, DACC) and sold commercially as Leukomed® Sorbact® in reducing the incidence of SSI (Bua et al, 2017; Stanirowski et al, 2016a; b; Totty et al, 2019), and as having the potential to significantly reduce the associated costs of SSI for the NHS (Stanirowski et al, 2019). A narrative review of 29 studies of Sorbact technology in 4044 patients also reported this technology to effectively reduce bacterial bioburden in chronic wounds and facilitate wound progression and healing (Chadwick and Ousey, 2019).

## ABUHB APPROACH TO QUALITY IMPROVEMENT

Maternity services in ABUHB are heavily invested in delivering high quality services to women and their families through a sound understanding of data and a focus in quality improvement programmes. In the authors' clinical experience, ABUHB maternity services has an excellent record of engagement with national projects and internal structured service evaluation led by senior multidisciplinary clinicians and researchers. A whole system approach to problem-solving and quality improvement is used, rather than a narrow focus on one or two factors.

To tackle the rising SSI rate, a variety of new and existing staff training and pre-operative care

measures were implemented more rigorously throughout 2017 (see below). This was complemented by a change in post-operative care measures, i.e. clear messages on dressing care and hygiene when changing dressings, for all patients undergoing caesarean section in early 2018, via implementation of the ABUHB organisational method.

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## ABUHB ORGANISATIONAL METHOD

### Staff training and processes

Education for midwives and support workers about wound care and recognition of wound infection was provided on internal mandatory study days. This training was delivered by the infection control team, targeting SSI and including pictorial resources, as well as presentation slides and group discussion. This was also supported by Essity's clinical nurse advisory team, who delivered continued professional development (CPD) accredited training workshops in both hospital and community midwifery settings on factors affecting wound healing, such as age, nutrition, hydration, and disease-related conditions, e.g. diabetes.

An electronic training package for aseptic non-touch technique was introduced in the health board, and, from 2017, midwives were required to complete this as part of their mandatory training.

### Pre-operative care

Evidence around skin preparation before surgery was reviewed and while chlorhexidine wash continued to be the skin preparation of choice, in line with recent evidence (NICE, 2019), the skin was no longer dried with swabs, but allowed to dry by evaporation in line with NICE guidance (2019).

New drapes were introduced with increased adherence to the skin area surrounding the incision.

### Post-operative care

Clear information about wound care and leaving the dressing intact was provided to women on discharge from hospital care into the community. This included the need for scrupulous hygiene before and after dressing removal (NICE, 2019).

Midwives were reminded of the importance of following up wound swabs to ensure that infections were being treated with the appropriate medication, and ensuring that those without infection were neither treated with antibiotics, nor reported as being infected on the database.

The range of dressings on the market was reviewed by the head of maternity in conjunction with the ABUHB maternity review panel, in particular to provide optimum protection against infection for women with a raised BMI. Leukomed Sorbact bacteria binding post-operative dressings were introduced in all areas of the maternity service for patients with a body mass index (BMI) greater than 30 in the latter half of 2017; with a decision subsequently being taken to use this dressing on all patients at the beginning of 2018.

The introduction of Leukomed Sorbact included a face-to-face training package for staff. This involved an introduction to wound healing with emphasis on signs of infection. Regular monthly training sessions for Leukomed Sorbact were also provided by the Essity account manager to accommodate shift patterns and staff changes. Previously, wound dressings had been removed 24 hours post-surgery to allow clinicians to visualise the wound and apply a fresh, dry dressing. However, following the introduction of Leukomed Sorbact, dressings were left in place to protect the wound from contamination for four to five days. This allowed the wound to remain undisturbed, reducing the risk of contamination from external contaminants.



**Figure 1.**

ABUHB average SSI rate (%) per year (Caesarean Section Surgical Site Infection Surveillance Quarterly Report: Royal Gwent Hospital. Includes data from 01/01/2017–31/12/2017, Version 1, Issued: 14/05/2018; and data from 01/01/2018–31/12/2018, Version 1, Issued: 11/06/2019; Public Health Wales, 2018).

Between 2017 and 2018 (Figure 1), ABUHB maternity services achieved a marked decline in the average SSI rate associated with caesarean section from 5.95% to 2.68%; well below the Welsh national average of 4.02% (Public Health Wales, 2018). This represents a 54% reduction in the SSI rate within one year. These results are aligned to the findings of other clinical trials, which have consistently shown a reduction in the incidence of SSI for Leukomed Sorbact compared to a range of standard post-operative dressings (Stanirowski et al, 2016a, b; Bua et al, 2017; Totty et al, 2019).

### Cost-savings to ABUHB

The 2018 Public Health Wales report indicated that ABUHB maternity services reduced their overall SSI rate by 47 individual episodes in 2018. As mentioned previously, it costs the NHS on average £3,976 per SSI episode (Jenks et al, 2014). It can therefore be deduced that the ABUHB maternity services saved an estimated £163,816 during 2018. This figure considers the expenditure of £23,056, which the maternity services required to implement using Leukomed Sorbact dressings for women who received a caesarean section during 2018.

### PATIENT EXPERIENCE

As mentioned above, SSI post-caesarean section can have physiological, psychosocial and financial implications on women's

health, wellbeing and quality of life. Therefore, a survey was developed by the ABUHB maternity services and disseminated to explore the experiences of women who have had an infection following caesarean section. Local research and development (R&D) approval was gained, and the survey was registered as a structured service evaluation. It was available via social media (Twitter and Facebook) between the 14th and 20th of August 2019. Women were asked how having an infection affected their home life and daily activity. Most participants commented and reflected upon the following parameters: pain, sleep, mobility, emotions, ability to care for their baby, sex life or intimacy, appetite, ability to breast-feed their baby, social activities (including shopping, visiting friends, etc), and bonding with their baby. These are highlighted in the participant accounts below:

*... I had a two-year-old and a newborn to look after so relied heavily on family to help me, due to pain and appointments. I was put on two types of antibiotics following my C-section, but had developed an infection anyway. Bed transfers were the most difficult. I couldn't do this independently so relied on my husband for assistance and to pass me baby so I could breastfeed her during the night.*

(Woman A)

*My infection caused me and my family great stress, I was in a great deal of pain which left me unable to bend and lift my baby properly.*

(Woman B)

*... When I had my infection, it prevented me from healing and therefore looking after my baby, although I don't feel it affected my bond with my baby it did affect my ability to care for her and I was more dependent on others, including my husband and mother. This did not help in terms of the huge adjustment to having a baby and the fact that my birth did not go to plan.*

(Woman C)

*It was very painful and limiting with trying to look after my babies and hard to keep clean.*

(Woman D)

*As a result, my husband had to take extra unpaid leave from work which affected us financially.*

(Woman E)

*It just made me really worried and stressed, I struggled to breast feed anyway and gave up while recovering from infection.*

(Woman F)

Moreover, women also commented on their post recovery experiences, as shown below:

*I felt ok once infection had improved, but still had internal pain from the wound. A slow healing process which was frustrating with a baby and a toddler!*

(Woman G)

*It was like instant relief after the infection had cleared. It took about a week or two for me to get my energy back and feel more me again. To be able to care for my baby properly after felt amazing and able to be a proper mum.*

(Woman H)

*Very relieved, but also some feelings of guilt that if I'd had a 'normal' birth I would have never got an infection and would have*

been able to look after my baby better earlier.

(Woman I)

I had good care from my GP, nurses and hospital staff when treating my infection.

(Woman J)

I was prescribed some antibiotics from my midwife who had swabbed my wound. Then it got much worse very quickly, I was checked and swabbed at the hospital — the midwives there were amazing. Then once that swab came back my midwife took really quick action in getting me different antibiotics, she really was brilliant — having good care really helped me emotionally.

(Woman K)

## CONCLUSION

As highlighted here, this holistic approach to quality improvement implemented by ABUHB maternity service has been instrumental in reducing the SSI rate for women birthing by caesarean section. Consequently, the birth experience for women having a caesarean section has been improved and the financial costs to the health board reduced. Use of interventions in practice, such as the ABUHB Method, has been encouraged and supported by previous studies (Stanirowski et al, 2016a; Bua et al, 2017). This report also suggests that such exemplars have the potential to reduce the incidence of SSIs and cost to other NHS health boards. In future, more research is warranted to determine if the ABUHB organisational method will have similar effects on other surgical procedures, which carry a high risk of wound infection. **JCN**

## Declaration of interest

Essity financially supported the evaluation and write up.

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## KEY POINTS

- Wound healing is a complex and dynamic series of events. If pathogenic bacteria enter wound sites, infection can occur.
- SSI post-caesarean section can have physiological, psychosocial and financial implications on women's health, wellbeing and quality of life.
- The holistic approach to quality improvement implemented by ABUHB maternity service has been instrumental in reducing the SSI rate for women birthing by caesarean section.

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