Time to Act:

A State of the Nation report on Surgical Site Infections in the UK

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Foreword

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Surgical site infections (SSIs) are a really significant problem for patients and the NHS.

When I consent a patient for surgery, I do so in the knowledge that if they do get an infection, then it could ruin their life. An infection can result in months of additional operations. Sometimes, we can never cure the infection. These patients will often go on to lose their jobs, lose their relationships, and sometimes, people lose their homes. It can be devastating.

On top of this, for every infection, there is a cost to the NHS. This is not only a cost in terms of our time, trying as hard as we can to cure the infection, but also in terms of wider health outcomes. For instance, our use of antibiotics to treat the infection. Antimicrobial resistance is a global health challenge, and reducing the number of preventable infections will play a key role in reducing our reliance on antimicrobials, ensuring a safe supply for future generations.

Through my work in leading the Quality Improvement in Surgical Teams (QIST) programme and as a Consultant Surgeon at NHS Northumbria Healthcare, I have seen first hand some of the challenges in tackling preventable SSIs across the NHS. In my view, national reporting of SSIs is not robust enough, which has resulted in poor quality data. Without this baseline, and understanding of the number of infections in trusts, it is hard to create a clear case to take action. Currently, it's too easy for infections not to be found and not to be reported.

Despite the challenges with data collection, there are a number of highly successful interventions taking place across the NHS which are helping to drive down SSI rates. The task is now to scale up these interventions where appropriate, both across surgical specialties and across the NHS, to create a more consistent picture and drive forward tangible change to SSI rates across the UK.

In order to do this, we need to convince people of the nature and scale of the problem. Stakeholders from across the health system, including patients, healthcare professionals, industry and policymakers need to be aware of the challenges, and work together to help construct and embed the solutions. This report sets out the clear impact of SSIs on both NHS and patients, and highlights examples of some of the great work being undertaken across the UK to reduce the number of SSIs.

This is even more important in the current context. Following the COVID-19 pandemic, we will see elective care resume across the country, with a large number of surgeries taking place in order to clear the large number of patients waiting. With this in mind, it is more vital than ever that patients feel confident in returning to hospital settings and consenting to surgery.

By working collaboratively and sharing best practice, I strongly believe we can drive down SSI rates in the UK.

It is Time to Act to reduce the impact of SSIs on patients, the NHS and society, and we all have a part to play.

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Executive Summary

Surgical site infections (SSIs) present a considerable challenge for healthcare systems across the world, including in the UK, and have a substantial impact on patients and healthcare professionals. Despite clear evidence and guidelines on how to reduce the risk of these infections on a global, regional and national basis – and the fact that research shows up to 60% of SSIs are preventable[1] – infection rates remain high. Progress has been made in recent years, yet more than 5% of patients undergoing a surgical procedure still develop an SSI,[2] and each infection has been estimated to cost the NHS between £10,000[3] and £100,000 per patient.[4]

It is now time to act. Collectively we need to reduce the variation in practice across the UK, embed evidence-based examples of best practice, and work collaboratively with the NHS to help reduce the incidence of SSIs to improve patient outcomes.

Embedding this guidance and changes to practice cannot take place in silos. It will require action from the whole healthcare community: from policymakers, to trusts, to hospitals, healthcare professionals and medical Royal Colleges, right the way through to the patient themselves. This report, T*ime to Act: A State of the Nation report on Surgical Site Infections in the UK*, will review the available evidence, examples of best practice and reflections from the front line, to make recommendations to each of these groups in order to drive significant improvement in reducing SSI rates in the UK.

These recommendations are:

For policymakers to:

1. Convene a Preventable Infections Taskforce, with expertise from across all four nations, to produce a UK-wide strategy for further reducing (HCAI) rates across the UK.
2. Set a clear and deliverable target to reduce SSIs across all surgical specialties within the lifetime of the 5-year Antimicrobial Resistance (AMR, Healthcare Acquired Infection) plan, and subsequently for the 20-year plan.
3. Introduce annual mandatory reporting of SSI rates across all surgical specialties across all four nations of the UK to continue to drive down SSI incidence.
4. Support investment into the training and education of healthcare professionals around infection prevention in the operating theatre, and at every stage of the patient pathway.

For Hospitals to:

1. Deliver a compulsory training and education programme for healthcare professionals on the importance of infection prevention, and specifically, on reducing preventable SSIs.
2. Prioritise value-based procurement to ensure safety and quality of products are considered above unit cost.
3. Engage in dialogue with healthcare professionals about what equipment they feel is needed to best deliver safe, high quality care.

4. Establish a multi-disciplinary approach to reduce infection pre, intra- and post-operatively, assessing the level of risk across the patient pathway to determine what steps should be taken to reduce infection.
5. Participate in the Getting It Right First Time programme's SSI survey (in England), with an appointed SSI Trust Champion.
6. Ensure all wards have clearly displayed patient information about SSI signs and symptoms. All patients should be discharged with information on SSIs.

For surgical teams to:

1. Take all evidence-based preventative steps possible throughout a patients' journey through surgery to reduce risk of a surgical site infection.
2. Discuss with Trust procurement leads the importance of having access to appropriate equipment to reduce infection risk, with patient and healthcare professional safety prioritised over any cost consideration.

For medical Royal Colleges and other Health Care Professional Representative organisations to:

1. Develop 'infection prevention hubs' on their websites, intranet, or member communications, to share best practice and set out clear and accessible information on guidelines, surveillance data and policy initiatives to reduce SSIs.
2. Consider making SSI reduction a campaigning priority over the next three years.

For patients to:

1. Ask their healthcare professional about information on spotting the key signs and symptoms of an SSI – and actions they can take to help reduce their own risk of infection – before being discharged from hospital.

For patient organisations to:

1. Signpost patients to clear information about the range of preventative measures that may be taken before and after surgery to reduce SSIs – such as whole body washing using a chlorhexidine based solution before surgery, and monitoring and caring for their wound after their discharge from hospital - and the importance of hospitals following National Institute for Health and Care Excellence (NICE) guidelines, with a clear explanation on why these steps are important in reducing infection risk.

Overview and a history of SSIs

Surgical site infections (SSIs) are a common type of Healthcare Associated Infection (HCAI) that can significantly impact both healthcare systems and patients.[5] SSIs can lead to extended hospital stays – resulting in additional cost burden for healthcare providers – and contribute to antibiotic resistance, poor patient experience, and in the most acute or complex cases, morbidity.[6] It has been estimated that over a third of deaths in patients with SSIs were directly attributable to the infection.[7]

Policymakers across the world are focused on the challenge of how to tackle rising levels of antibiotic resistance. As part of this challenge, a key focus has been on decreasing and controlling the number of preventable infections, and in turn, reducing reliance on antimicrobials. Recent strategies in the UK such as the NHS Long Term Plan,[8] the Patient Safety Strategy,[9] and the 5[10] and 20 year[11] plans for antimicrobial resistance all highlight the importance of tackling infections at their root cause, which is critical to reducing the demand on antibiotics.

It is within this context that both global and UK-specific guidelines have been developed to support the reduction of HCAIs, including SSIs. When implemented effectively, many of these policies and practices are contributing to cutting the rate of infections in the UK. However, with antibiotic resistance continuing to rise,[11] and the wider costs of these infections to stretched health systems becoming clearer, it is vital that we revisit the data and guidelines to explore what more can be done to tackle SSIs across the UK. Alongside this, we must reflect on the challenges and examples of best practice from across the world that the UK can learn from in order to reduce the burden of SSIs.

About HCAIs

The World Health Organization (WHO) highlights that HCAIs are the most frequent adverse event affecting patient safety across the world.[13] The term HCAI covers a wide range of different infections, with the common underlying factor being that they were developed either as a direct result of a healthcare intervention, such as a surgery, or from being in contact with a healthcare setting.[14]

In the UK, some of the most common HCAIs are:

- Surgical site infections
- Gastrointestinal
- Urinary tract
- Bloodstream
- Clinical sepsis
- Pneumonia/respiratory tract[15]

In England, over three and a half thousand people died from a HCAI in NHS hospitals in 2018 alone.[16]

About SSIs

SSIs represent around 20% of all HCAIs. At least 5% of patients undergoing a surgical procedure develop an SSI.[17] The National Institute for Health and Care Excellence (NICE) defines an SSI as:

"A surgical wound with local signs and symptoms of infection, for example, heat, redness, pain and swelling, and (in more serious cases) with systemic signs of fever or a raised white blood cell count. Infection in the surgical wound may prevent healing, causing the wound edges to separate, or it may cause an abscess to form in the deeper tissues."[18]

Most SSIs are caused by the surgical incision being contaminated with microorganisms from the patient's own body during surgery. Infections can also be caused by microorganisms from an external source, however, this is less common.[19] SSIs also range in severity, from a 'superficial incisional SSI', which is located just in the area of skin where the incision was made, through to an 'Organ or Space' SSI, in which the infection can be any other area of the body other than the immediate tissues surrounding the surgical site, including in organs.[20]

A history of SSI rates in the UK

Prior to 1997, there was no nationwide surveillance or data capture on the number of SSIs across the UK. From 1997, data was collected from NHS trusts in orthopaedic surgery on a voluntary basis. While the number of hospitals undertaking mandatory reporting increased between 1997 and 2005, it is not possible to accurately assess the true infection rate for this surgical specialty in the UK. Mandatory surveillance of SSI rates in NHS trusts in England in orthopaedic surgery was first undertaken in 2005.[21] In the present day, alongside the mandatory orthopaedic reporting, many trusts voluntarily report over 13 other surgical categories.[22]

In December 2019's report, the data comparison spanning a 10 year period (between 1 April 2009 and 31 March 2019) presented a mixed picture. SSI risk following hip and knee replacement surgery was relatively stable over the period, with small annual decreases from 2012/13, while rates for both hip and knee replacement surgeries declined throughout the period. The case is not so positive for long bone fractures, where SSI rates are varied. This is also the case for gastrointestinal surgeries, while spinal surgery reported the greatest increase in rates of SSI over the period.[23]

This mixed picture of incidence data over a 10 year period - which can be attributed to a number of factors, and is discussed in more detail in the next chapter of the report - reinforces the need to re-examine the way we are tackling SSIs in order to ensure significant decline in rates across all surgical specialties.

Tackling SSIs

The positive news is that up to 60% of SSIs are preventable.[24] Steps can be taken across a patients' journey through surgery - before, during and after - to ensure their risk of infection is lowered. This is a complex process, as many factors have been identified as being linked to an increased risk of SSIs, including the location of the surgery, age and the presence of any underlying conditions.[25]

There are a number of guidelines and policies in place designed to support health providers to prevent infections before they occur, and treat them successfully when infections arise. There are also various surveillance systems in place to try and capture the extent of infections and benchmark how well preventative measures are working. Evidence shows that national surveillance systems that enable hospitals to measure their rates against an average have been found to be associated with significant reduction in SSI rates.[26]

However, on reviewing the data on SSIs and the available evidence – including discussions with infection prevention leaders – it is clear that there are considerable challenges in implementing this guidance across the system. A round table with leaders in infection prevention and control, hosted by the Health Service Journal, found that healthcare professionals were not receiving training on reducing SSIs that reflected the latest guidance and best practice.[27] There are also challenges around surveillance. For example, this data capture process is only mandatory for orthopaedic surgery, meaning data is not captured for the majority of surgeries that take place.[28] Further issues have also been raised about the reliability of the rate of infection reporting itself in mandatory surveillance, with some studies suggesting that national surveillance data underestimates the prevalence of SSIs and is not appropriate for benchmarking.[29]

This makes clear that there is still more to be done.

Through a review of the available evidence and data, guidelines and policy, this report will seek to highlight the impact of SSIs across all four nations of the UK, and what is being done to prevent more infections. It will identify areas of best practice, where the UK's health system is undertaking effective action to reduce the number of SSIs, with a spotlight on some international examples. Alongside this, there are a number of reflections from those on the 'frontline' of the battle against SSIs, from policy experts, to clinicians, through to patients. Based on this analysis, recommendations will be made for all key stakeholders on measures which can be implemented to continue to minimise variation, reduce the impact of SSIs in the UK, and improve care.

The State of the Nation: What is the picture for SSI rates in the UK?

This chapter examines the available data surrounding SSIs in each of the four nations of the UK, drawing comparisons between each country and discussing the overall trends for SSIs in the UK. It will also reflect on international standards and comparison points.

Each devolved health system is responsible for the monitoring and surveillance of SSIs, therefore there is no overall data on SSIs in the UK. However, each of the four nations follow similar guidelines on reporting, therefore we can expect each country to complement one another when analysing the overall trend of SSIs in the UK.

England

The data concerning SSIs and HCAIs in England presents a comprehensive overview, given that many UK-focused studies of SSI rates have taken data primarily from the English surveillance systems. Surveillance of SSIs is executed by the Surgical Site Infection Surveillance Service (SSISS),[30] who publish annual reports in December of each year.[31] In England, it is mandatory for NHS Foundation Trusts to submit surveillance data for one orthopaedic surgical category once every financial year, although a small number of hospitals are exempt from this. Submission of SSI data for other surgical specialties is voluntary. This is why the richest data is for hip and knee replacements, reductions of long bone fracture and repairs of neck of femur.

Rates of SSIs have been steadily declining since 2014, albeit minimally. In 2018/19, 1,183 SSIs were recorded,[32] which represents a reduction of 155 SSIs from the previous year. In orthopaedics, specifically hip and knee prosthesis, there is an incidence rate of 0.5%.[33] The risk of SSIs is higher when analysing total orthopaedics inpatient and readmissions, where a hospital in 2017/18 reported rates as high as 9%.[34] With regards to other surgical specialties, annual reports demonstrate that the highest proportion of SSIs classified as superficial incisional resulted from small bowel surgeries, whilst the highest proportion of SSIs classified as deep incisional were as a result of cranial surgery.[35] Bile duct, liver and pancreatic surgery also have a high SSI incidence.[36] In 2009, a pilot study of surgical site infection following caesarean section also demonstrated high rates of postsurgical infection, arguing that this specialty should be a “clinical and public health priority”.[37]

Although there has been a reduction in SSI rates in England since 2014, the average reduction rate is only 0.1%. This leads us to consider why SSIs are not declining at a faster rate, reducing their overall impact on patients and the healthcare system. Worse, it is not possible to assess the full picture because hospital Trusts only submit mandatory surveillance data for orthopaedics, meaning the real scale of SSIs across the NHS in England is unknown. The National Institute for Health and Care Excellence (NICE) estimates that there are around 300,000 HCAIs a year,[38] therefore if SSIs represent up to 20% of these, this could mean up to 60,000 SSIs occur every year.[39]

Wales

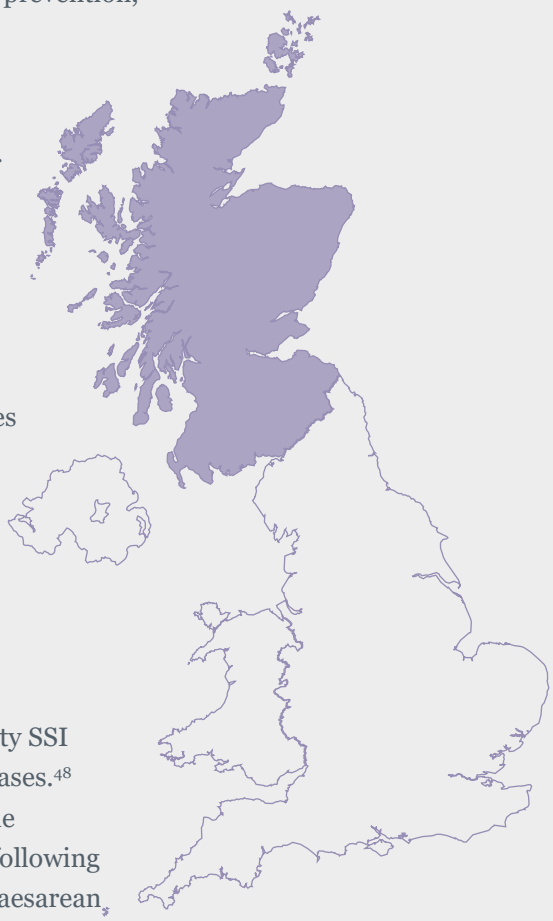
The monitoring requirements in Wales extend beyond orthopaedic surgery, as hospitals are required to monitor caesarean section operations as well.[40] In a 2019 document, the Welsh Government stated that there was an aim for colo-rectal surgery to be added to the currently mandated SSI surveillance, and is currently developing a module.[41] Surveillance of SSIs and HCAIs is conducted by the Healthcare Associated Infection, Antimicrobial Resistance & Prescribing Programme (HARP), who supports the NHS in Wales to reduce the burden of healthcare associated infections and antibiotic resistance. Within this sits the Welsh Healthcare Associated Infection Programme (WHAIP), which provides a framework for the control, prevention and management of infectious diseases in Wales.[42] This framework allows WHAIP to ensure the monitoring of HCAIs, SSIs and other infections are recorded consistently.

In its latest data collection from orthopaedics, Wales found that 1 in 458 procedures had an SSI reported in 2018, down from 1 in 285 procedures with an SSI reported in 2017 – an SSI rate of 0.2%.[43] For caesarean sections, this figure is markedly higher, as 1 in 25 mothers had an SSI attributable to their C-section procedure.[44] However, Public Health Wales is keen to highlight the variability of reporting practice – some Health Boards are fully compliant with the surveillance scheme while others are not reporting infections, and some are not even reporting procedures. This is demonstrative of the improvement in reporting practices that needs to occur in order to further reduce SSIs.

Nevertheless, it should be acknowledged that overall, Wales has seen a significant decrease in annual SSI rates in the last ten years. For C-sections, SSIs have reduced by 62% since 2008.[45] HARP has also committed to the improvement of the orthopaedic surveillance system and investigating improved methods to encourage more reporting, which may act as a catalyst for further action on SSI rates in Wales.

Scotland

Health Protection Scotland (HPS) holds responsibility to support the prevention, control and reduction of healthcare associated infections in all care settings across Scotland.[46] SSI surveillance in Scotland is conducted according to the Surgical Site Infection Surveillance Protocol (SSISP) and Resource Pack which is published by Health Protection Scotland. The Protocol provides national policy and guidance on SSIs, in addition to information, definitions and instructions for national surveillance of SSIs.[47]



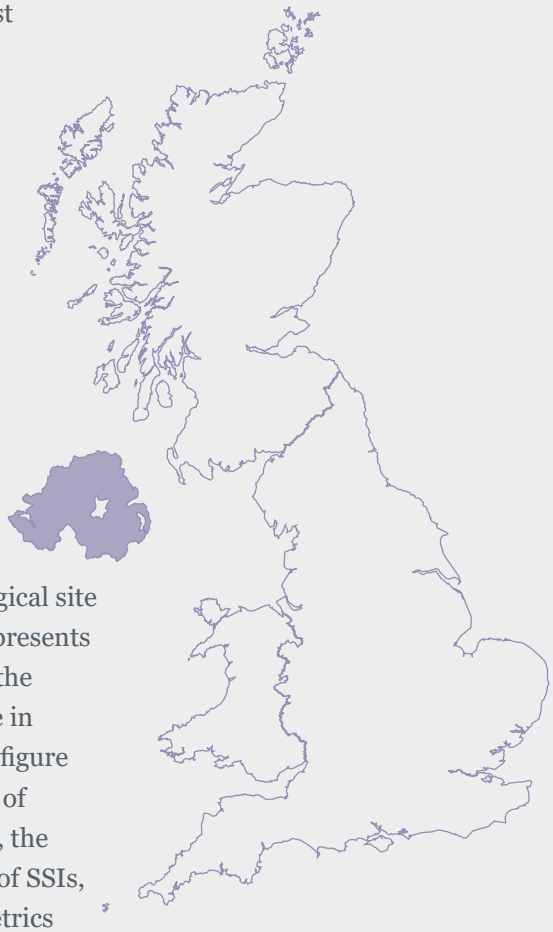
HPS monitors the incidence of SSIs within each NHS board on a quarterly basis, and SSISP data is collected at a hospital level with healthcare providers mandated to undertake surveillance programmes on all patients within four mandatory categories:

- hip arthroplasty
- caesarean section
- planned large bowel surgery
- planned major vascular surgery

A total of 8,707 procedures were recorded through the hip arthroplasty SSI surveillance programme during 2018, and SSIs were reported in 62 cases.[48] Of these cases, 17.7% were diagnosed during the inpatient stay and the remainder were identified on readmission to hospital in the 30 days following the procedure. The overall incidence of SSI therefore was 0.7%. For caesarean sections this incidence was significantly higher, with the overall SSI incidence including the post discharge surveillance period to day 10 at 1.5%.[49] For inpatient stay, however, this was lower at 0.2%.

Northern Ireland

Monitoring of HAIs in Northern Ireland is conducted by the Public Health Agency (PHA), and surgical site infection surveillance in Northern Ireland is outlined in their 2014 guidelines for reporting.[50] The guidelines aim to promote a standardised, validated approach to SSI surveillance methods, as well as enabling Trusts to benchmark against aggregated Northern Ireland and international data. Despite this, the data on SSIs is fairly limited, particularly in comparison to the other UK nations. This could be because SSI data has traditionally been submitted to the European Centre for Disease Prevention and Control (ECDC), and not to the PHA, however the last instance of this was recorded in 2009.[51] At one stage, there was a specific body for monitoring SSIs – the Northern Ireland Healthcare-associated Infection Surveillance Centre – however this is now defunct.



Consequently, Northern Ireland has monitored its SSI rates through Point Prevalence Surveys (PPSs) in line with the ECDC, and these are usually conducted at five-year intervals. This aims to provide a standardised tool of quality improvement, and is the closest thing that Northern Ireland has to an accessible monitoring report on SSIs. The latest survey was conducted in 2017.[52] In the latest PPS surgical site infections were shown to account for 17% of HCAIs. Although this represents a 2% decrease in rates of SSIs as a proportion of HCAIs from 2012,[53] the increase in HCAI prevalence in 2017 demonstrated an actual increase in SSI risk. In 2012, approximately 5% of patients had a HCAI, and this figure increased in 2017 to 6.25% of patients,[54] therefore increasing the risk of SSIs occurring. With regards to prevalence rate per surgical specialty, the 2017 PPS found that general surgery had the highest prevalence rate of SSIs, accounting for 26.8% of all SSIs, with orthopaedics following.[55] Obstetrics and gynaecology also displayed higher rates of SSI, as they accounted for 17.1% of all SSIs reported.[56]

Given the limited information available on SSIs in Northern Ireland, it is impossible to determine the extent to which SSIs occur in the health system. Nevertheless, from the information available it is clear that the prevalence of SSIs in acute trusts is increasing. This is acknowledged in the 2017 PPS, as it is part of its recommendations that the SSI surveillance programme be improved in light of the growing infection rate.

Conclusions

From examining the SSI rates in the four nations of the UK, there is an overarching narrative of SSIs occurring for roughly 15-20% of overall HCAIs, with each country displaying similar rates of infection. Although the general trend shows SSI incidence decreasing across the UK, it is important to emphasise that the rate of decline is not significant, and in the case of Northern Ireland the prevalence rate has in fact increased in recent years. Therefore, an overall decline in SSIs should not be mistaken for significantly positive progress in UK infection prevention.

While all countries conduct mandatory surveillance in orthopaedics and caesarean sections, they also show higher SSI rates in surgical specialties such as large bowel surgery and gynaecology. However, reporting practices vary slightly: all four countries monitor orthopaedics as part of their mandatory surveillance, yet Scotland and Wales extend this to other surgical specialties, whilst Northern Ireland does not publish annual reports at all. The availability and scope of the data there means it is hard to ascertain a clear picture of the prevalence of SSIs across the UK. Although all four countries have committed to improving their surveillance practices, it is clear that some countries are closer to this goal than others.

What is the impact of these infections on the UK?

The impact of SSIs is multi-dimensional: not only do they present large costs to the health system, both in the cost of healing the SSI and the amount of extra days in hospital needed for this treatment, but this can have a lasting impact on the patient too. Surgical site infections cause excess morbidity and mortality, and can have serious consequences for patients affected as they can result in increased pain, social disruption, and in some cases require additional surgical intervention.[57]

Each SSI has been estimated to cost just over £10,000[58] per patient, with deep-incisional SSIs costing up to a staggering £100,000 per patient.[59] There is also evidence to show the impact of SSIs on the cost of a particular surgery. For example, a study in 2014 also found that an SSI doubled the cost of a C-section, as a non-SSI C-section had a mean cost of £3,572, whereas a C-section with an SSI had a mean cost of £7,467.[60] Not only does this represent huge costs to the system, but each one of these infections can have life changing consequences for the patient.

Across the devolved nations, the story is similar. In 2018 in Northern Ireland, almost £900,000 worth of damages were paid in clinical negligence as a result of HCAIs.[61] Although this figure does not represent solely SSIs, when considered in comparison to the population size, it is considerable. In Scotland, HCAIs are estimated to cost the NHS £183 million per year.[62] Therefore, reducing SSIs in the UK is not only essential to protecting patients, but also to improving efficiency and reducing costs across the health system.

“Everybody has a role to play in achieving a good outcome for the patient, it’s about teamwork. There has been a significant focus, particularly in orthopaedics and cardiac surgery, to put interventions into place that make a difference. But patients need to be informed to enable them to reduce their own risks as well.

I think patients are becoming more aware of the risks, but as risk reducing interventions are put into place by the hospital team to improve outcomes, we’re seeing our population getting unhealthier. Patients need to look after their health, and get themselves in the best position they can prior to surgery to help reduce the risk of infection even further.

SSI prevention needs to be thought of like taking a plane journey. It is made up of several stages that are all as important as each other. You may take a taxi to the airport, you expect the Taxi to have an MOT and to be roadworthy and therefore safe. You expect the person driving the vehicle to have a license to drive and be competent. You expect there to be a warm welcome when you board the aircraft. You expect the plane to be safe, you expect the person flying it to be trained, qualified, experienced and skilled and of course safe. During the journey you will need to have food, you need to be kept at the right temperature, you need the right amount of oxygen whilst airborne. If any one of those elements, however big or small is missing, it can have a significant impact, and your journey will not go as planned. The journey to the hospital, the welcome you receive, the environment you are cared for in, the equipment, devices and medications that you are exposed to, and the clinical teams caring for you, are all important factors that will impact on the outcome of your surgery. Every element matters.”

Lucy Everett
Lead Nurse and Deputy Director of Infection Prevention and Control,
Royal Brompton and Harefield NHS Foundation Trust

“The prevention of SSIs requires a collaborative approach, raising the profile of infection control and the scientific data to support evidence-based practice. The Association for Perioperative Practice (AfPP) is currently working with leading professional organisations in the prevention of SSIs by promoting and supporting the adoption of best practice to prevent SSI throughout the patient's surgical journey. It’s about working together as healthcare professionals across all specialties, to improve patient outcomes by reducing SSIs. It is important to understand not only the surgical pathway, but an integrated pathway, which is a multidisciplinary care plan of anticipated patient care. Joined up thinking and integration of care are critical aspects of patient care and the prevention of SSIs.

We need to be influencing healthcare professionals in their first year of education and helping them to understand about their practice and the importance of SSI prevention. We [the AfPP] aim to enhance quality of care and enhance patient safety across both the NHS and the independent sector. By providing national standards, guidance and recommendations we can empower practitioners, not only with the knowledge, but the evidence-based research to change and improve perioperative practice by reducing the risk of SSIs.

For patients, the impact of an SSI can be significant. It is not only the length of stay in hospital, but the quality of life post-surgery and complications. It could be the financial cost to the patient, including loss of earnings. It could be that further surgery, and wound dehiscence may leave them disfigured, and in considerable pain. It may mean they cannot work again. For organisations, it’s not only the increased length of stay in hospital for the patients, but further treatments and revised surgery needed. It’s causing financial issues for the NHS which are totally preventable.”

Lindsay Keeley,
Patient Safety and Quality Lead,
The Association for Perioperative Practice

Best practice from across the world

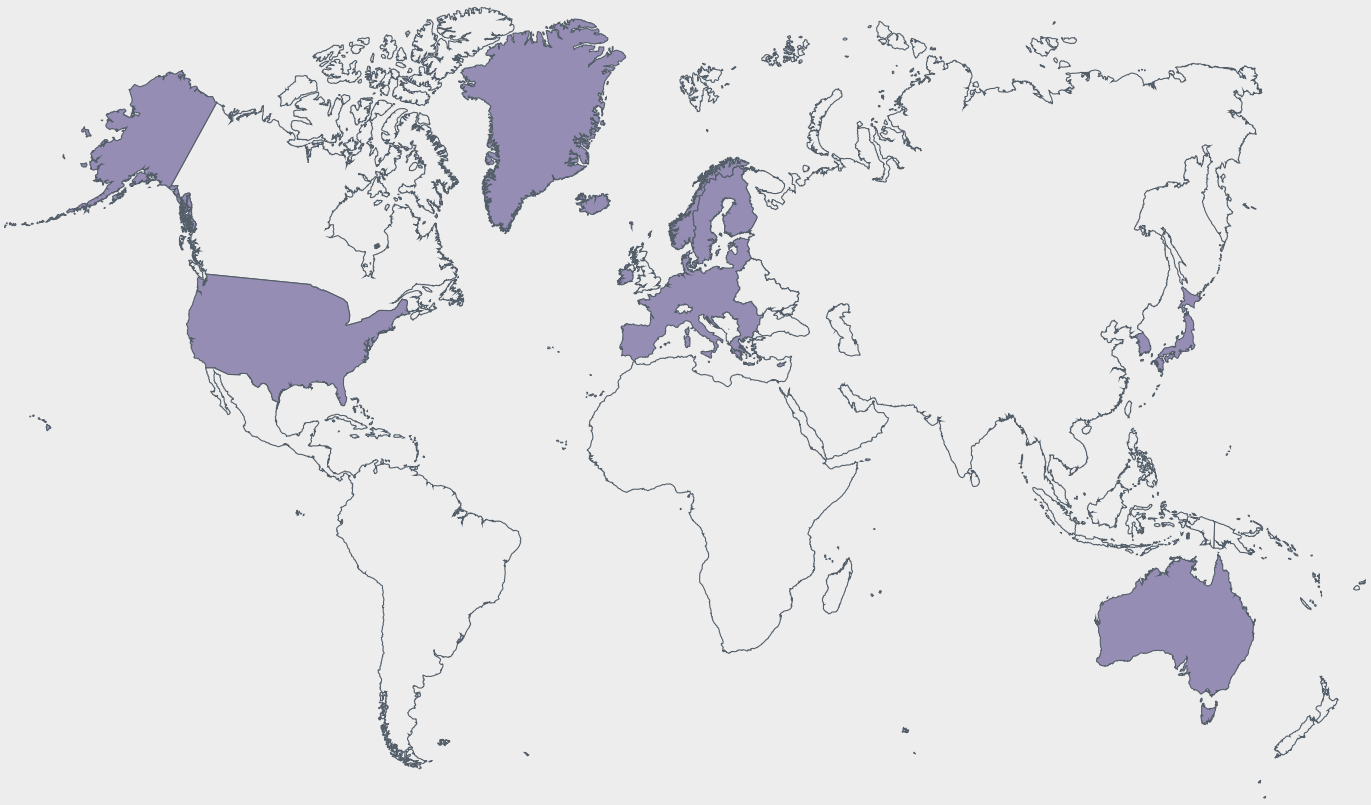
Having reviewed the incidence and impact of SSIs on the UK, this chapter will provide a short overview of how countries and regions from across the world undertake the monitoring and surveillance of SSIs. It will also highlight international guidelines, and examples of best practice in tackling infections in the operating theatre that the UK might seek to replicate.

This chapter is not intended to be an exhaustive review of methods of surveillance and guidelines. It will also not seek to compare respective monitoring systems or guidelines, recognising that each health system is unique in terms of its funding, structure, policies and operating environment; and that data on SSIs is not reported uniformly across the world. Instead, it will seek to highlight notable data and guidelines that could be comparable to an approach that the UK could learn from, or build on, or inform the recommendations of this report in order to tackle the UK's SSI burden.

Incidence and Surveillance

The World Health Organization has found that SSI is the 'most surveyed and frequent type of HAI' in low- to middle-income countries. It affects up to one third of patients undergoing a surgical procedure.[63] In these countries, the polled incidence of SSI was 11.8 per 100 surgical procedures,[64] with the risk of an SSI in these countries being 3 to 5 times higher than in high-income countries.[65] Recognising that low- to middle-income countries face a slightly different set of challenges to the UK with regard to their healthcare systems, the rest of this chapter will predominantly focus on the activity of higher-income countries.

While in higher-income countries the incidence of SSIs is not as high as low- and middle-income countries, they remain a considerable challenge. For example, SSIs remain the second most frequent type of HAI across Europe and in the USA.[66] What is clear is that there are a number of different ways that countries and regions monitor SSI incidence – variation exists in how the data is captured, what surgical specialties record data, and how frequently the data is reported.



The USA

The USA monitors the incidence of SSIs through the Centers for Disease Control and prevention, which provides an annual report of select HAIs across four different settings: acute care hospitals, critical access hospitals, inpatient rehabilitation facilities and long-term acute care hospitals.[67] Data is collected at national and state level by the National Healthcare Safety Network, the US' HAI surveillance system. More than 22,000 hospitals and other facilities provide data into the network.[68] Abdominal Hysterectomy and Colon surgery are the two surgeries on which all or the majority of acute hospitals provide data. In 2018, the last year for which data has been recorded, 1,829 SSIs were reported for abdominal hysterectomy surgeries,[69] and 7,323 infections were reported for colon surgeries.[70] Research from the US in 2005 found that SSIs contributed to 400,000 extra days in hospital for patients, costing an additional $10 billion per year.[71]

22,000 hospitals
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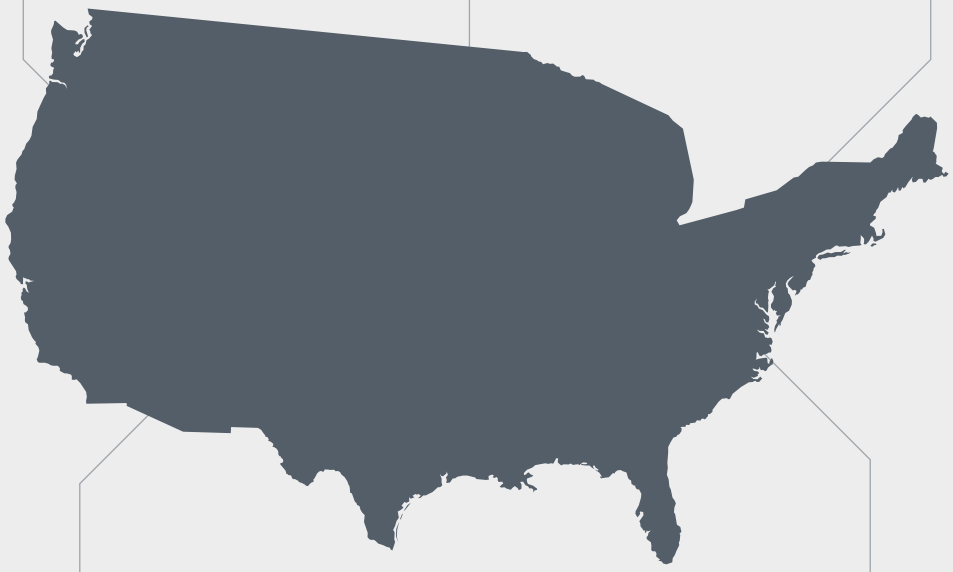

$10 billion per year
in additional costs[71]

400,000 extra days per year
in hospitals for patients[71]

The EU/EEA

The European Centre for Disease Prevention and Control conducts an annual surveillance report for SSIs across Europe. EU/European Economic Area (EEA) countries contribute to the system by uploading surveillance data at regular intervals in a common format. The most recently published annual report in October 2019, provided a summary of data collected in 2017. 12 EU member states (including all four nations of the UK), and one EEA country reported SSIs for nine types of surgical procedure. The report found that 10,149 SSIs were reported from a total of 648,512 surgical procedures. Depending on the type of procedure, the percentage of SSIs varied from 0.5% to 10.1%. From 2014 to 2017, the data shows a 'statistically significant increasing trend' for the percentage of SSIs recorded.[72] It is difficult to draw conclusions from this EU-wide data, due to the fact that only a small number of countries choose to report, and also, due to the fact that practices and surveillances vary from country to country, it is difficult to compare data.

With these challenges in mind, the Centre has committed to further strengthening the surveillance of SSIs in Europe by collecting data on structure and process indicators of SSI prevention. This will be reported together with the 2018-2019 surveillance data, which is unavailable at the time of writing.[73]

Within the EU and EEA, countries also report into national systems of surveillance. For example, data from France estimated that 3% of all surgeries resulted in infection, with a total cost of nearly 58 million euros. In Italy, between 2009 and 2011, 355 Italian surgical wards reported into its national surveillance system, reporting 1,628 infections per 60,460 surgeries. It is noted that 60% of SSIs were diagnosed through Italy's 30-day post-discharge surveillance.[74]

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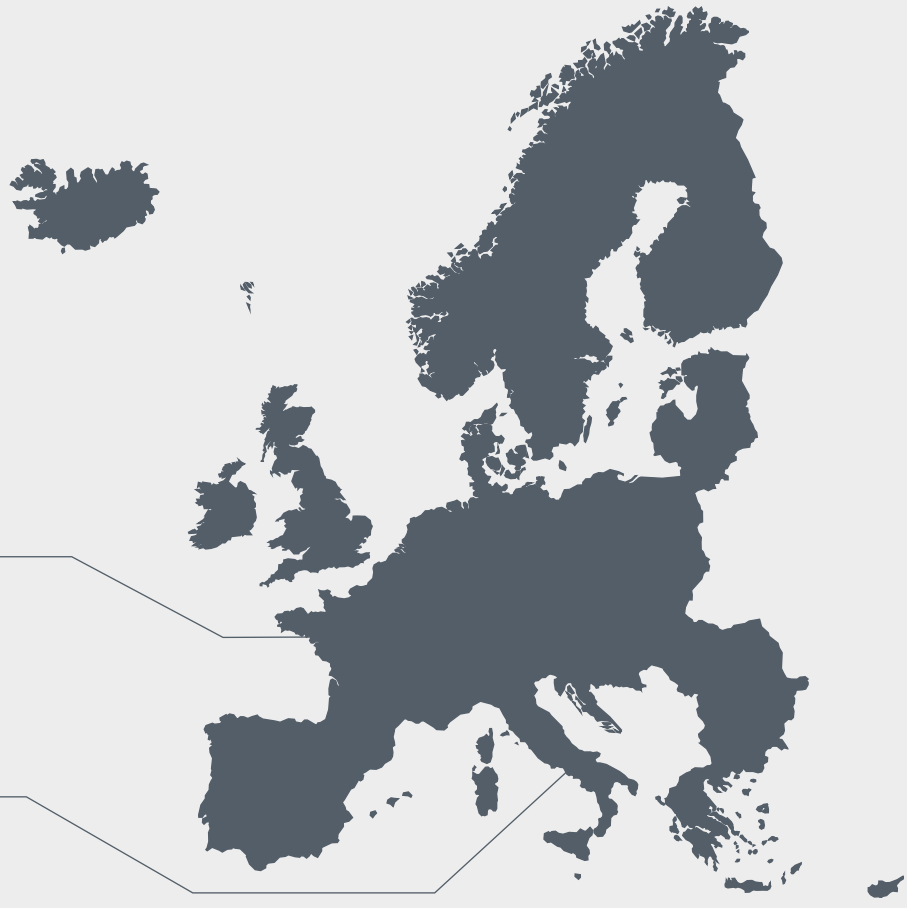
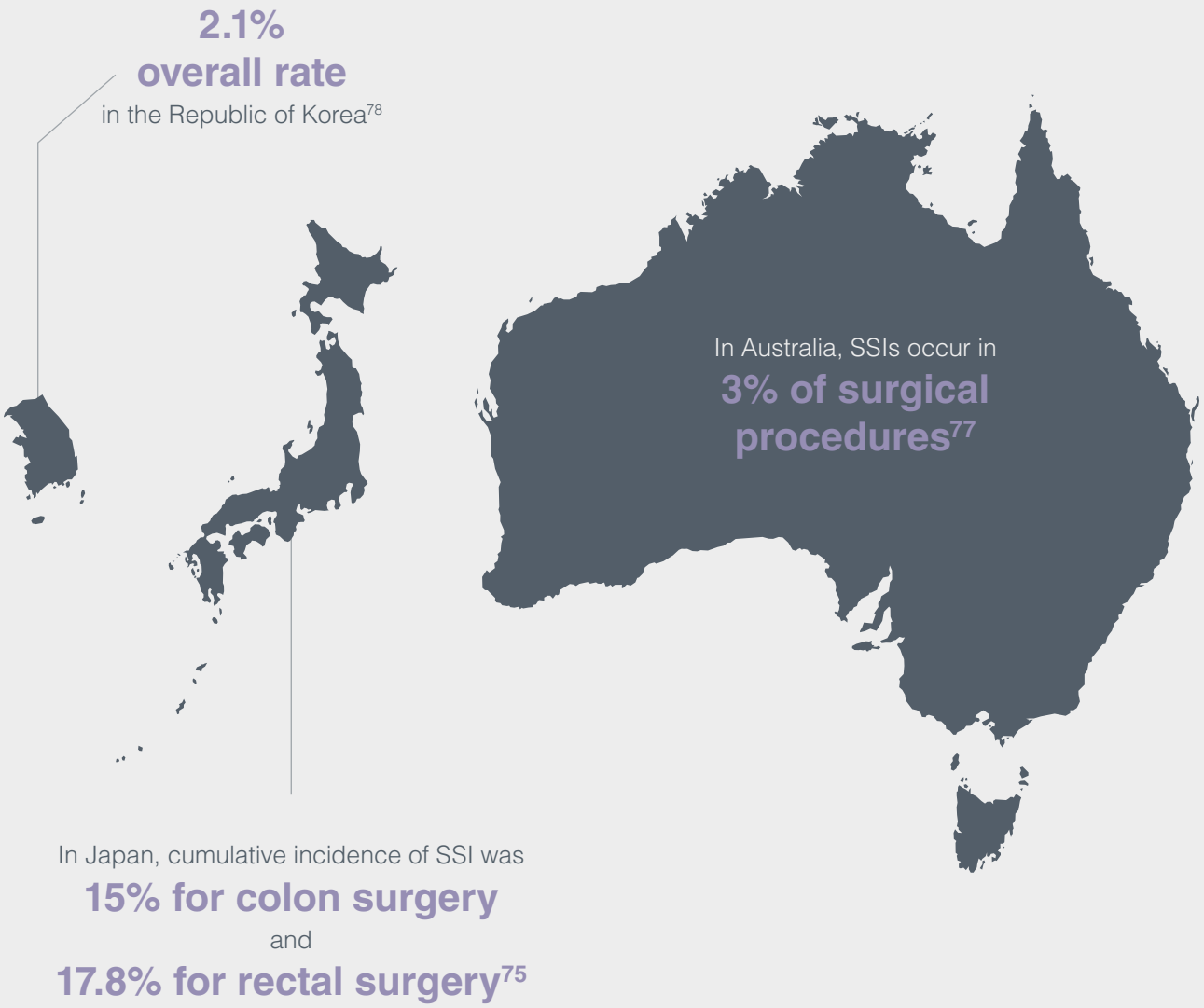


Japan, Australia, and Republic of Korea

In Japan, the nosocomial infection surveillance system is voluntary for hospitals to report into, however, in 2013, 470 hospitals participated. A recent study analysing the data from the surveillance system found that for colon surgery, the cumulative incidence of SSI was 15%, and for rectal surgery, was 17.8%.[75] In Australia, participation in the surveillance system is also voluntary for healthcare facilities, and is limited to hip arthroplasty, knee arthroplasty and coronary artery bypass grafts.[63] SSIs occur in around 3% of surgical procedures.[77]
In the Republic of Korea, there is a national surveillance system in place, which is based around infection incidence in gastrectomy and total hip arthroplasty. The overall SSI rate is approximately 2.1%.[78]



Guidelines

In 2016, the WHO introduced global guidelines on the prevention of SSIs. It was noted that due to the burden of SSIs across the globe, and 'numerous' gaps in evidence-based guidance, that a standard global approach was needed. Of particular note, the WHO was clear that its guidelines should be valid for any country, irrespective of their level of development or resources.[79]

Given the objective of creating standardised, evidence-based guidelines, the WHO guidelines should be considered the starting point for SSI prevention. The guidelines are summarised below.

There are of course also national guidelines for preventing SSIs. The US Centre for Disease Control updated its guidelines in 2017. The guidelines set out steps to prevent SSIs across all stages of the patient pathway, such as full body washing before surgery and the implementation of glycemic control measures during the whole peri-operative period.[80]

WHO guidelines[79]

Before surgery

- Ensure patients bathe or shower
- Do not shave patients
- Only use antibiotics when recommended
- Surgical scrub technique: hand wash or alcohol-based handrub
- Use chlorexidine alcohol-based antiseptic solutions to prepare skin

During surgery

- Limit the number of people and doors being opened
- Ensure all surgical equipment is sterile and maintain asepsis throughout surgery

After surgery

- Do not continue antibiotics to prevent infection –this is unnecessary and contributes to the spread of antibiotic resistance
- Check wounds for infection and use standard dressings on primary wounds

Guidelines and policy to tackle the burden of SSIs

This chapter considers the guidelines and policies each of the four UK nations has developed to help minimise the risk of surgical site infections. England, Wales, Scotland and Northern Ireland each employ national evidence-based guidelines to help minimise the risk of healthcare associated infections in hospitals and acute care settings, which include guidance on SSIs.

Whilst there have been no UK-wide government strategies to reduce HCAIs or SSIs, the UK's two AMR strategies have recognised the importance of recording and minimising surgical site infections as part of the wider effort to address antimicrobial resistance. Guidance across the four nations is regularly updated, and each country operates mandatory SSI surveillance programmes for a small number of surgical procedures.

England

Public Health England's healthcare associated infection and antimicrobial resistance department operates NHS England's Surgical Site Infection Surveillance Service (SSISS). This body ensures that the quality of patient care is enhanced and improved by encouraging NHS hospitals to 'use data obtained from surveillance to compare their rates of SSI over time and against a national benchmark, and to use this information to review and guide clinical practice.'

Getting It Right First Time (GIRFT) is an NHS improvement programme delivered in partnership with the Royal National Orthopaedic Hospital NHS Trust.[81] GIRFT is designed to improve the quality of care within the NHS by reducing unwarranted variations, and as part of this, has an SSI workstream.[82] This workstream seeks to complement the work of Public Health England (PHE) by engaging frontline clinicians in the data collection process and exploring variation in surgical practice and outcomes for a wider range of procedures and specialties. GIRFT plans to conduct annual SSI surveys allowing Trusts in England to draw comparisons over time for procedures and specialties, including those procedures not currently included in the PHE SSI surveillance programme.

The National Institute for Health and Care Excellence (NICE) also publishes a range of regularly updated guidance for healthcare professionals, commissioners and providers, as well as patients and their families for the prevention and treatment of surgical site infections. The latest guidance on SSIs was published by NICE in April 2019 which includes educational resources, best practice case studies and evidence summaries. NICE also regularly publishes and updates clinical pathway documents on preventing and treating surgical site infections to support clinical decision making across care settings.[83] Whilst NICE guidance is developed for care settings in England and Wales,[84] this guidance also applies or is aligned to national guidance in Scotland.[85] Northern Ireland follows NICE Guidance (see 'Northern Ireland' below).

It is also important to be aware of the role of Academic Health Science Networks (AHSNs) in England. AHSNs are the "catalysts" that connect the NHS with academic organisations, local authorities, the third sector and industry, and create the right conditions to spread innovation, improvement and best practice across the healthcare system. AHSNs are driven by improving patient outcomes,[86] and do this using their uniquely-placed knowledge, expertise and networks to bring together patients, healthcare staff and partners on a local level to determine priorities and develop solutions. The ability of AHSNs to disseminate best practice across the NHS is in part down to their unique position at the intersection of academia and industry, allowing a greater exchange of knowledge around best practice to take place.

Patient safety is a guiding principle of the AHSNs. In 2018/19, AHSNs successfully hosted 15 Patient Safety Collaboratives (PSCs) across England. The PSCs were commissioned by NHS Improvement as a way of sharing methodologies and ways of working, to amplify AHSNs impact. At the mid-point of the programme, PSCs are showing impressive results: in the case of the PSC focused on improving standards of care for patients undergoing emergency laparotomy surgery, there has already been 268% increase in uptake from NHS trusts, which has resulted in a 552% increase in patients benefiting from improved standards of care in surgery.[87] The Collaborative provided the 28 hospitals participating with a care bundle, which included screening the patient for signs of deterioration, transfer to theatre within six hours of the decision to operate, and screening for sepsis.[88]

Wales

In July 2019, the Welsh Government set out improvement goals for the Welsh Health system to deliver on for HCAI and AMR in 2019-2020.[89] These goals build on the progress made across Wales during 2018/19 and reflect the challenges set out in the UK-wide AMR strategy. The key areas that the Welsh Government expected Health Boards to deliver on included improving prevention, control and management of inflections to deliver significant change in key infections, including SSIs.

The latest targets for the reduction focus on reducing a range of HAIs, quantified as rates of cases per 100,000 of the population. However, these targets do not provide updated SSI-specific targets. However, the improvement goals do include an expanded remit in the monitoring of surgical site infections through targets around the prevention, control and management of infections in secondary care settings. These include:

- To expand surgical site infection surveillance beyond orthopaedic elective hip and knee surgery and C-section surgery using the ICNet Enterprise Monitor SSI module. Colo-rectal SSI surveillance will be the first pilot.
- To embed the use of the Outbreak Surveillance Module of ICNet Enterprise Monitor into regular management of outbreaks.
- To participate in the national surveillance of carbapenemase Producing Organisms which will be implemented during 2019/20.

Of note, these goals were set to be renewed on 31 March 2020, but at the time of writing, no updated goals have yet been published.

Scotland

Health Protection Scotland (HPS) holds responsibility to support the prevention, control and reduction of healthcare associated infections in all care settings across Scotland.[90] As of April 2020, HPS comes under the remit of Scotland's new national public health body, Public Health Scotland.

As a national body, HPS works with local hospital boards' Infection Prevention and Control and Health Protection teams to develop and review national infection prevention guidance across all care settings. It also supports these teams to 'prepare for and manage outbreaks and incidents' and share best practice across hospital boards. HPS publishes annual HCAI reports on the surveillance of healthcare associated infections in Scottish Care settings. Each report captures the incidence rate of a range of HCAIs, including surgical site infections. The tenth report was published in May 2019, covering the period January to December 2018.[91]

The National Infection Prevention and Control Manual[92] provides mandatory guidance to infection and prevention, providing practice requirements to ensure consistency in practice across the NHS in Scotland. The Manual aims to reduce the risk of HAIs by ensuring staff are able to apply effective infection prevention and control precautions, reduce variation in IP practices and align practice, monitoring, quality improvement and scrutiny.

In Scotland, guidance for national policy and guidelines for Healthcare Associated Infections, including SSIs and antimicrobial prescribing and resistance is collated in Health Protection Scotland's HAI Compendium,[93] which includes NICE guidance. This provides healthcare

professionals with a comprehensive resource to ensure national standards are met across all care settings. Health Protection Scotland publishes and regularly updates the Surgical Site Infection Surveillance Protocol and Resource pack.[94] The purpose of the pack is to provide information, definitions and instructions for the surveillance of SSIs in all NHS Scotland care settings.

Northern Ireland

Northern Ireland is the only nation in the UK not to develop its own guidance on HCAIs and SSIs, instead directly following NICE guidance for reporting.[95] Surgical site infection surveillance in Northern Ireland is outlined in their 2014 guidelines for reporting.[96] To achieve this, Northern Ireland's Public Health Agency outlined the following objectives:

- Promote a standardised, validated approach to SSI surveillance methods.
- Provide aggregated risk-adjusted data on SSIs which enables Trusts to benchmark against aggregated Northern Ireland and international data.
- Promote the use of evidence-based information to permit timely recognition of SSIs for prevention, early intervention and cost containment.
- Improve the way surveillance results are used by individual hospitals and across Trusts.
- Promote the integration of SSI surveillance (including routine data collection) with strategic planning and continuous quality improvement systems for infection control.
- Promote participation in the development of SSI performance measure reporting.

In order to meet above objectives, the PHA Surveillance Team undertakes a range of functions:

- Assisting hospitals in implementing standardised, validated surveillance methods.
- Collecting specified surveillance data from hospitals.
- Analysing and reporting risk adjusted SSI aggregated data.
- Conduct collaborative research studies.

Trusts are required to submit data routinely however this does not appear to be readily available, as it has traditionally been submitted to the European Centre for Disease Prevention and Control (ECDC). At one stage, there was a specific body for monitoring SSIs – the Northern Ireland Healthcare-associated Infection Surveillance Centre – however, this is now defunct.

Conclusions

The four nations of the UK take similar approaches to addressing the burden of SSIs across care settings.

Each country undertakes some form of SSI surveillance programme which mandates reporting on SSI rates for a small number of surgical procedures, whilst encouraging the widest possible voluntary participation in a wider range of procedures. Over the past three decades each of the responsible bodies has gradually expanded the remit of their SSI surveillance programmes. Whilst this is a welcome step, it is notable that unlike other forms of HCAI, none of the national bodies responsible for HCAIs has provided targets for SSI reduction. The UK Government has recognised the difficulties, methodological issues and limitations in developing national HCAI prevalence estimates, and by extension, national targets to benchmark policy against. Further consideration as to how national targets for SSI reduction could be met, is considered in the 'recommendations' section of the report.

Another challenge is the implementation of guidelines in a more uniform way across the UK. As the next chapter will illustrate, there are pockets of best practice, where individual Trusts have strictly embedded guidelines and infection prevention protocols, and as a result, have seen significant reductions in their SSI rate compared to the national average. The GIRFT programme in England has identified this variation in practice, and has made it a specific area of focus. In order to significantly reduce the impact of SSIs in the UK, it will be crucial to scale up examples of best practice, thereby reducing the variation that exists across the UK.

Guideline implementation: current best practice in SSI prevention

SSIs can be caused by a range of different factors. There are three main sources of pathogens which can cause these infections: microbial flora on the skin and in the body of patients, microbial flora of health professionals in the operating theatre, and the operating theatre environment itself, including instruments and tools used during the procedure. A less common source of infection can also be microorganisms released from an infection at another site in the body, which attach to a prosthesis or other implant left in the surgical site.[97]

However, as the NICE guidelines set out, there are a number of steps which can be taken by operating teams to reduce a patients' exposure to these pathogens. This chapter will consider the practical steps which can be taken by operating teams to prevent SSIs from occurring. It will also set out some examples of best practice from across the UK, and explore some of the challenges in these guidelines being implemented.

Pre-operative

When the patient arrives at hospital for a pre-assessment, they may be provided with an antimicrobial whole-body wash to use prior to surgery. The WHO recommends that the patient should wash with soap or the antimicrobial whole-body wash to remove bacteria from the skin.[99] Using a chlorohexidine digluconate antimicrobial solution significantly reduces the number of bacteria on the skin compared to soap and water.[100] Hair should not be removed routinely to reduce the risk of SSIs. However, if hair has to be removed, NICE recommends that electric clippers with a single-use head should be used on the day of surgery. Razors should not be used for hair removal, as they increase the risk of SSIs.[101] Before entering the operating theatre, patients should be given specific theatre wear that is appropriate for the procedure.[102]

The operating theatre itself, as highlighted above, is also a potential source of infection, with airborne bacteria entering a wound during surgery. However, steps can be taken to ensure the environment in the

Case study: the quality improvement for surgical teams programme: QIST: anaemia & MSSA collaborative

The QIST Infection Collaborative brings together 30 trusts from across England to help reduce SSIs. Led by Northumbria Healthcare NHS Foundation Trust and working in partnership with the British Orthopaedic Association, trusts across the country have been brought together to drive forward improvements in patient care.

The Collaborative has introduced two complimentary care-bundles for mild anaemia and MSSA into routine clinical practice. To support the reduction of MSSA, the Collaborative is scaling up and evaluating the introduction of pre-operative screening, in addition decolonisation with body washing and nasal gel treatments for patients carrying MSSA. Overall, the Collaborative expects to support savings of up to £6.3 million. By working together in a coordinated and supportive manner and sharing knowledge across trusts, hospitals can develop common solutions and support the implementation across the surgical pathway.[98]

operating theatre is as safe as possible, including through the ventilation, and keeping the movements of staff present to a minimum, which reduces the number of airborne micro-organisms.[103] Operating theatre staff should also ensure that instruments are prepared in a clean area as close to the start of surgery as possible. A high-quality procedure tray can support the operating team, with sterile packs providing all the components surgical teams need for specific interventions. These trays can save surgical teams vital minutes by reducing preparation time by up to 40%.[104]

It is important that the patient stays warm before surgery to lower the risk of post-operative complications. According to NICE, to reduce the risk of hypothermia, active warming should start preoperatively.[105] The patient can be provided with a patient warming blanket on the ward. The same blanket can be taken with them to the operating theatre. To maintain core temperature, if the patient's temperature is 36 degrees or above start active warming at least 30 minutes before induction of anaesthesia.[106]

Intra-operative

The surgical team should take standard infection control precautions recommended by NHS England and NHS Improvement. For effective hand hygiene when preparing for a surgical procedure, the surgical team should scrub using an anti-microbial soap[108] and put on personal protective equipment including sterile gowns, face and eye protection, headwear and surgical gloves. All personal protective equipment must be located close to the point of use, and stored to prevent contamination. Surgical teams should ensure that protective items are only used once, unless specified by the manufacturer. Double gloving is recommended during higher risk procedures[109] but can help reduce the risk of infection in any procedure. A surgical glove is a sterile barrier between the healthcare worker and the patient. A staggering 92% of glove punctures[110] go unnoticed during surgery meaning the sterile barrier is no longer intact. There is significant evidence to show the enhanced protective effects of double-gloving, a 2014 Cochrane Review concluded that double-gloving reduces the risk of an inner-glove perforation by 71% compared to single gloving.[111]

Immediately before surgery, NICE recommends that the patients' skin is prepared using an antiseptic preparation.[112] Wound irrigation and lavage can also be considered. Surgical teams should also maintain optimal oxygenation during surgery, and in the recovery period,

Case Study: Royal Liverpool and Broadgreen Hospital

Royal Liverpool and Broadgreen University Hospital implemented a quality improvement programme in two hospital Trusts for orthopaedic services, informed by NICE guidance recommendations to reduce both infection rates and readmission rates attributable to SSIs. Recognising that NICE guidelines highlighted the need for collaborative leadership across the hospital, Liverpool and Broadgreen reviewed the whole patient journey to identify areas for improvement, and appointed two full time nurses to monitor and liaise with the wider multi-disciplinary team for SSI prevention.

The team put in place mandatory skin preparation protocols and interoperative patient warming measures. Investments were also made to the theatre itself with the installation of new airflow systems to keep the operating theatre table clean with filtered air. Theatre staff also received new training on handwashing and theatre etiquette, a local antibiotic prophylaxis strategy for all surgery, and a new protocol for dressings was also introduced providing strategic action to wound management.

These and other measures helped support improved outcomes across a range of metrics, including reductions in infection rates, with hip fracture surgery reducing from 5% infection in 2010 to 1.6% in 2013. Annual infection rates for total hip replacement reduced from 1.9% in 2010 to 0.2% in 2013. The team noted that its orthopaedics service evolved in 'all aspects of care and is now well established', demonstrating the importance of a whole-system approach to successful SSI reduction.[107]

ensuring that a haemoglobin saturation of more than 95% is maintained.[113] The method of wound closure is also important, with NICE recommending that when using sutures, surgical teams should consider using antimicrobial triclosan-coated sutures, especially for paediatric surgery, to reduce the risk of surgical site infection. NICE also recommends using sutures rather than staples to close the skin after caesarean section.[111] At the end of the procedure NICE recommend that the surgical incision is covered with an interactive dressing. It is important that the dressing supports the wound healing process when left in place for the period indicated and through a continuous assessment process post operatively.[115] It is also recommended that negative pressure wound dressings are considered as an option for closed surgical incisions in patients who are at high risk of developing an SSI.[116]

Theatre efficiency is also important, enabling shorter procedures, reducing the risk of a surgical site infection. Research finds that the likelihood of an SSI increased with the length of the surgery: the mean operative time was approximately 30 minutes longer in patients with SSIs compared to those without SSIs.[117] This is where a high quality procedure tray can support operating theatre teams, reducing preparation time for surgeries by up to 40%.[118]

Post-operative

After the operation has taken place, NICE recommends using an aseptic non-touch technique for changing or removing surgical dressings. The surgical site can be cleansed using sterile saline for wound cleansing up to 48 hours after surgery, and tap water can be used after 48 hours if the surgical wound has separated or surgically opened to drain pus.[120] It is recommended that NHS Trusts use a structured approach to care to improve overall management of surgical wounds, including through preoperative assessments to identify people with potential wound healing problems.[121]

Patients can shower safely 48 hours after surgery. An advanced shower proof dressing will allow this to happen, ensuring that the suture line is protected.[122]

Variation in practice

However, despite this extensive set of guidelines and preventative steps that can be taken to reduce the risk of SSIs, there is still a challenge in implementing these measures into clinical practice. During a review of all surgical departments across England in April 2017, the GIRFT team found that surgical teams lacked awareness of their own SSI rates[123] suggesting a need to raise awareness of SSIs in NHS Trusts, review how SSI rates were recorded, and review current practice.

Case Study: Antrim Area Hospital

Antrim Area Hospital is a busy general district hospital with a caesarean section rate of 28%. The hospital set an ambitious target of reducing post C-section SSIs by 50% by adopting a range of measures to better assess, prevent and treat incidences. In developing the programme, maternity notes were analysed for every woman who had undergone a C-section in the previous months, with the team collecting data on maternal and fetal characteristics, the nature of surgery, antibiotic prophylaxis, and wound management.

A three-tiered approach was then taken through the introduction of SSI educational programmes, as well as ensuring optimal surgical and post-surgical conditions. Antrim's team established an educational programme on wound management, dressing choice and self-care with community staff provided with reference tools for SSI definitions.

Optimal surgical conditions were ensured through a full theatre-environment review by the infection control team, the introduction of maternal IV antibiotics ahead of skin incision where appropriate. The team also established pre-operative skin prep protocols using a chlorhexidine solution and clear normothermia practices. Post operatively, wound care was improved through an advanced 7-day showerproof dressing and implementing strict aseptic techniques if dressings were changed.

Through the introduction of multidisciplinary working and patient engagement, Antrim far exceeded their 50% target achieving a 95% reduction, with rates falling month on month. Antrim ensured that all staff were aware and involved with the project to ensure its continued success.[119]

The GIRFT review has found that only half (50.3%) of Trusts surveyed in 2017 had an SSI prevention bundle in place.[124] GIRFT suggests this may point to a lack of awareness of policy amongst respondents, which may change in subsequent surveys. It was also found post-operative follow up arrangements were variable across England.

One of the key recommendations made by the GIRFT programme is for Trusts to review their own surgical units' deep SSI rates and introduce a multi-disciplinary approach to reduce infection risk pre-, intra- and post-operatively.[125] This has been successfully delivered in Trusts such as Ashford and St Peter's Hospitals NHS Trusts. The GIRFT programme is working to spread best practice such as this across the UK through their SSI survey, the success of which is dependent on the level of participation by trusts. GIRFT Regional Hub teams support hospitals to implement improvements based on national findings.[126]

Conclusions

As reviewed in the previous two chapters, there are extensive guidelines in place across the UK to support the reduction of SSIs. Clear preventative steps can be taken by trusts at all stages of a patients' surgical journey, from using antimicrobial whole-body washes and high-quality personal protective equipment, to making surgeries more efficient, to following appropriate wound care protocols.

However, there is considerable variation in how these guidelines are being implemented. To tackle this, policymakers, trusts, HCPs and patients all have a role to play. This ranges from improving awareness amongst healthcare professionals around what best practice in SSI prevention looks like, ensuring the surgical teams have the right equipment to undertake the operation safely, and encouraging greater compliance with national surveillance schemes in order to benchmark performance and drive improvements.

Case Study: Ashford and St Peter's Hospitals NHS Foundation Trust

Ashford and St Peter's Hospitals NHS Foundation Trust was identified by Public Health England's SSISS as a higher outlier based on the comparison of their SSI rate to the national benchmark. A multidisciplinary approach was taken to reduce the 5% infection rate of the approximately 400 hip fracture patients the hospital treats annually. Through examining the whole patient journey, the Ashford team was able to assess risk across the pathway, and identify and put in place multiple simultaneous changes to care across the patient pathway.

Ahead of surgical procedures, Ashford and St Peter's introduced pre-operative bathing in a chlorhexidine wash to reduce skin bacterial load, in addition to pre-operative warming. The team put in place a range of intra-operative measures, including tight controls on patient temperature in the theatre, in addition to employing strict glycaemic control measures. Post-operatively, a restrictive transfusion protocol with single unit transfusions. Oozing wound protocols were also introduced through the use of an advanced post-operative wound care dressing.

Following the introduction of these and other measures, Ashford and St Peter's saw significant improvements in outcomes, with mortality rates dropping by 4% and early infection rates dropped to 0.24%. Mean length of stay also dropped from 15.7 to 13.8 days, with the project potentially saving £2 million for the hospital.[127]

Conclusions and recommendations: don't just get ahead of SSIs, stop them catching up with you

This report has highlighted that across the four nations of the UK, there is still much to be done to further reduce the impact of surgical site infections. We have seen ample evidence that it is possible to introduce holistic guidelines, effective interventions pre-, intra- and post-operatively, and increase levels of SSI reporting. The challenge now resides in ensuring these guidelines are implemented across the whole system to drive improvement and significant reductions in incidence. This challenge needs to be met by us all. Stakeholders across the UK health system have a role to play, from training the workforce, to auditing and benchmarking, to the provision of high-quality equipment for health professionals and accessible information for patients. It is critical that we all play our part in helping to stay safe, and achieve the best possible outcomes.

Based on the evidence reviewed in the report, alongside the examples of best practice and reflections made by leaders in infection prevention, the following measures should be adopted in order to reduce rates of SSIs across the UK.

For Policymakers

While antimicrobial resistance is clearly a focus for policymakers, there has been less focus on how to specifically tackle HCAIs within this. Indeed, there is likely to be a low level of awareness about SSIs specifically. To tackle SSIs, policymakers should:

1. **Convene a Preventable Infections Taskforce, with expertise from across all four nations, to produce a UK-wide strategy for further reducing HCAI rates across the UK.**
2. **Set a clear and deliverable target to reduce SSIs across all surgical specialties within the lifetime of the 5-year AMR plan, and subsequently for the 20-year plan.**
3. Introduce annual mandatory reporting of SSI rates across all surgical specialties across all four nations of the UK to continue to drive down SSI incidence.
4. Support investment into the training and education of healthcare professionals around infection prevention in the operating theatre, and at every stage of the patient pathway.

For Hospitals

While there are clear guidelines in place to help hospitals reduce the number of SSIs, there is difficulty in implementing the guidelines consistently across the UK in practice. This can be attributed to a number of factors, including awareness, training and education and the provision of high-quality infection prevention equipment. It would therefore be recommended that Trusts should:

1. **Deliver a compulsory training and education programme for healthcare professionals on the importance of infection prevention, and specifically, on reducing preventable SSIs.**
2. **Prioritise value-based procurement to ensure safety and quality of products are considered above unit cost.**
3. Engage in dialogue with healthcare professionals about what equipment they feel is needed to best deliver safe, high quality care.
4. Establish a multi-disciplinary approach to reduce infection pre, intra and post-operatively, assessing the level of risk across the patient pathway to determine what steps should be taken to reduce infection.
5. Participate in the Getting It Right First Time programme's SSI survey (in England), with an appointed SSI Trust Champion.
6. Ensure all wards have clearly displayed patient information about SSI signs and symptoms. All patients should be discharged with an information leaflet about SSIs.

For Healthcare Professionals

As highlighted by the Getting it Right First Time programme, there is a lack of awareness of SSI rates in their trust by some frontline clinicians.[128] This must be tackled as a priority if best practice is to be embedded across the system in order to reduce the impact of SSIs in the UK. HCPs have a key role to play in addressing this. Surgical teams should:

1. **Take all evidence-based preventative steps possible throughout a patients' journey through surgery to reduce risk of a surgical site infection.**
2. Discuss with Trust procurement leads the importance of having access to appropriate equipment to reduce infection risk, with patient and healthcare professional safety prioritised over any cost consideration.

For medical Royal Colleges and other health care professional organisations

Medical Royal Colleges and other professional organisations are uniquely positioned to reach a large number of healthcare professionals. Given the need to raise awareness of SSI rates and prevention amongst surgical teams, these organisations can play a key role by mobilising their membership to better understand and deliver best practice in SSI prevention. In addition, these organisations have a strong influence in policymaking, and should consider using their platform to help elevate the issue of SSI reduction as a health policy priority across the UK. Therefore, medical Royal Colleges and other professional organisations should:

3. **Develop 'infection prevention hubs' on their websites, intranet, or member communications, to share best practice and set out clear and accessible information on guidelines, surveillance data and policy initiatives to reduce SSIs.**
4. Consider making SSI reduction a campaigning priority over the next three years.

For Patients and Patient Organisations

Patients generally have a low level of awareness of SSIs.[129] A greater understanding of key symptoms of an SSI would likely mean patients would be more likely to follow preventative measures. Patient organisations are trusted, reliable sources of information for patients, and as such, could support in helping to raise awareness of how patients can reduce their own risk of SSIs.

Therefore, patients should:

1. **Ask their healthcare professional about information on spotting the key signs and symptoms of an SSI** – and actions they can take to help reduce their own risk of infection – before being discharged from hospital.

Patient organisations should:

1. **Signpost patients to clear information about the range of preventative measures that may be taken before and after surgery to reduce SSIs** – such as whole body washing using a chlorhexidine based solution before surgery, and monitoring and caring for their wound after their discharge from hospital - and the importance of hospitals following NICE guidelines, with a clear explanation on why these steps are important in reducing infection risk.

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