**[Perioperative and surgical care initiative of the year](https://awards.patientsafetycongress.co.uk/award-category/perioperative-and-surgical-care-initiative-year%22%20%5Ct%20%22_blank)**

### Ambition

* Provide a clear rationale for the work, and provide context as to why the initiative or improvements were required.
* What was the ambition for the project, and how did this draw on, or differ from, existing best practice in surgical care through the perioperative period?
* Outline the targets set for patient safety and quality improvement, and what measures were put in place to achieve them.

Surgical site infection (SSI) accounts for 14.5% of hospital acquired infections in the UK. It is a significant cause of patient morbidity including increased length of stay, readmission, wound dehiscence, hernia, critical care admission, and death. SSI rates of up to 30% have been reported after colorectal surgery where wounds are frequently contaminated by bowel content. However, prevalence is likely to be underestimated as SSI often presents after hospital discharge, so accurate measurement of SSI requires post discharge surveillance.

Public Health England requires mandatory SSI reporting following orthopaedic, vascular and obstetric surgery but not for gastrointestinal surgery and incidence is only captured during inpatient stay or readmission. Data submitted to the national SSI surveillance service shows only 39% of UK trusts continuously monitor SSI after general surgery. Only 19 hospitals presented a complete dataset for lower gastrointestinal surgery and the reported rate of 8.7% (range 0.3 -24.5%) only includes inpatient and readmission data. The Getting It Right First Time (GIRFT) specialty report for general surgery showed that only 4% of hospitals (5 out of 138) knew their SSI rates (4 out of 50 in first GIRFT report).

The more robustly SSI is measured, the higher the rate. Research studies using 30-day patient follow-up have shown SSI rates of 18 - 25% after abdominal surgery. This means that there is no benchmark for SSI after elective colorectal surgery and most hospitals do not know their SSI rates

Care bundles have been shown to reduce SSI. The existing World Health Organisation SSI bundle, which is part of the Surgical Safety Checklist, consists of four interventions which have been shown to independently reduce infection: Antibiotics within 1 hour of surgery, normothermia , blood glucose control in diabetics and appropriate hair removal. This is routinely used throughout the NHS. Despite high compliance with this, one hospital in the West of England (WoE) halved SSI using an additional 4 point care ‘surgical ‘care bundle.

Seven hospitals in the WoE had already worked together to improve care after emergency surgery in the Emergency Laparotomy Collaborative. The aim was to build on this collaborative approach :

* To establish reliable SSI measurement after elective colorectal surgery using 30-day patient-reported outcome measures in all trusts
* To implement this new evidence-based 4-point care bundle

Measures were:

* 30-day patient-reported SSI rate
* Response rates
* Compliance with each bundle element

With the aim of reducing regional SSI by 50% by March 2021

### Outcome

* Clearly demonstrate the benefits of the initiative on quality of care, using quantitative evidence to show tangible positive impacts on the safety of surgical care patients.
* Discuss any other positive outcomes that were a result of the initiative, which could include improved patient experience, waiting time reduction, capacity increase or optimised treatment pathways.
* Include patient and/or staff testimonials supporting the efficacy of the initiative.

Definitions and bundle components were agreed by the collaborative. Colorectal surgery was defined as colorectal resection, small bowel resection and reversal of Hartmann’s procedure.

To establish reliable measurement of 30-day patient-reported SSI, the Health Protection Agency questionnaire, a validated questionnaire used to monitor SSI after surgery, was used. Prior to the project, of the 7 hospitals other than the one where the bundle had been implemented, only one trust was continuously measuring SSI. They had already established a method of measuring in-hospital SSI, so this was included as well as 30 day patient-reported outcomes and so they had more robust data One trust was unable to collect patient-reported measures but collected consistent measures pre and post bundle implementation electronically and from note review

All hospitals successfully measured SSI achieving an average response rate of 80%. Unfortunately the COVID pandemic meant one hospital had a period where patient-reported data was not collected due to staff redeployment, so their post implementation data was limited to 5 months.

The evidence-based care bundle consisted of:

* 2% chlorhexidine skin preparation
* A second dose of antibiotic after 4 hours
* Use of a dual ring wound protector
* Antibacterial (Triclosan coated) sutures for abdominal wall closure

Baseline measures were collected before implementation and ongoing audits of compliance with each bundle element were measured by theatre teams, who also prompted the surgeons to use each bundle component. Average compliance of 95%, 73%, 70% and 73% was achieved for each element respectively. Overall compliance with whole bundle was **X%**

The trust that had originally implemented the bundle in 2013 reduced SSI from 20% (208 patients) to 10% and sustained their reduction in SSI from 2013- 2021 (1870 patients).
All trusts, except one with a low baseline rate, demonstrated at least 27% improvement in SSI rate, the greatest being 75% improvement.

Combined regional average baseline SSI was 18% (range 8- 30%) pre November 2019 (903 patients). Implementation of bundle in all trusts between November 2019 and May 2020 resulted in 50% improvement in SSI rate to a regional average of 9% (range 6-15%) by January 2021 (1147 patients). This relates to saving 103 patients from an SSI, a significant improvement in patient experience.

The MDT approach and collaborative element enabled staff and trusts to support each other during the difficulties of the COVID-19 pandemic and engagement was high, with theatre teams in particular being empowered to make a difference.

### Spread

* Show how these improvements in provision of safe, high-quality perioperative surgical care are replicable and scalable.
* Outline the efforts made to share best practice, or examples of where this project has embedded and spread to other departments, settings or organisations.

This project started in 2019 using the IHI breakthrough collaborative model to spread best practice. Teams were taught quality improvement methodology and measurement focused on process (bundle compliance and response rates) and outcome (SSI rates). Meetings were held with each team at the beginning of the project and there was one face-to-face event prior to the COVID-19 pandemic. All hospitals implemented the bundle just before the pandemic, so subsequent meetings were online and supplemented by online coaching. As the WHO checklist includes elements to reduce SSI, a spot audit was performed by all hospitals prior to implementing the new bundle. During COVID-19, cancer surgery was still performed so measurement continued but with reduced numbers. All hospitals successfully implemented the bundle and reduced SSI. Challenges included standardising measurement, procurement of antibacterial sutures and sustaining measurement during the pandemic when staff were redeployed to other roles. Despite these challenges we have demonstrated that a care bundle developed in a single hospital can be adopted and spread and the original outcome of a 50% reduction in SSI after elective colorectal surgery can be replicated in other hospitals and deliver results within 18 months

The bundle is easily adaptable to other surgical procedures and three hospitals implemented the same bundle after emergency abdominal surgery during 2020, although this was not part of the original project. Measurement of SSI can be more challenging after emergency surgery as mortality rates are higher and a proportion of patients might have their abdomen left open initially after surgery (laparostomy). Patient-reported outcomes alone cannot measure the totality of SSI as a higher proportion of patients remain in hospital at 30 days, so a combination of in-hospital measurement and post-discharge surveillance is required. Compliance with the bundle is also more difficult as it is not always possible to use a wound protector. However, all 3 trusts reduced SSI. The average combined baseline SSI rate was 23.5% (range 13- 32 %) and decreased to 10% (range 7-12%) following bundle implementation. Average response rate was 75%.

We are currently exploring other ways of measuring SSI such as e-PROMS and primary and secondary care data linkage to facilitate adoption and spread and are considering expanding the project to vascular surgery and caesarean section

Results have been shared with Royal College of Surgeons and will be presented at the Association of Surgeons of Great Britain and Ireland with the aim of sharing more widely.

### Value

* Clearly evidence how the initiative has improved value for patients and staff, in terms of patient experience, staff satisfaction and quality of care.
* If possible, provide evidence of value creation in other areas, in terms of increased capacity, reduced costs, reduced variation and/or improved efficiencies.

The decreased incidence of SSI has undoubtedly had a significant impact on patient experience reducing the pain and discomfort associated with an infection as well as costs of patient time and travel.

Published literature estimates that development of an SSI after surgery leads to a 34-226% increase in cost and GIRFT estimates that English NHS trusts have spent £35.2 million over 5 years on SSI-related medical negligence claims. NICE estimates an SSI costs between £2000 and £3000. SSI also increases length of stay and readmissions with significant costs. Local data demonstrates that 50% of patients developing an SSI after colorectal surgery are only seen in the community, incurring costs of GP visits, antibiotics, dressings and nursing time.

Overall we estimate that we have saved 103 patients from developing a SSI since the start of the project. Using the NICE estimate of £3000 per SSI, this would extrapolate to a cost saving of £309 000. This does not include additional savings from SSI reduction after emergency laparotomy

In terms of costs associated with the projects:

* Triclosan coated sutures are recommended by NICE but are approximately 85p more expensive per suture, equating to approximately £2.55 per patient. Economic analysis has demonstrated that this expenditure is cost-effective with a number needed to treat of 28 but despite this, teams found it difficult to persuade hospitals to fund the sutures.
* Dual-ring wound protectors were already in use for laparoscopic surgery but there was a small increase in cost related to increased use
* Each hospital used different personnel to collect patient -reported outcome data using paper questionnaires, telephone follow-up or both. This incurs a manpower cost for data collection and upload. We are currently exploring other ways of measuring SSI:
	+ One hospital is trialling collection of SSI using e-PROMS which will involve a text questionnaire being sent to patients.
	+ We are also testing whether population health management data can be used to link primary and secondary care data to measure hospital-acquired and community-detected SSI after surgical procedures. By automating data collection, it should be easier for hospitals to accurately measure SSI reducing cost and facilitating adoption and spread
* The project was supported by the West of England Academic Health Science Network but costs were reduced by running events online. All teams delivered this quality improvement as part of their job and there was no backfill or funding to deliver the change.

### Involvement

* Show how patients were involved in decisions around their care, and their views were embedded in the design of the initiative
* Provide clear evidence of a multidisciplinary approach, with all relevant parties fully engaging in the work, including managers, medics and nurses as well as patients and families, and how this has led to improved safety.
* Detail how a culture has been developed in which all members of staff can raise concerns and make suggestions for improvements.

Patients were integral to this project as patient-reported 30-day SSI using the health protection agency questionnaire was the outcome measure. It asks questions about 3 groups of symptoms and signs which together establish presence of an infection. The introduction of enhanced recovery protocols after colorectal surgery have reduced length of stay to less than a week. As the median time to presentation of SSI is 13 days post-operatively it is likely that previously reported SSI rates based on in-patient and readmission data have underestimated the true incidence. By using patient reported outcomes this was the first time that many hospitals knew their SSI rates after elective colorectal surgery.

Each hospital formed a multidisciplinary team to implement the project. The regional clinical lead for the project wrote to all medical directors and chief executive officers prior to starting the project to gain executive support and senior leader were updated with the success of the project. We also informed the Royal College of Surgeons’ Quality Improvement team. We involved the company who make antibacterial sutures (they have no competitor) to support introduction of the sutures into hospitals. At the time antibacterial sutures were an Innovation Technology Payment product and our industry partner supported the 2 eligible trusts in our region to benefit from the cost reduction

Most hospitals implemented paper questionnaires and/or phone calls to measure SSI. Some used in-hospital surveillance in addition. Data collection was undertaken by infection control nurses, enhanced recovery nurses, specialist cancer nurses or junior doctors. Collaborative events were attended by all members of the multi disciplinary team and were an opportunity to learn and share from experiences and to review data

An online toolkit was developed to aid implementation. This included QI resources, published evidence and documents to support data collection. Feedback on compliance was essential to continue engagement and coffee room posters were designed for teams to share within their hospitals. A video was designed to publicise the project including one especially for theatre nurses.

The key to implementing the bundle was involvement of theatre teams to prompt teams to do the right thing and also to measure compliance. Theatre teams were empowered to time operations to ensure a second dose of antibiotics was given after 4 hours and also to remind surgeons to use wound protectors and antibacterial sutures. This was therefore a truly multidisciplinary project including staff along the whole patient journey