

Changing wound care protocols to reduce postoperative caesarean section infection and readmission

KEY WORDS

- ▶ Caesarean section
- ▶ Infection
- ▶ Diabetes
- ▶ Obesity
- ▶ PICO
- ▶ Opsite Post-Op Visible

Due to concern centring on the caesarean section wound infection rate being higher than the national average, a project was undertaken at the Wrightington Wigan and Leigh NHS Foundation Trust to reduce overall infection and readmission rates in this patient group. Changes in practice included wound care education for midwives, a change in the standard postoperative dressing, and the introduction of a new portable negative pressure system for incision management for patients with a high body mass index (BMI). Following the implementation of these measures, the infection rate dropped from 12% to 6%; in the highest risk group there were no infections or readmissions.

LINDSEY BULLOUGH
*Tissue Viability Nurse,
Wrightington Wigan and
Leigh NHS Foundation Trust,
Wigan*

DIANE WILKINSON
*Infection Control Junior
Matron, Wrightington
Wigan and Leigh NHS
Foundation Trust, Wigan*

SEAN BURNS
*Clinical Director, Dept.
Obstetrics and Gynaecology,
Wrightington Wigan and Leigh
NHS Foundation Trust, Wigan*

LOUISE WAN
*Specialist Registrar,
Wrightington Wigan and
Leigh NHS Foundation Trust,
Wigan*

Research from the Health Protection Agency (HPA, 2012) undertaken across 15 NHS Trusts in England identified a 9.6% surgical site infection rate among women followed-up after caesarean sections. The majority of these infections were minor (88%), however, higher wound infection rates were found among patients who were diabetic (15%) or obese (19%).

Within the Wrightington Wigan and Leigh NHS Foundation Trust, the infection rate following caesarean sections was found to be approximately 12% in 2011 – higher than the average reported by the HPA of 9.6%. This rate of infection is higher than would be expected for what is considered to be a relatively ‘clean’ operation (i.e. not in an area of the body with high bacterial levels, such as the large bowel – which has a 14.7% infection rate). The rate of infection following an abdominal hysterectomy is also much lower, at 6.6% (HPA, 2012).

Of some concern were the readmissions due to infection – leading to full or partial wound dehiscence – in caesarean section patients with a high body mass index (BMI), with an average of three patients readmitted per month. Women with BMI $\geq 35\text{kg/m}^2$ were noted to be the most likely to be readmitted. Readmission among this group is far from ideal, with patients having just given birth and who should be bonding with their new baby. There is also a cost to the health service

in relation to bed days, opportunity costs and the loss of tariff payments as a result of readmission within 30 days of surgery (Department of Health [DH], 2012).

A 3-month audit was carried out to identify the issues relating to wound infection and readmissions in the caesarean section patient population. The audit revealed:

- ▶ A gap in wound care knowledge among staff.
- ▶ A lack of ownership relating to the patient’s wound.
- ▶ Inadequate postoperative wound management practices.

A programme of change was undertaken to reduce wound infections, wound dehiscence and readmission of post-caesarean section patients. A multidisciplinary team comprising a tissue viability nurse, infection control nurse and the obstetricians and midwives set out to reduce the overall infection rates through a programme of wound education for staff, patient education and changes to the wound care products used in this patient group.

CHANGING PRACTICE TO HELP IMPROVE OUTCOMES

Several initiatives were undertaken:

- ▶ The National Institute for Health and Care Excellence (NICE, 2008) recommendations on

the prevention and treatment of surgical site infection were implemented for pre-, peri-, and postoperative care.

- ▶ Staff education in surgical wound management and the importance of reducing surgical site infection was also undertaken.
- ▶ An information leaflet was produced for patients to help them report suspected wound infections at an early stage.

STAFF EDUCATION

The pressures on nurses in everyday ward and community care environments can mean that wound care is not their main focus. There may also be insufficient access to training and education opportunities and, although in some situations training may be available, staff access to this may be limited as a result of pressure on the staffing levels in the clinical areas (King, 2000).

The challenge for nurse specialists, when under work, time and resource pressure, is creating easily accessible educational material and flexible training, which is at the correct academic level for the staff involved. Thompson et al (2001) discussed the importance of the role of the clinical nurse specialist in transferring research-based knowledge and clinical evidence into practical protocols, which can be utilised by clinicians in the healthcare environment.

To this end, part of the project involved the creation of teaching materials and running drop-in sessions that allowed staff easier access to the available education. The key focus of the education for nurses was to disseminate the findings of the NICE Guidelines on Prevention and Management of Surgical Site Infection (NICE, 2008).

IMPROVING PATIENT INFORMATION

Traditionally, patients undergoing caesarean sections at the authors’ Trust received little information relating to their wound and what to look for in relation to wound complications. The team designed an information card (Figure 1) on the signs and symptoms of wound infection that was given to patients prior to discharge (the reverse side of the card [Figure 1b] also provided general postoperative care advice). Patients are asked to contact the team when early signs of infection are present.

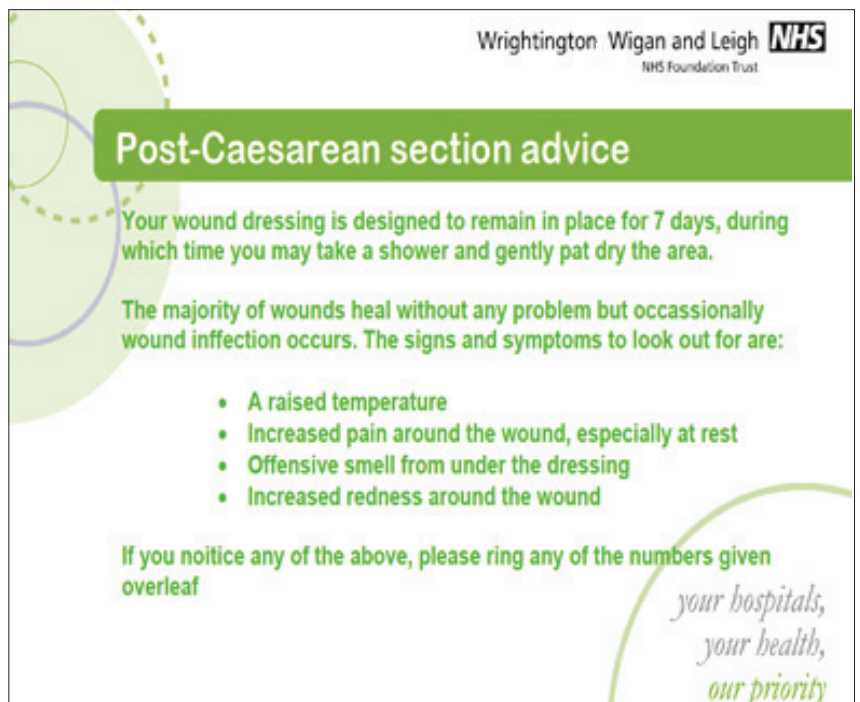
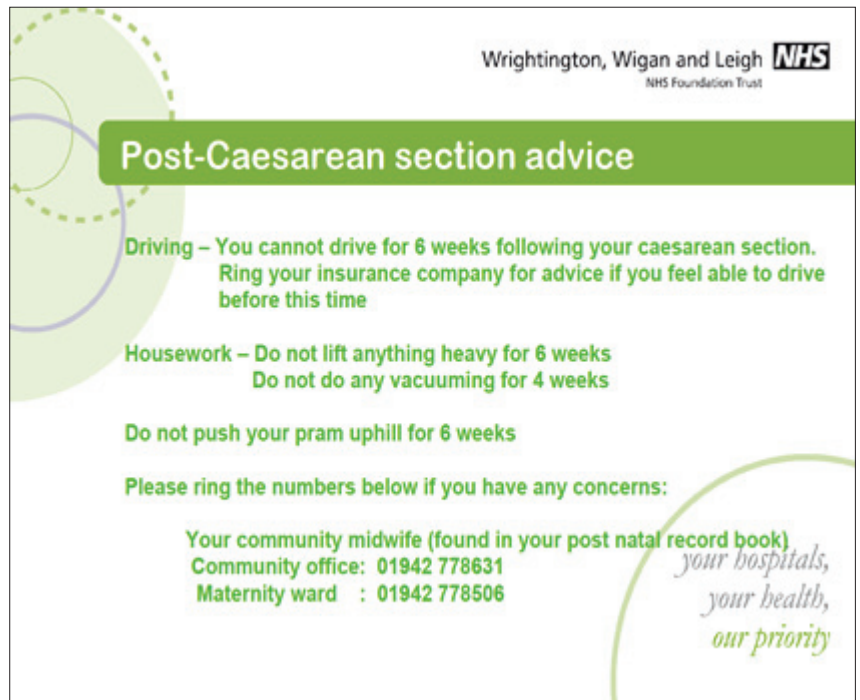


Figure 1. A card designed by the authors’ team to provide information on the signs and symptoms of wound infection to patients prior to discharge following caesarean section, and general postoperative care advice.

SURGICAL SITE MANAGEMENT AND WOUND CARE REVIEW

Surgical site wound care practice was standardised with regards to skin preparation,



Figure 2. PICO therapy *in situ* on a patient with a body mass index of 42 kg/m² post-caesarean section.

hair removal and wound dressing application, in line with the NICE guidance (NICE, 2008). Despite this, no reduction in infection was achieved; the rate remained static at 12% (with three readmissions per months) before and after this intervention.

Further review of the surgical site wound care practice revealed the removal of the postoperative wound dressing on day one following surgery. At this point in the wound healing process there is not sufficient restoration of the bacterial barrier

function of the skin to protect against infection (Timmons, 2006). Following dressing removal at day one, patients were allowed to bathe or shower, risking further contamination of the wound.

To close the window of possible wound contamination and aid healing, OPSITE Post-Op Visible (Smith & Nephew) was used and left *in situ* for at least 7 days in uncomplicated, low-risk cases (i.e. BMI <35 kg/m²). In wounds with excessive exudate levels, the dressing was changed earlier. This dressing allows good visibility of the incision during treatment and is soft and conformable.

USE OF NEGATIVE PRESSURE IN HIGH-RISK PATIENTS

Early studies on the use of negative pressure wound therapy (NPWT) in the management of closed incisions have demonstrated that in high-risk incisions, NPWT can help to remove oedema, reduce haematoma formation, and reduce tension on the suture line (Stannard, 2012). Thus, the modality was considered to be of benefit to women with a BMI >35kg/m² following caesarean section (i.e. at high-risk of wound infection and breakdown). It was agreed with the local obstetricians that NPWT would be added to the standard postoperative care package for this at-risk group.

PICO (Smith & Nephew) – a single-use NPWT – was selected and was left *in situ* for 1 week as per the manufacturer’s instructions. PICO is designed to manage 150ml of exudate, is easy to apply, and the small pump is easy to manage in a bag or in the patient’s pocket. Midwives underwent training on the application and management of the device. Figure 2 shows a PICO in place on the caesarean section wound of a woman with a BMI of 42 kg/m².

OUTCOMES

Follow-up was carried out via telephone survey for a minimum of 30 days postoperatively. Infection was confirmed by both clinical diagnosis and microbiological investigation.

The infection rate prior to the introduction of the initiatives described above averaged 12% between August 2011 and February 2012. Following the changes in practice, including the introduction of PICO and OPSITE Post Op Visible, between February 2012 and November 2012, the infection rate dropped to 6%. No infections or readmissions occurred among those women who received PICO (Table 1).

Table 1. Summary of wound infection rates among patients who underwent a caesarean section between February 2012 and November 2012, following the introduction of a package of initiatives to reduce infection at the authors’ Trust.

Therapy	Patients who underwent caesarean section (n)	Wound infections n (%)	BMI range (kg/m ²)
PICO	50	0 (0)	35–53*
OPSITE Post Op Visible	610	39 (6.3%)	<35
Total	660	5.9%	

*One patient with a BMI of 30 kg/m² was included in this group due to having significant additional comorbidities.

Figure 2 illustrates the number of caesarean sections and infections per month at the authors' Trust for the 6 months before and the 9 months after implementing the initiative package.

Two patients had an allergic reaction to the PICO dressing and therapy was discontinued at 4 days postoperatively. These reactions were to the transparent film retention strips, not the silicone wound contact layer. The reactions were temporary and neither patient developed an infection.

DISCUSSION

The outcomes reported here represent a 50% reduction of infections in caesarean section wound. If sustained, these results would lead to cost savings for the Trust, and improved clinical outcomes and wellbeing for this patient group.

Obesity is strongly associated with development of a surgical site infection – whether superficial, deep or organ/space – increasing in line with the woman's weight (Wloch et al, 2012). Those who are overweight (BMI 25–30) are 1.6 times more likely to develop an infection, obese women (BMI 30–35) are 2.4 times more likely and those with a BMI over 35 are 3.7 times more likely to develop an infection.

Wound infection impacts not only on the mother and her family, but also has an impact on health service resources in relation to antibiotic use, GP time and midwifery care. In addition, for some patients with an infection, it is necessary to be readmitted to hospital. Each readmission is expected to cost in the region of £350 per bed day, excluding wound management. For example, in November 2011 there were four readmissions due to wound infection. However, following this change in practice there have been no readmissions or incidents of dehiscence. Since one of the benefits of this initiative is the reduction of readmissions, as well as a reduction of preventable wound infections and wound dehiscence, it is appropriate to investigate the expected cost savings.

It is important to stress that of all the changes in practice, one of the most impactful was the re-education of the midwives in the management of surgical wounds and in application and removal of wound dressings. In addition, supplying patients with information cards ensured that those who were developing wound infections were able to identify signs at an early stage and contact a healthcare professional.

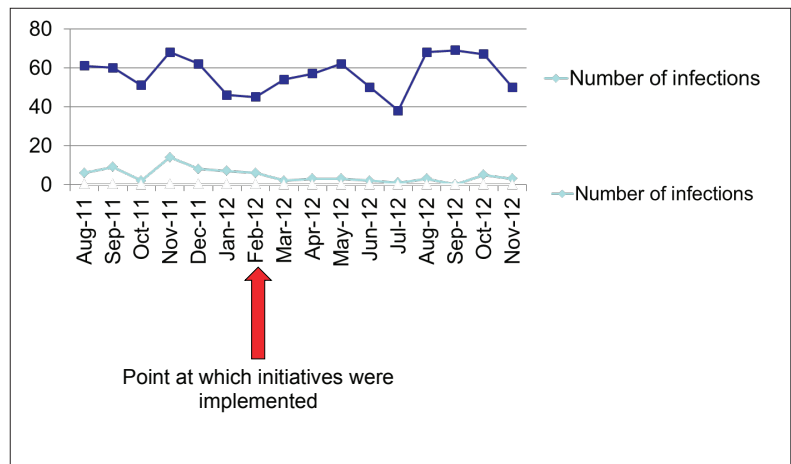


Figure 2. Caesarean sections and infections per month for the 6 months prior to and the 9 months following the implementation of the initiative package.

COST EFFECTIVENESS OF NEW WOUND DRESSINGS

Based on an average of 65 caesarean sections per month, and assuming one postoperative dressing per patient, Table 2 shows the breakdown of costs of dressings and readmissions. Using the standard dressing, the annual cost of dressings would be £476 (12 x 65 dressings at a unit cost of £0.61). Using the new protocol, 60 patients (7.7%) would require PICO at a unit cost of £120 and 720 (92.3%) would require OPSITE Post-Op Visible, at a unit cost of £2.26. This results in an annual cost of £7 200 and £1 627 respectively (Table 2).

Prior to the change in practice, there had been an average readmission rate of three per month due to wound breakdown as a result of infection. Assuming a cost per readmission of £1 050 (3 days length of stay at £350 per day), the expected cost per month is £3 150, and the annual cost for readmissions would be £37 800. Overall, the use of the new protocol would result in a cost saving of £29 449 per year.

These results suggest that, in addition to the impact on patient wellbeing as a result of reduced infection incidence, there are potential cost savings as a result of adopting the new protocol.

Additional savings in resource may also be realised as a result of a decrease in the incidence of wound infection. For example, the use of antimicrobial products and antibiotics, GP consultations, district nursing and outpatient visits could all potentially be reduced.

Table 2. Breakdown of expected costs.

Annual cost (£)		
Item	Previous protocol	New protocol
Standard dressing	£476	£0
OPSITE Post-Op visible	£0	£1627
PICO	£0	£7200
Readmissions	£37,800	£0
Total	£38,276	£8,827

CONCLUSION

It is essential that the risk of infection for patients undergoing caesarean section procedures is minimised. One way to do this is to identify criteria that may deem a patient at higher risk of wound complications, either due to their body weight or their relative health at the time of surgery (Wloch et al, 2012). The next step is to implement actions that may help to reduce these risks. Staff education and training in wound care is an essential component of any change in practice, as is gaining support for the change from the staff on the ground.

For the majority of patients, NPWT may not be necessary, however, for high-risk patients it would appear that this should be considered as an alternative to traditional dressings. Although further research is needed into the exact mode of action of the PICO dressing, the outcomes produced in this small study would suggest that fluid removal, reduction in haematoma formation and splinting of the wound edges have ensured that the patient’s wound healing has been achieved without complication. The department is continuing to audit these outcomes and indications are that PICO may reduce the infection rates in high BMI patients.

This study demonstrates that using negative pressure on closed incisions in high-risk patients can potentially reduce wound complications,

readmission rates and may reduce the overall incidence of wound breakdown in this vulnerable patient group. In addition, the positive impact on the patient and family’s wellbeing during an important time in their lives cannot be ignored.

More importantly, this project identified the need for improved staff education, a better understanding of wound care issues and encouraged all staff to be aware and take ownership of this problem. The additional cost of the dressing is off set by the potential reductions in readmission rate, suggesting this protocol may be both clinically and cost effective. WUK

ACKNOWLEDGEMENT

The authors would like to thank John Timmons for editorial support with this article.

REFERENCES

Department of Health (2012) *Payment by Results Guidance for 2012-2013*. Available at: <http://bit.ly/1fVsBz1> (accessed 2.04.2014)

Health Protection Agency (2012) *Risk of Infection from Caesareans at Nearly 10 Per Cent* Available at: <http://bit.ly/1pUMDOC> (accessed 2.04.2014)

King BM (2000) Assessing nurses’ knowledge of wound management *J Wound Care* 9(7):343-6.

National Institute of Health and Clinical Excellence (2008) *Surgical Site Infection (CG74)* (accessed 02.04.2014)

Stannard JP, Gabriel A, Lehner B (2012) Use of negative pressure wound therapy over clean, closed surgical incisions. *Int Wound J* 9(Suppl 1): 32-9

Thompson C, McCaughan D, Cullum N et al (2001) The accessibility of research-based knowledge for nurses in United Kingdom acute care settings. *J Adv Nurs* 36(1): 11-22

Timmons J (2006) Skin function and wound healing physiology. *Wound Essentials* 1: 8-17

Wloch C, Wilson J, Lamagni T et al (2012) Risk factors for surgical site infection following caesarean section in England: results from a multicentre cohort study. *BJOG* 119(11):1324-33.