

Reducing Surgical Site Infections in Caesarean Sections: An evidenced-based maternity care bundle

Shen Chuen Khaw^{1*}, Muna Patell¹, Mehvish Jalil¹, Sadaf Ahmad¹, and Meena Bhatia^{1*}

¹Department of Obstetrics, The Women’s Centre, John Radcliffe Hospital, Oxford University Hospitals NHS Foundation Trust, Oxford OX3 9DU, United Kingdom.

*Corresponding authors: Meena.Bhatia@ouh.nhs.uk and AdrianSC.Khaw@gmail.com

Background

A surgical site infection (SSI) is an infection that can occur within 30 days following surgery. Approximately 5–20% of Caesarean Sections (CS) have associated SSI.¹⁻³ These infections can have serious consequences for both mothers and babies, resulting in increased maternal morbidity, extended hospital stays, postnatal readmission, and reduced maternal mental wellbeing which disrupts a precious postnatal time.^{2,4}

In the UK, the number and complexity of CS is steadily rising. This increases the risk of SSI becoming a greater burden on patients and the NHS. Measures taken to reduce this burden could have positive health, socio-economical and system-based benefits for women and babies at a pivotal time in their lives.¹⁻⁴

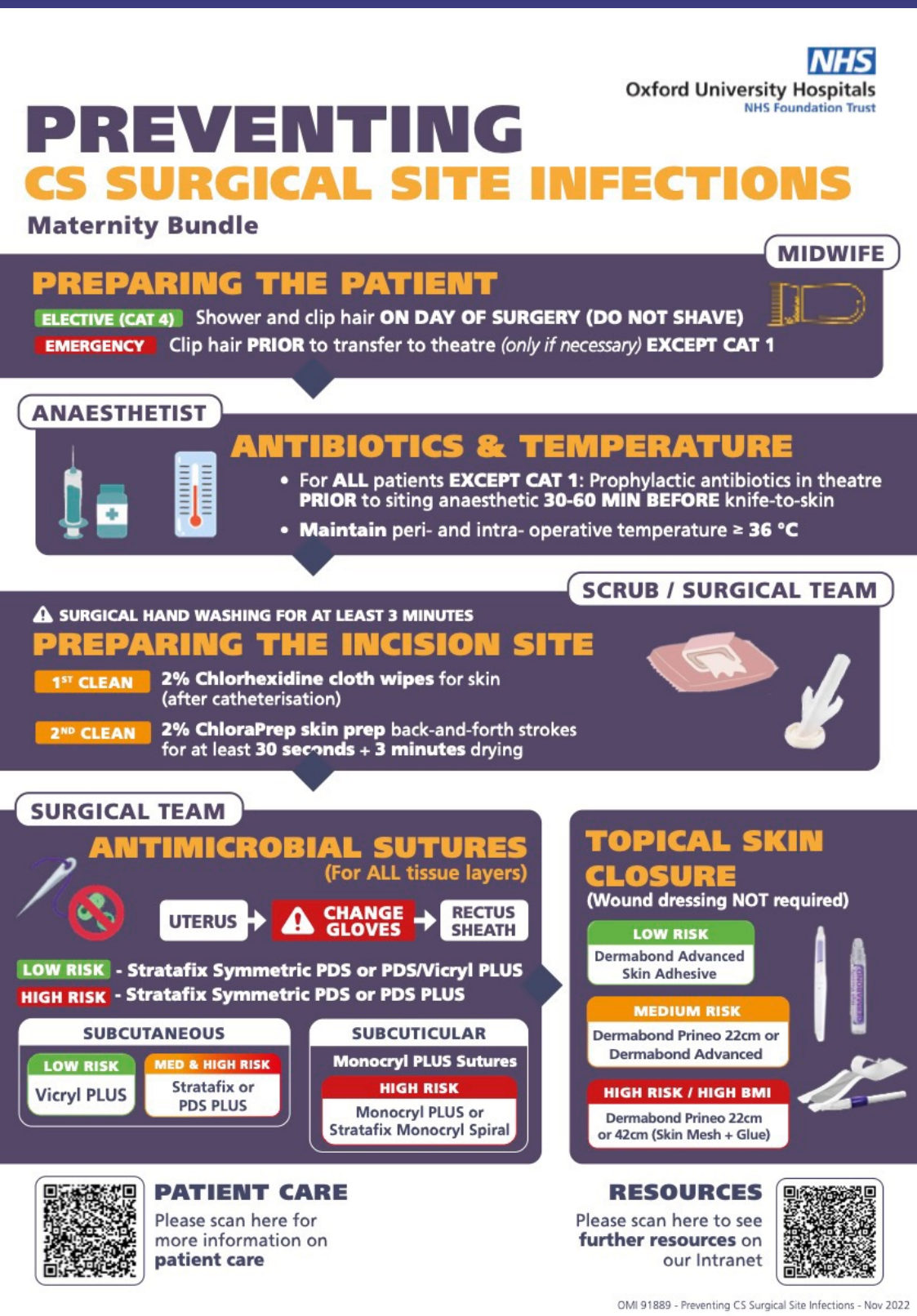
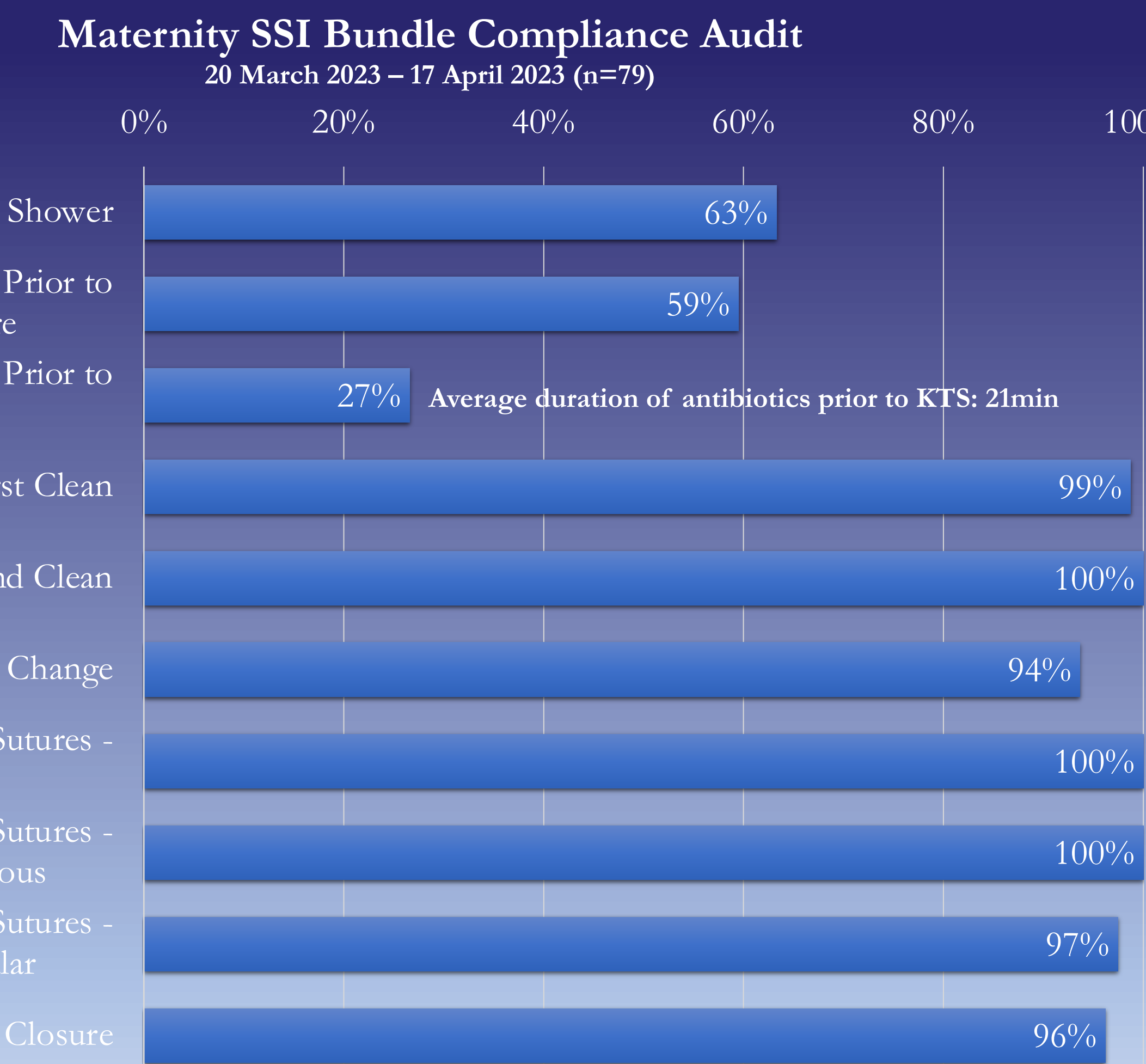
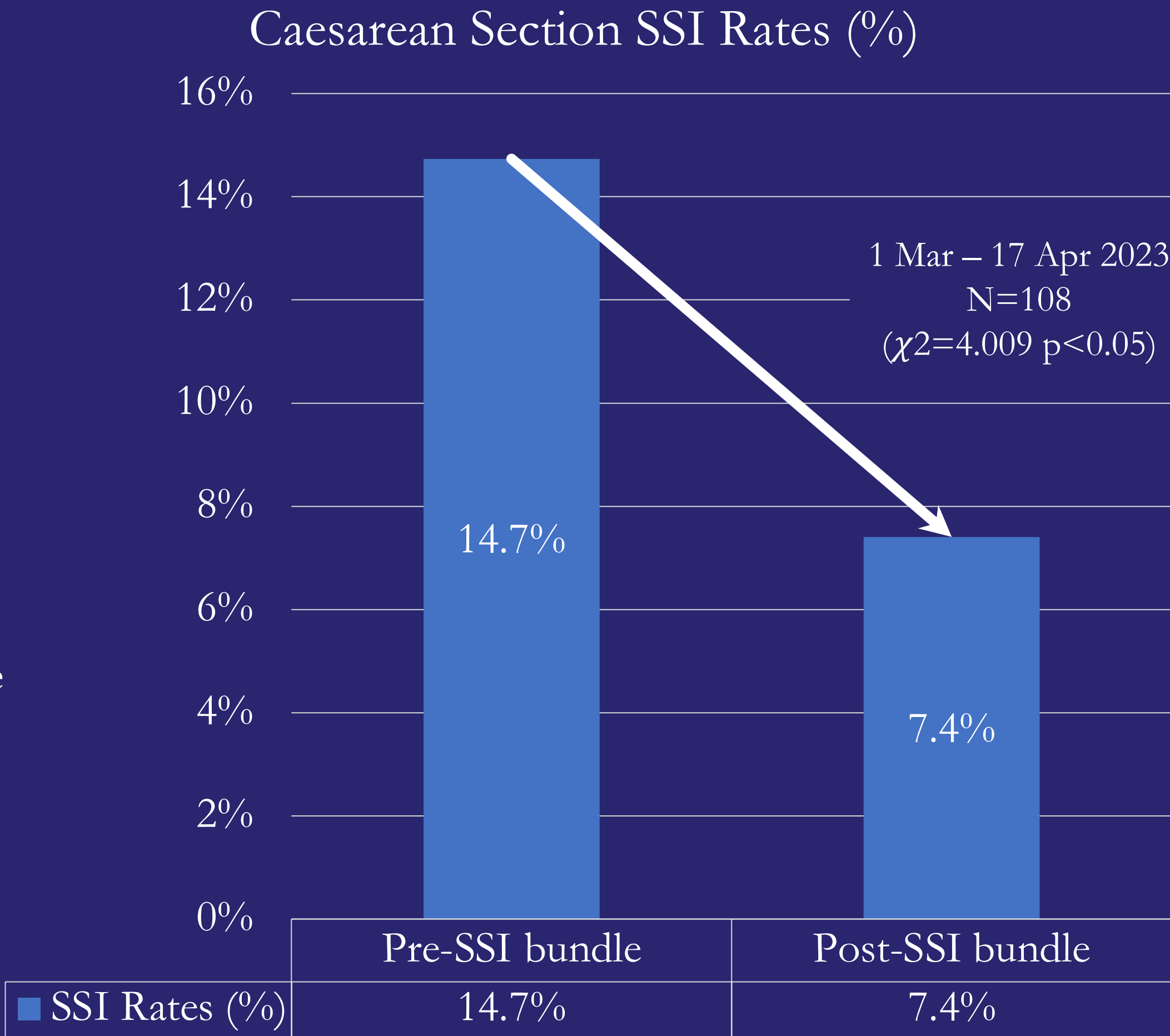
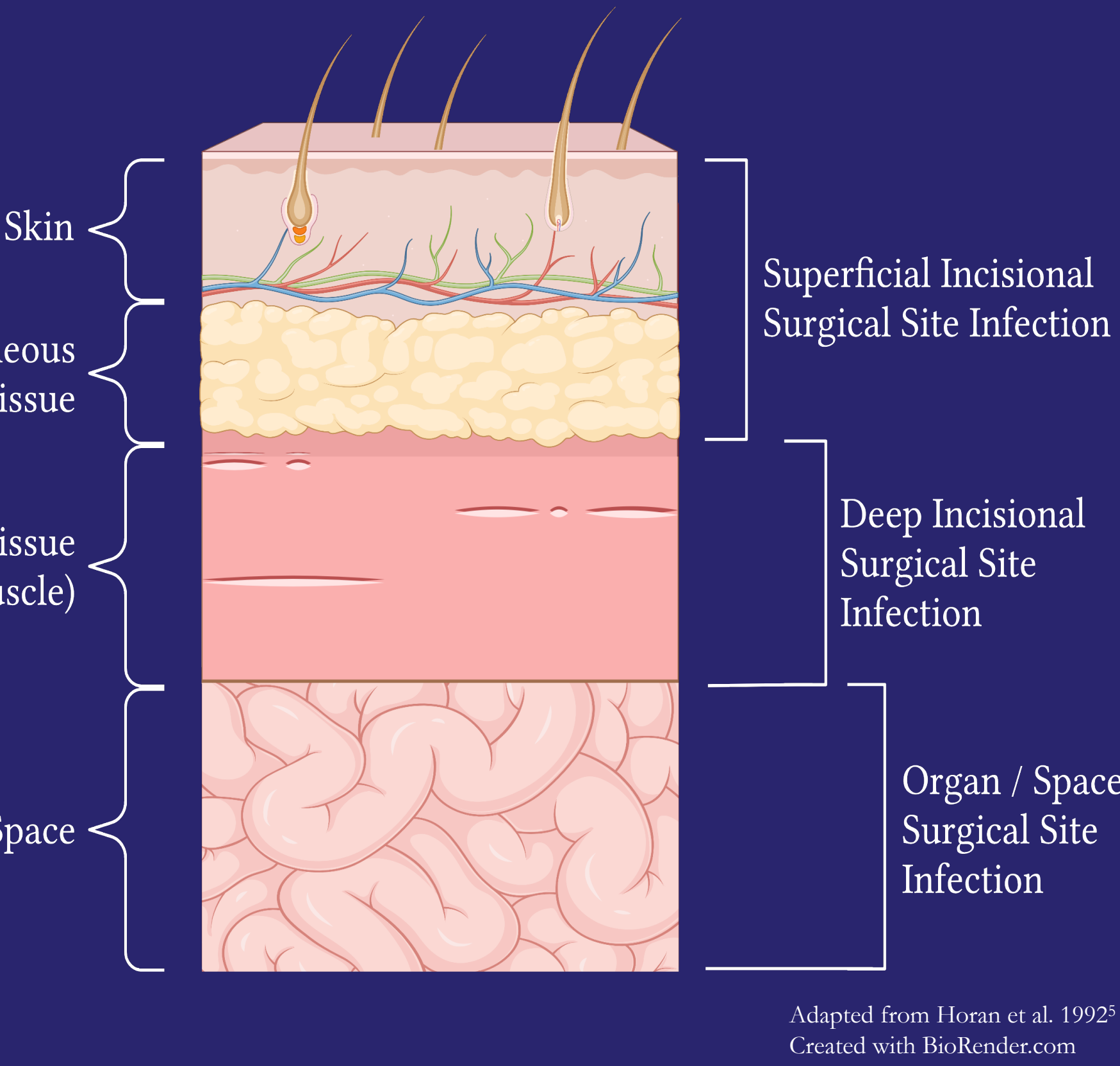
Objectives & Design

We conducted a single-site feasibility study to understand the

- (a) prevalence of SSI associated with CS within an NHS maternity unit
- (b) possible risk factors associated with SSI following CS¹⁻³
- (c) potential implementation and impact of an evidence-based bundle of care (Maternity CS SSI reduction bundle) to reduce SSI risk¹⁻³

The bundle^{1-3,6-7}

- pre-operative counselling,
- patient preparation
- prophylactic antibiotics
- temperature maintenance
- double-clean of the incision site
- antimicrobial sutures
- antimicrobial topical skin closure



Results

Between 10th February 2020 and 9th May 2020, 422 caesarean sections occurred at our unit. We collected data from 414 women and found 61 CS SSIs (14.7%). We identified that **emergency caesarean sections** and having a **high BMI ≥ 30** were associated with higher SSI rate; 67% and 63% respectively.

We held well-received training sessions with midwives and nurses to familiarise them with post-operative wound management. Eye-catching posters and QR codes were created to facilitate access to resources and wound care advice on any digital device. We also co-developed a patient-facing wound healing surveillance app that allows women to use their phones to track the progress of their wound recovery, take images and report symptoms if they have wound concerns. Clinicians will be able to use the app to access individual data, construct a dashboard, advise women regarding wound care, and refer them for additional follow-up and treatment in a timely manner.

We integrated the Maternity SSI prevention bundle in our elective caesarean section list beginning in December 2022, and we then re-audited SSI rates in elective caesarean sections. Between 1 March 2023 and 17 April 2023, 130 elective CS were performed, and we were able to obtain complete data from 108 women. Following the implementation of the Maternity SSI prevention bundle, our post-CS SSI rates dropped significantly to 7.4% ($\chi^2=4.009$, p<0.05). A compliance audit was also carried out, which revealed nearly perfect compliance with theatre components. As a result, we are interested in improving patient counselling and will gradually roll out the bundle to our emergency lists. We are also in the testing phase of the wound healing monitoring app, which was launched on May 12, 2023, and are now analysing the data.

Conclusions

CS SSIs are related with a variety of undesirable outcomes.¹⁻⁴ Thus far, we have effectively implemented a care bundle to lower infection rates, and we have discovered a substantial decrease in CS SSI rates from **14.7% to 7.4%**. Our findings demonstrate that an evidence-based bundle may considerably lower SSI rates, and we want to progressively incorporate the bundle into our emergency CS list.

Acknowledgments

The authors would like to express their gratitude to the Oxford maternity department, the infection prevention and control team, and the Oxford University Hospital NHS Foundation Trust for their invaluable assistance with this study. The authors would also like to specifically thank Lisa Butcher, Giles Bond-Smith, Laura Jones, Catherine Weems, Ursula Blyth, Francesca Wright, Editha Wood, Tatenda Chisodza, and Anastasia Krywonos for their contributions towards the success of the project.

References

1. Ekanem EE, Oniya O, Saleh H, Konje JC. Surgical site infection in obstetrics and gynaecology: prevention and management. The Obstetrician & Gynaecologist;2021;23:124–37.
2. Suarez-Easton S, Zafran N, Garmi G, Salim R. Postcesarean wound infection: prevalence, impact, prevention, and management challenges. Int J Womens Health. 2017 Feb 17;9:81-88. doi: 10.2147/IJWH.S98876. PMID: 28255256.
3. Gomaa K, Abdelrahman A.R., El Gelany S. et al. Incidence, risk factors and management of post cesarean section surgical site infection (SSI) in a tertiary hospital in Egypt: a five year retrospective study. BMC Pregnancy Childbirth 21, 634 (2021).
4. Weckesser, A., Farmer, N., Dam, R. et al. Women's perspectives on caesarean section recovery, infection and the PREPS trial: a qualitative pilot study. BMC Pregnancy Childbirth 19, 245 (2019). <https://doi.org/10.1186/s12884-019-2402-8>
5. Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG. CDC definitions of nosocomial surgical site infections, 1992: a modification of CDC definitions of surgical wound infections. Infect Control Hosp Epidemiol;1992;13:606–8.
6. National Institute for Health and Care Excellence (NICE). (2021). Plus Sutures for preventing surgical site infection [MTG59]. <https://www.nice.org.uk/guidance/mtg59>
7. National Institute for Health and Care Excellence (NICE). (2020). Surgical site infections: prevention and treatment [NG125]. <https://www.nice.org.uk/guidance/ng125>