Discussion paper

Surgical Site Infection Improvement Programme: Proposal to change data collection requirements for orthopaedic procedures and options for inclusion of other procedures

July 2019

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1. Purpose

The Health Quality & Safety Commission (the Commission) is reviewing potential options to reduce the current data collection and reporting requirements for the orthopaedic Surgical Site Infection Improvement Programme (SSIIP) to an amount that reflects the programme's level of maturity. This paper seeks the health and disability sector's views on a proposed option and on which other surveillance activities may be undertaken, such as collecting other process measures across surgical procedures or collecting data on another procedure.

The SSIIP has been a national programme for six years. For over five years, it has collected orthopaedic surgical site infection (SSI) data from all 20 district health boards (DHBs). The median national rate of orthopaedic SSIs has decreased by 25 percent since August 2015. Compliance with the orthopaedic SSI process measures (antibiotic dose and timing and alcohol–based skin preparation) has been consistently high (96–100 percent compliance) since mid-2015.

In an external evaluation of the SSIIP in 2017–18, Sapere collated information on the data the programme has collected. Its interim[1] and final[2] evaluation reports both state that manual data collection is a significant barrier to expanding the SSIIP and causes frustration among some DHB staff. These findings are consistent with feedback from the infection prevention and control (IPC) national workshop in May 2018. Participants identified 'SSIIP – less counting, more preventing' as the second-most popular topic for discussion. The workshop discussion on this topic focused on the time and resources required to collect and report SSI data to the national programme. Participants raised ideas and questions that were collated for the Commission's IPC programme to discuss.

Currently SSI surveillance is a largely manual process, which has made it more difficult to expand national surveillance and improvement activity to include reducing other healthcare associated infections (HAIs). An electronic HAI surveillance software system (eg, ICNet) can reduce time spent on data collection. However, it will never make HAI surveillance a fully automated process as some amount of manual data collection and clinical decision-making will always be involved.

The Strategic Infection Prevention and Control Advisory Group (SIPCAG), which represents a range of stakeholders relevant to IPC at a national level, has been actively considering data collection and reporting options. Discussions have also been held with the orthopaedic expert faculty group, Royal Australasian College of Surgeons (RACS), and New Zealand Orthopaedic Association (NZOA) and New Zealand Joint Registry (NZJR) executive committees. After a recent SIPCAG meeting discussed the feedback from the sector about data collection for the SSIIP, members agreed to the development of this discussion paper describing the various options for collecting orthopaedic SSI surveillance data so the Commission can gather sector-wide feedback on them.

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[1] Artus J, Rook H, Blick G, et al. 2017. *Formative Report: Interim evaluation of the Surgical Site Infection Improvement programme.* Sapere Research Group. URL: www.hqsc.govt.nz/our-programmes/infection-prevention-and-control/publications-and-resources/publication/3159 (accessed 7 June 2019).

[2] Artus J, Blick G, Ryan M. 2018. *Evaluation of the Surgical Site Infection Improvement Programme: Final (summative) report*. URL: www.hqsc.govt.nz/our-programmes/infection-prevention-and-control/publications-and-resources/publication/3489 (accessed 7 June 2019).

We have researched and are reporting on four surveillance options that the orthopaedic SSIIP could implement in the future programme:

- standard or full surveillance – making no change to current process
- light surveillance – reporting only full data for SSI cases with total numbers as the denominator
- intermittent surveillance – following the current process for only three months every year
- abandon surveillance – stopping all surveillance involved in the current orthopaedic SSIIP.

This paper describes the benefits and disadvantages of each of these options, as well as their impact on:

- focus (prioritisation level in DHBs)
- IPC staff capacity (implications on resources)
- surgeon and other key stakeholder engagement
- quality improvement (implications for future improvement).

If the data collection requirements for the orthopaedic SSIIP change, SIPCAG considers that they should be replaced with other measurement and quality improvement activity. In addition to amending the data collection requirements for orthopaedic surgery, we would like your feedback on other process and outcome measures for the Commission's IPC team and the SSIIP clinical lead to consider for the future.

The Commission is seeking the views of the sector about the direction we should be taking in response to previous feedback about current data collection. These views will help us to consider the issues and will inform SIPCAG's discussions about a whole-of-sector approach to HAIs in New Zealand. We will gather all feedback and discuss it with SIPCAG before going to the Commission board for a final decision. **The deadline for providing feedback is 9 August 2019**.

2. Background

SSIs are linked with prolonged hospital stays and increased re-hospitalisation and mortality rates, as well as with additional health care costs.[3] To reduce the risk of SSIs, the sector uses several kinds of interventions and there is a drive to apply these consistently. Standard practice in hip, knee and cardiac surgery includes antibiotic prophylaxis with ≥ 2 g dose of cefazolin, administered within one hour of knife-to-skin, as the first-choice antibiotic (≥ 1.5 g of cefuroxime is an acceptable alternative). Vancomycin or clindamycin is reserved for patients with β-lactam allergy or methicillin-resistant *Staphylococcus aureus* colonisation.

The Commission began to implement the SSIIP in 2011, before starting to collect orthopaedic SSI data from all DHBs in 2013. For over five years, we have collected orthopaedic SSI data, which provides detailed data on antibiotic prophylaxis and skin preparation (skin prep) compliance and outcomes. DHBs report to the Commission on process and outcome quality and safety markers (QSMs) based on this data (see Appendix 1). We also collect other data such as demographics and patient risk factors. Using this baseline data, the SSIIP team can correlate the process measures (clinical interventions) with the SSI rate and determine any new opportunities for improvement based on data that is specific to New Zealand.

National Monitor, an online database, collects orthopaedic SSI data on all hip and knee arthroplasty patients. DHBs must collect about 35 fields of data for every orthopaedic surgical procedure that meets the SSIIP criteria; they must complete an additional 10 fields for those cases that result in an SSI (see Appendix 2).

The national orthopaedic median SSI rate has decreased by 25 percent from 1.18 to 0.89 (per 100 procedures) since August 2015. For the past two years, all DHBs have achieved 96–98 percent compliance for antibiotic prophylaxis (timing and dose). Compliance for the skin preparation process marker has been consistently high (around 99 percent) and was retired as a formal QSM in July 2016 (see Appendix 3).

Some DHBs have a low SSI rate and question the benefit of continuing to spend time on collecting and reporting data. The SSIIP takes time for mainly IPC staff to collect and report SSI data. The time involved potentially limits spread of surveillance and quality improvement (QI) activities to other surgical procedures.

We have used various sources of information over the last year to gather together stakeholder perspectives on the process and outcome data. We have also drawn on approaches from other national and/or state jurisdictions to get a list of potential options for future data collection. This information has been reviewed to help the Commission decide on what orthopaedic SSI data to collect and what national HAI surveillance and QI activities to conduct in the future.

If the sector agrees on the option of reducing the amount of data to collect for the orthopaedic SSIIP, then the Commission would like to expand surveillance and QI to other surgical procedures. We also seek your views on this possibility.

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[3] Bratzler DW, Houck PM. 2005. Antimicrobial prophylaxis for surgery: an advisory statement from the National Surgical Infection Prevention Project. *American Journal of Surgery* 189(4): 395–404.

3. Qualitative and quantitative information to explain data collection process and workload

The following sources of information have provided an overview of the data collection needed for the SSIIP:

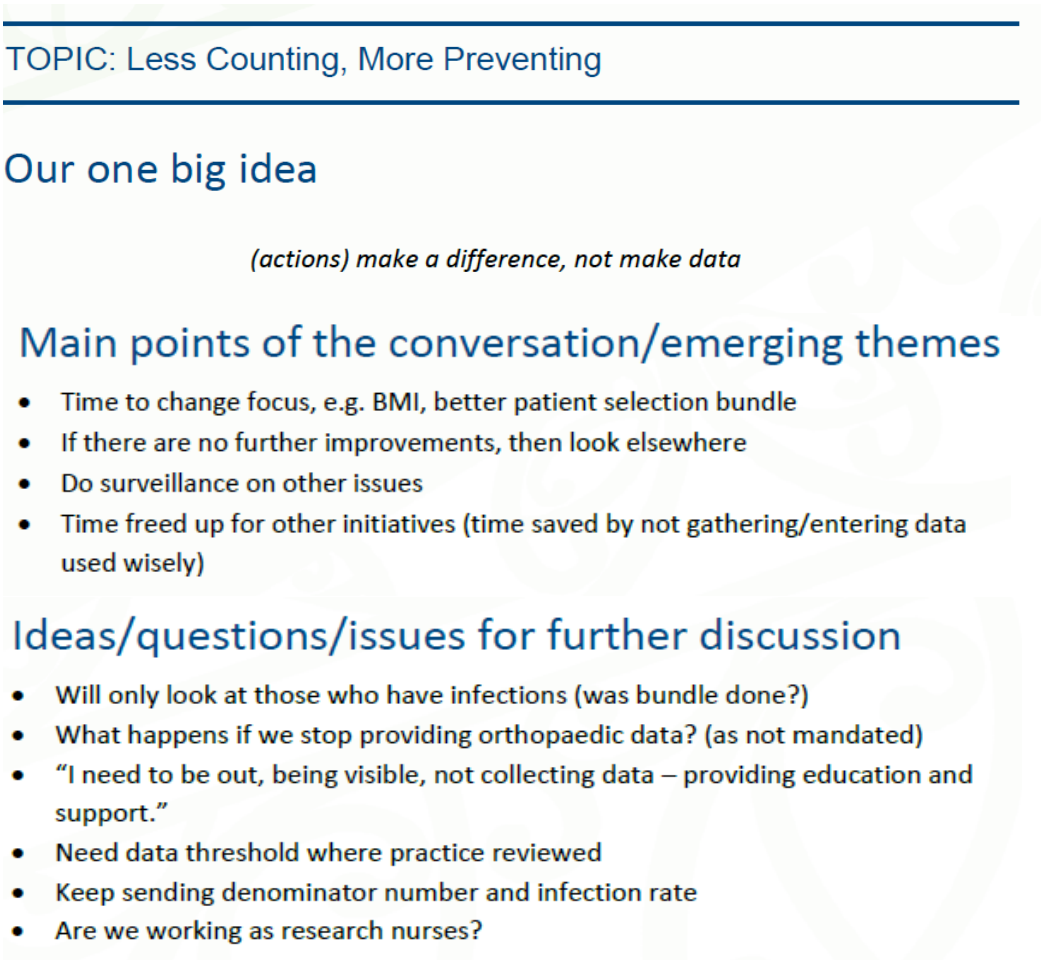
1. Output from the 'unconference session' at the Commission-led IPC workshop in May 2018
2. SSIIP evaluation interim and final reports – Sapere Research Group
3. Survey of DHBs – time spent on data collection, case review and reporting
4. Infection rates and surgery volumes over the last two years.

3.1. Outputs from the unconference session (May 2018)

The 'Putting Prevention First: leadership and action on preventing healthcare associated infections' workshop was held on 17 May 2018. During the afternoon session, participants took part in an 'unconference' by pitching ideas for discussion topics and coming up with 'one big idea' for each topic. The Commission IPC programme team committed to discussing the top three ideas with SIPCAG.

'SSIIP – less counting, more preventing' was the second-most popular topic of the unconference (Figure 1).

Figure 1: Big idea, themes and issues emerging from the 'SSIP – less counting, more preventing' topic at the unconference session



3.2. SSIIP evaluation interim and final reports

The interim SSIIP evaluation report,[4] published in December 2017, reports that manual data collection is one of the barriers that DHBs most frequently mentioned as limiting expansion to other SSI surveillance.

Sapere concludes:

- 'The lack of a fully automated data collection is a major barrier to the success of the programme, not only in relation to limiting ease of expansion of the programme but also as to how DHBs perceive its value, relative to the effort they put in to collecting data. For all DHBs to become fully automated, significant investment of funding is required. Automation may not address all data collection issues (as some may relate to specific data systems of individual DHBs) but it will address most concerns.'
- 'Larger DHBs more often have dedicated admin to collect and submit data which reduces the resource burden on individuals; they often commented that the data collection and submission was not problematic.'
- 'Before the programme can expand to routine collection of data for other surgical procedures, automated systems must be in place in all DHBs or other requirements must be dropped … DHB feedback suggested that no more can be added to the workload of existing resources without taking something away.'

The manual nature of surveillance limits the ability to spread to other surgical specialities

How well does the SSIIP design factor in spread and scale?

The interim evaluation report found that the SSIIP design factored in the concept of growth (spread and scale) effectively but it has not yet realised its full potential – its lack of automated data collection limits its growth. The original concept for the programme was that it would grow incrementally over time. The firm intention was to include at least three groups of procedures: orthopaedic, cardiac and caesarean sections (although the latter was then removed from scope because of the workload this would place on DHBs). Yet manual data collection has limited the potential for such expansion because it requires significant resource that has not been dedicated to the programme at a local DHB level.

The interim evaluation report notes evidence of the spread of the practice of monitoring SSIs with other surgical procedures or using the quality improvement approach with other procedures with the aim of reducing SSIs. Nine DHBs that responded to the perception survey indicated that they carry out additional surgical site infection surveillance. The most common additional surgical procedure monitored was caesarean sections; other areas mentioned included breast surgery, spinal surgery and plastics. About a quarter of respondents (27 percent) stated that they also used the interventions, or clinical bundles, with other surgical procedures, most notably the antibiotic prophylaxis protocols and skin prep; areas mentioned specifically were general surgery, plastics and caesarean sections.

[4] www.hqsc.govt.nz/our-programmes/infection-prevention-and-control/publications-and-resources/publication/3159

If we can address data collection issues, DHBs have expressed interest in expanding surveillance to other procedures with a ‘high risk’ or ‘high impact’ of infections such as colorectal and spinal surgery.

Implementing ICNet can reduce time spent on data collection

Five DHBs have implemented ICNet as their electronic surveillance system for HAI surveillance: Auckland, Canterbury, Taranaki, Waitematā and West Coast. However, only three of those DHBs are using the ICNet SSI module (Table 1). Although West Coast and Taranaki DHBs are now live with the ICNet SSI module, they still need to enter some data manually. All DHBs usually enter numerator data manually.

Table 1: Current DHB use of ICNet

DHB	Go live with ICNet	Have a surgery feed	Populating SSI data via ICNet
Canterbury	September 2012	Yes	Yes
West Coast	April 2014	Yes	Yes
Auckland	2017	No	No
Waitemata	2017	Yes	No
Taranaki	June 2017	Yes	Yes

Auckland DHB is able to extract data from existing data warehouses, which it reports in both a CSV file and an Excel spreadsheet. After reviewing data, the DHB uploads it via a CSV file into the National Monitor. Where DHBs do not have the ICNet system in place, they can input data by either uploading a CSV file (which can be a relatively automated process) or manual entering.

DHBs without the ICNet system find the data collection processes involve more manual tasks than they expected. Some DHBs report that the elements in the data set are not easily accessible electronically or are not available in one place within their hospitals – some collect data manually from several sources, including theatre sheets and ward charts. DHBs without ICNet enter data into web-based forms that sit between the DHB data collection processes and the National Monitor.

The Accident Compensation Corporation (ACC) is providing seed investment in the ICNet platform project to encourage DHBs to expand their use of ICNet and to be nationally consistent. This initiative, established and funded by the ACC treatment injury prevention programme, is engaging with all DHBs, with an aim for additional DHBs to get business case approval to implement ICNet. Most recently, Lakes DHB’s business case has been approved. Senior staff from the Commission are contributing to the project as leadership group members, which includes identifying linkages between the local ICNet roll-out project and the National Monitor.

DHBs can gain efficiencies through using ICNet. While they must enter some data manually, the extent of this can be reduced if data is available in existing electronic systems that are interfaced with ICNet. DHBs that have implemented the ICNet SSI module have reported significant reductions in time spent on manual data collection.

How the programme supports DHBs to reduce manual data collection in the National Monitor

The Commission has a clear focus on finding ways to reduce the workload involved in manually collecting data.

Review of programme documentation and discussions with the Commission team confirmed that identifying and implementing initiatives to address these limitations is a clear area of focus. The following are some examples.

- The programme has funded a part-time business analyst (working out of Canterbury DHB) over the past two years. Part of this role was to work with DHBs to make it easier for them to submit data and to use the data at a local level.
- Southland Hospital tested a CSV data upload process; it now has a semi-automated data collection for around 90 percent of the orthopaedic surgery data fields.
- The business analyst is now working with Dunedin Hospital to replicate the Southland process. The experience has also been shared as a case study with other DHBs.

About one-third of DHBs have some form of automation in place.

- Canterbury, West Coast and Taranaki DHBs now use the local ICNet system to populate the SSI data.
- Auckland DHB and Counties Manukau Health have automated data collection and upload via a CSV file.
- Southland Hospital has automated its orthopaedic data collection. Dunedin Hospital is in talks with its IT department to do the same.
- Waikato DHB has recently automated its orthopaedic data collection by creating an app.
- Waitematā DHB has ICNet and has interfaced its surgery system; however, it is not yet using the local ICNet system to automate data collection. The Canterbury DHB team continues to collaborate with Waitematā DHB to support Waitematā's use of its surgery feed.

3.3. Survey of DHBs

To inform the cost-based analysis section of the external evaluation, Sapere sent a survey to all 20 DHBs. It asked about the resources that DHBs commit to the orthopaedic stream of the SSIIP.

Fifteen out of 20 (75 percent) DHBs responded to the survey. To account for those that did not respond, Sapere scaled up the results by matching each missing DHB with a peer that is roughly equivalent in terms of the volume of procedures it delivers each year.

Staff members were asked about their time commitments (over a quarter) for the following activities:

- Data management – time usually spent on collecting, entering and checking data
- Case review – time on screening and analysis to determine if a case meets the definition of an SSI
- Reporting – time on internal reporting, validation, discussion and taking action.

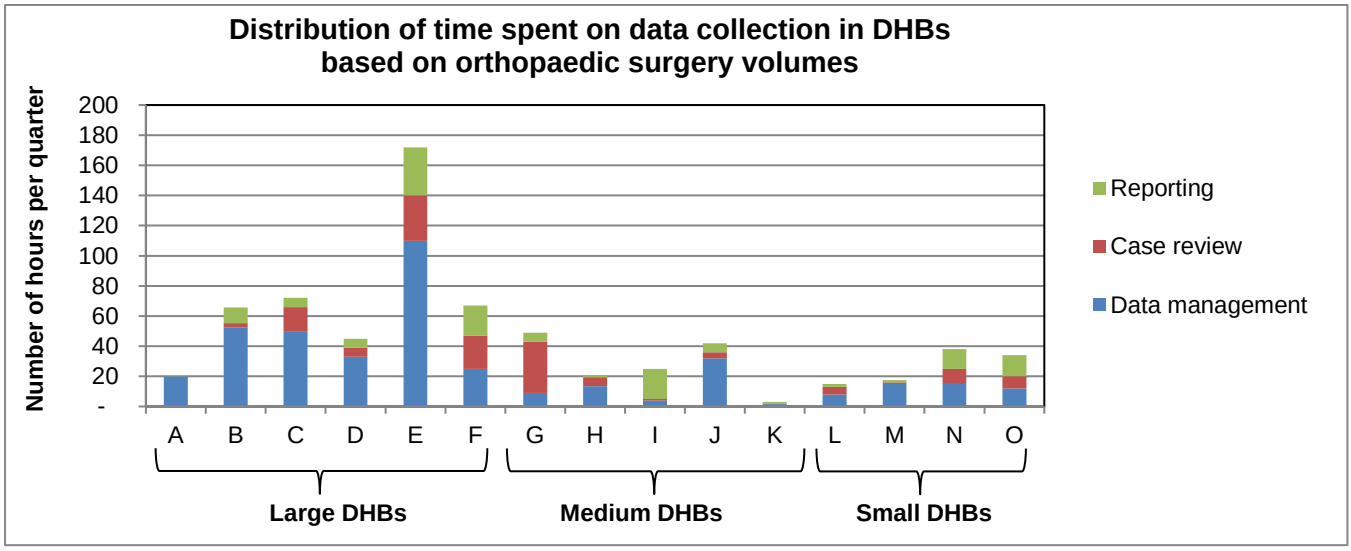
The scaled-up results show that:

- data management tends to involve the most time at an average of 81 hours per quarter and some DHBs reported spending as much as 330 hours per quarter (median 45 hours, minimum 6 hours)
- case review was the second-most time-consuming at an average of 30 hours per quarter (maximum 102 hours, median 18 hours)
- reporting involved the least amount of time at an average of 9 hours per quarter (maximum 32 hours, median 6 hours).

Figure 2 presents the number of hours each of the 15 DHBs that responded to the survey spent on each of the activity areas in the national orthopaedic programme per quarter.

The data management component takes the majority of time because either DHBs had no electronic documentation systems or, where they did, the systems were disparate with no interfaces between them. For this reason, DHB staff had to use a range of methods to collect data, including a considerable amount of manual work in reviewing patient files. All the data then needs to be pulled together and entered into the data collection form.

Figure 2: Hours spent each quarter on orthopaedic stream of SSIIP, by DHB



3.4. Infection rates and surgery volumes for the last two years

It is helpful to consider the workload of data collection alongside the data on SSIs that DHBs are reporting. Table 2 presents the number of orthopaedic SSI cases, orthopaedic procedure volumes, and orthopaedic SSI rate for each DHB.

Table 2: Aggregated orthopaedic SSI data over two years (January 2017 – December 2018)

DHB	SSI cases			Procedure volumes			SSI rate		
	≤ 5	6–15	≥ 16	< 1,000	1,000–1,500	>1,500	< 0.5	0.5–1.0	> 1.0
Auckland		11			1,080			1.0	
Bay of Plenty		10				1,677		0.6	
Canterbury			21			2,902		0.7	
Capital & Coast		7			1,037			0.7	
Counties Manukau			31		1,457				2.1
Hawke's Bay		8		791				1.0	
Hutt Valley	1			546			0.2		
Lakes		12		725					1.7
MidCentral		7		822				0.9	
Nelson Marlborough		11			1,118			1.0	
Northland		15			1,147				1.3
South Canterbury	2			356				0.6	
Southern	5				1,437		0.4		
Tairāwhiti	5			263					1.9
Taranaki		8		679					1.2
Waikato			19			2,020		0.9	
Wairarapa	2			317				0.6	
Waitematā			17			2,240		0.8	
West Coast	1			203			0.5		
Whanganui	2			581			0.3		
Total New Zealand	195			21,398			0.9		

4. Options for orthopaedic SSI data collection

As other jurisdictions have matured their SSI surveillance programme, they have adjusted the reporting requirements of health care facilities. Below we present four potential options, along with a summary of benefits, disadvantages and any comparable approaches in other jurisdictions for each option. Table 3 then gives an overview of the impacts of all four options. Please review this information and consider how well each option might work in New Zealand.

4.1. Standard or full surveillance (no change to current programme)

Under this option, the orthopaedic SSIIP would continue with the same full data collection – that is, carry on with the current approach. This includes collection of all data fields in the orthopaedic data collection form (see Appendix 2).

Benefits

- The national programme would continue monitoring ongoing trends for process measures, outcome measures and other risk factors.
- SSIIP would capture information on susceptibility patterns of micro-organisms and the prevalence of multi-drug resistant organisms linked to orthopaedic SSIs.
- SSIIP would continue to provide data that can be used in many ways, such as to:
  - clearly demonstrate the impact of surgical antibiotic prophylaxis (SAP), specifically antibiotic timing and dosage, on reducing the SSI rate
  - verify sustained antimicrobial stewardship through consistent, evidence-based SAP practice
  - provide evidence to support a shift to a single dose of antibiotics (ie, not giving antibiotics postoperatively) in the future.
- The data collected can give insight into potential risk factors that are currently included in SSIIP monitoring. Analysis of those risk factors may help identify future opportunities for quality improvement.
- It is possible to identify and address equity issues through data matching with the National Minimum Data Set (NMDS) and other data sets such as NZJR.
- SSIIP's robust data set allows continued collaboration with stakeholders such as RACS and NZOA/NZJR executive committee members.
- Future reports could potentially include risk adjustment. An example of risk adjustment is the internationally recognised standardised infection ratio (SIR) used in the United States as a result of data collected through the National Health Safety Network (NHSN) database.[5]
- Continuing with the current approach would maintain momentum for automatic data collection, which has benefits across the IPC service.

[5] National Center for Emerging and Zoonotic Infectious Diseases. 2019. *The NHSN Standardised Infection Ratio (SIR): A guide to the SIR*. Centers for Disease Control and Prevention. URL: www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf (accessed 7 June 2019).

Disadvantages

- The current data collection is resource intensive as it is a largely manual process for 15 of the 20 DHBs.
- DHBs are spending less time than they would like to on case review and QI activity.
- The amount of time DHBs must dedicate to data collection for this programme constrains their ability to make improvements in other surgical areas and procedures.

4.2. Light surveillance

Under this option, full data collection for SSI cases would continue, but with one change: DHBs would report just a monthly number for each procedure type for denominator data. This type of surveillance would significantly reduce the time needed for data collection.

Benefits

- This approach would reduce the workload involved in collecting orthopaedic data.
- IPC and surgical staff would gain more time to review SSI cases in more detail, which may lead them to identify further opportunities for improvement.[6,7]
- Staff would have more time to collect data on additional surgical procedures, which they could use to identify opportunities for improvement.
- The existing data set containing five years of orthopaedic data is available to gain insight into patient risk factors. While this light surveillance option would not collect detailed data on all orthopaedic surgeries in the future, the current robust data set can be analysed and used to draw conclusions for further improvement. Currently this data is under analysis to identify how to optimise antibiotic dosage and timing.
- With this approach, SSIIP could capture information on susceptibility patterns of micro-organisms and prevalence of multi-drug resistant organisms linked to orthopaedic SSIs.
- It would continue to be possible to monitor compliance for the process measures (antibiotic timing and dosage) and the pre-operative *Staphylococcus aureus* bundle for SSI cases.

Disadvantages

- Risk adjustment for patient factors would not be possible because these data parameters would only be collected for SSI cases rather than the entire hip and knee surgical population.
- This approach would not collect data on compliance rates for existing process measures and so it would not provide information on ongoing compliance.

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[6] This option could include the recommendation to categorise, report and review every deep and organ/space SSI case as an adverse event through the national adverse events reporting programme (www.hqsc.govt.nz/our-programmes/adverse-events/national-adverse-events-policy). Most deep and organ/space SSIs should be categorised as a SAC (severity assessment code) 2 or SAC 3 event based on the level of harm to the patient. Some national reporting requirements may lead to further insight into the causes of each SSI. This process would encourage collaboration among the infection control committee, adverse events committee and surgical services staff to make identified improvements at the local level.

[7] A standardised SSI template could be launched nationally to support DHBs in identifying potential causes and opportunities for improvement.

- DHBs may choose not to expand SSI surveillance to other procedures because of ongoing capacity issues.
- The approach would give no insight into compliance for modified process measures.

Similar approaches by other jurisdictions

The Scottish Surveillance of Healthcare Associated Infection Programme (SSHAIP) supports light surveillance protocols for its SSI data collection. While Australia does not have a national SSI surveillance programme, Victoria and Western Australia have specific state-based programmes. Aspects of each of these programmes are described below.

Scotland: SSHAIP[8]

- Scotland focuses on SSIs in addition to the five-yearly point prevalence study required by European Centre for Disease Control and Prevention. It has four mandatory procedures for SSI monitoring: hips, lower segment caesarean section (LSCS), vascular and bowel (identified from prevalence study).
- Due to the resource requirements of the prevalence study, it moved to a 'light' SSI surveillance protocol after seven years of full surveillance. However, not all National Health Service (NHS) trusts moved to the light protocol. Feedback was that the move to 'light' monitoring was acceptable if you knew your data well.
- Scotland has an active review process for infections – having two cases of the same infections in the same ward triggers a response and clinical review. SSI surveillance is not just about the rate but also case review.

Western Australia: Healthcare-associated Infection Surveillance Western Australia (HISWA)[9]

- Indicators for surveillance under HISWA are SSIs following hip and knee arthroplasty and LSCS procedures.
- Data fields required for reporting are:
  - numerator: patient ID, date of birth, procedure, procedure date, date infection identified, risk index, point of detection (initial admission, readmission), infection classification (superficial, deep, organ space), specimen (sterile, non-sterile, not obtained), microbiology
  - denominator: total number of eligible patients meeting each risk index score (data required for each risk index calculation is American Society of Anesthesiologists score,[10] length of procedure and wound classification) for each type of procedure.

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[8] Health Protection Scotland. 2019. *Surgical Site Infection Surveillance Protocol and Resource Pack*. Health Protection Scotland. URL: www.hps.scot.nhs.uk/web-resources-container/surgical-site-infection-surveillance-protocol-and-resource-pack-edition-71 (accessed 7 June 2019).

[9] Healthcare Associated Infection Unit. 2014. *Healthcare Associated Infection Surveillance Western Australia: Surveillance Manual*. Department of Health, Western Australia. URL: https://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/Infectious%20diseases/PDF/HISWA/surveillance-manual-version-6-oct-2014.pdf (accessed 7 June 2019).

[10] American Society of Anesthesiologists. 2014. ASA physical status classification system. URL: www.asahq.org/standards-and-guidelines/asa-physical-status-classification-system (accessed 7 June 2019).

Victoria, Australia: Victorian Healthcare Associated Infection Surveillance System (VICNISS)[11]

- All hospitals with more than 100 beds contribute data on the SSI component.
  - Participation in SSI surveillance for hip and knee replacements is mandatory for hospitals performing more than 50 procedures annually.
  - If coronary artery bypass graft surgery is performed, data must be collected continuously.
  - Hospitals are encouraged to undertake surveillance on two or more other VICNISS surgical procedures.
- Public hospitals with 50–99 beds contribute state-wide data by assessing compliance with current recommendations for antibiotic prophylaxis. Through regular reporting on antibiotic prophylaxis, as part of the VICNISS surveillance programme, and because hospitals are able to compare their performance with state-wide data, some improvements have occurred in documentation and, most importantly, in compliance with guidelines, promoting optimal use of antibiotics.
- Smaller hospitals report serious SSIs without monitoring surgery. They do not calculate rates of infection as they may not perform enough surgery for these rates to be meaningful. These hospitals report infections even if the surgery occurred at another hospital before the patient was transferred.

4.3. Intermittent surveillance

Intermittent surveillance involves data collection for only part of the year. It might involve either: one quarter of full or standard surveillance and three quarters of light surveillance; or one quarter of full or standard surveillance and no other data collection for the rest of the year. This approach identifies the specific quarter for conducting full surveillance so it is possible to compare data across DHBs.

Benefits

- This surveillance option would significantly decrease the amount of data collection that DHBs have to do. They would have either minimal (light) or no data collection for three of four quarters every year.
- SSIIP could capture information on susceptibility patterns of micro-organisms and the prevalence of multi-drug resistant organisms linked to orthopaedic SSIs for part of the year.
- DHBs would continue to engage in surveillance but only for a limited period each year.
- With the time freed through only reporting full or standard surveillance for one quarter per year, surveillance of other procedures would become more feasible.

[11] VICNISS Healthcare Associated Infection Surveillance Coordinating Centre. VICNISS surveillance in our hospitals. URL: www.vicniss.org.au/about/surveillance-activities (accessed 7 June 2019).

Disadvantages

- This type of surveillance would produce prevalence rates (proportion or rate of patients with an SSI for a given period) rather than incidence rates (new cases over time) for orthopaedic SSIs. With only prevalence rates, it is not possible to detect trends in compliance with process measures or in SSI rates.
- Identifying any seasonal variation would be impossible.
- This approach would create an uneven IPC workload and workflow throughout the year. Having either limited or no data collection for 75 percent of the year may increase variation in how DHBs apply the SSI definition as staff would not be continually reviewing and discussing these orthopaedic cases. Staff may lose their high level of expertise that they develop through consistent surveillance.
- DHBs would have no incentive to prioritise optimising automated data collection processes.

A similar approach by another jurisdiction

Public Health England uses this type of surveillance for its SSI Surveillance Service.[12]

- A national mandate requires all NHS trusts undertaking orthopaedic surgical procedures to carry out a minimum of three months' surveillance in four orthopaedic procedures and voluntary surveillance in at least one of 13 other surgical procedure categories for three months each financial year.
- SSI surveillance has been in place for over 20 years.
- About 50 percent of NHS trusts do continuous SSI surveillance.

4.4. Abandon surveillance

Abandoning surveillance involves stopping all data collection for orthopaedic SSIs and procedures.

Benefits

Not requiring orthopaedic SSI surveillance would remove all resource implications of manual data capture.

Disadvantages

- The orthopaedic SSI rate is still decreasing, which indicates that surveillance may still present opportunities to make other improvements.
- The New Zealand SSI rate for orthopaedic surgery is still two times higher than the rate in England,[13] which also indicates there is still potential for improvement.

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[12] Public Health England. 2013. *Protocol for the Surveillance of Surgical Site Infections*. London: Public Health England. URL: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/633775/surgical_site_infections_protocol_version_6.pdf (accessed 7 June 2019).

[13] Public Health England. 2018. *Surveillance of Surgical Site Infections in NHS Hospitals in England, 2017 to 2018*. London: Public Health England. URL:

- Many years of good work on reducing the SSI rate may not be maintained; improvements need to be sustainable.
- Opportunities for improvement remain in relation to the patient risk factor, body mass index (BMI), and process measures, including surgical antibiotic dosing and timing and *Staphylococcus aureus* decolonisation, but these would not be measured under this option.
- It would be impossible to recognise antimicrobial resistance threats related to orthopaedic surgery.
- Adverse events related to orthopaedic SSIs and SSI rates will not be monitored and reviewed on a consistent basis so quality improvement will be non-existent.
- New Zealand would become a global outlier for national HAI surveillance. Many jurisdictions have national and/or state-wide SSI surveillance programmes. If New Zealand abandoned the orthopaedic SSIIP, it would be one of the few developed countries that have no national SSI surveillance programme.
- Opportunity for further quality improvement would be lost because there would be no data to analyse and use to identify issues in practice.
- Significant loss of credibility with key stakeholders could lead to less or no engagement with them for any future HAI surveillance. Completely stopping SSI surveillance for orthopaedic surgery may reduce the level of partnership and collaboration with surgeons.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765967/SSI_annual_report_NHS_hospitals_2017_18.pdf (accessed 7 June 2019).

Table 3: Impact of each data collection option on focus, IPC staff capacity, key stakeholder engagement and quality improvement

	Full or standard surveillance	Light surveillance	Intermittent surveillance	Abandon surveillance
Focus (prioritisation level in DHBs)	Continuing the current approach to data collection would enable the national SSIIP to establish where improvement has occurred and identify risk factors for further improvement.	Light surveillance would enable the national SSIIP to identify trends in SSI rates and enable individual DHBs to review their SSI cases more thoroughly to identify local opportunities for improvement.	Intermittent surveillance would enable the national SSIIP to compare the prevalence of orthopaedic SSIs across New Zealand but limit the ability to identify trends over time.	Stopping data collection would significantly reduce the DHBs' focus on orthopaedic SSIs. The gains made to date may not be sustained.
IPC staff capacity (implications on resources)	DHB IPC teams that have a manual or semi-automated process for surveillance data collection would need better resourcing.	IPC staff would have a lighter workload for data collection of denominators, allowing more time to focus on reviewing opportunities for improvement related to the SSI cases.	IPC staff would experience different impacts on their capacity throughout the year. Their workload would be significantly busier for one quarter of the year.	IPC staff would need little or no capacity unless orthopaedic SSI surveillance continues at the local level.
Surgeon and other key stakeholder engagement	The data collected would be useful to surgeons and other key stakeholders to review and use to identify improvement opportunities.	SSI rates and more detailed information on the numerator cases would be meaningful information to surgeons and other key stakeholders but identifying risk factors and process measure compliance from the data would be impossible.	Only prevalence data would be collected, which may not be useful to surgeons and stakeholders as it just reflects a point in time rather than trends over time.	Stopping data collection would not require or promote any surgeon and key stakeholder engagement. You cannot improve what is not measured.
Quality improvement (implications for future improvement)	Opportunities for future improvement would be identified from the data collected for both numerators and denominators. It would be possible to identify trends over time and risk factors related to the patient and surgery and so to make improvements.	It would be possible to identify potential opportunities for improvement based on the SSI cases only. Risk factors and process compliance would not be trackable.	Few opportunities for improvement would be available because the data would only reflect a point in time and would not reveal if the opportunities and issues are ongoing.	Few or no opportunities for improvement would be available. You cannot improve what is not measured.

5. Proposed option: light surveillance

Following discussions with various advisory groups including orthopaedic expert faculty group, RACS and NZOA, the Commission's SIPCAG recommends light surveillance as the best option for the orthopaedic SSIIP. All DHBs could continue full or standard surveillance if they chose but would also have the option of switching to light surveillance.

Light surveillance would focus data collection and allow for more detailed review of the orthopaedic SSI cases in addition to expanding SSI surveillance to other procedures and/or process measures. One way of supporting the detailed review of SSI cases would be to create a standardised investigation tool that DHBs could use while reviewing their SSI events. If light surveillance is chosen as the national approach, other specific process and outcome measures would be implemented to continue the focus on reducing patient harm from HAIs.

Light surveillance would enable DHBs to dedicate more time to perform an in-depth review of SSI cases in order to identify improvement opportunities. They would also gain greater capacity to expand SSI surveillance to other procedures and/or process measures.

The data collected for the SSIIP overlaps somewhat with the NZJR data collection. Discussions with NZJR and NZOA executive committees identified a potential opportunity to capture and transfer the overlapping data fields for all orthopaedic surgery denominators. The Commission will work with the NZJR executive committee to explore this opportunity so some data that the NZJR already captures could be correlated with the light surveillance data.

Programmes in other jurisdictions are primarily focused on surveillance, rather than process improvement. Improvement capability often sits independently with the health improvement agencies in each country. These jurisdictions do not develop interventions – hospitals are encouraged to use the National Institute for Health and Care Excellence[14] or Australian Commission on Quality and Safety in Health Care[15] guidelines.

The Commission's view, as a national quality improvement organisation, is that it is imperative we focus on surveillance as the basis for quality improvement. Although surveillance is just one component of the quality improvement process, it is an essential component.

[14] National Institute for Health and Care Excellence. 2013. Surgical site infection. URL: www.nice.org.uk/guidance/QS49 (accessed 7 June 2019).

[15] Australian Commission on Quality and Safety in Health Care. Healthcare-Associated Infection Prevention Program. URL: www.safetyandquality.gov.au/our-work/healthcare-associated-infection/ (accessed 7 June 2019).

6. Proposed process measures and surgical procedures to consider if the sector supports moving to light SSI surveillance

Some stakeholders support introducing further quality improvement activity, provided that the entire workload does not go to IPC teams. IPC is a partner in any change, but a multidisciplinary approach is needed with strong leadership and resources from the relevant clinical area.

General discussions with the sector have identified four types of surgical procedures as options for future SSI surveillance:

- caesarean sections
- colorectal surgery
- spine surgery
- vascular surgery.

Evidence-based or best practice bundles are available that could be implemented as process measures for each of the surgical procedures listed above.

The following are other potential new process measures for a specific type of procedure or across a surgical population.

- **Glycaemic control**: World Health Organization (WHO) global guidelines[16] recommend using protocols for perioperative blood glucose control for both diabetic and non-diabetic adult patients undergoing surgical procedures to reduce the risk of SSI *(conditional recommendation, low quality of evidence)*.
- **Anti-coagulant management** involves inpatient and outpatient management of adult patients undergoing procedures who are taking anticoagulant or antiplatelet therapy.
- **Normothermia**: WHO global guidelines recommend using warming devices in the operating room and during the surgical procedure for patient body warming with the purpose of reducing SSI *(conditional recommendation, moderate quality of evidence)*.

  The Australian and New Zealand College of Anaesthetists has asked for this specific process measure as the literature provides evidence that hypothermia in the

[16] WHO. 2018. *Global Guidelines for the Prevention of Surgical Site Infection* (2nd ed). Geneva: World Health Organization URL: www.who.int/infection-prevention/publications/ssi-prevention-guidelines/en (accessed 7 June 2019).

perioperative period increases the incidence of wound infection and impairs wound healing.[17,18,19,20]

- **Pre-operative interventions for obese patients** involves pre-operative nutritional interventions in obese and morbid obese patients.
- Support use of anti-staph bundles for orthopaedic and cardiac surgery involves pre-operative skin and nasal decolonisation
- **Support use of anti-staph bundle for other surgery** involves pre-operative skin and nasal decolonisation.
- **Antibiotic prophylaxis and skin prep QSMs across all clean procedures** apply current SAP and skin prep QSMs to all procedures (other than hip and knee arthroplasty and cardiac surgery).
- **Perioperative oxygenation**: WHO global guidelines recommend that adult patients undergoing general anaesthesia with tracheal intubation for surgical procedures should receive an 80 percent fraction of inspired oxygen (FiO_2) intraoperatively and, if feasible, in the immediate postoperative period for two to six hours to reduce the risk of SSI *(conditional recommendation, moderate quality of evidence).*

Healthcare associated infections other than surgical site infections could be included in the Commission's IPC surveillance and improvement programme. Some non–SSI HAIs that could be chosen are:

- peripheral intravenous catheter infections (PIVC infections)
- catheter associated urinary tract infection (CAUTI)
- *Clostridioides (Clostridium) difficile* infections.

To determine the type of HAI surveillance to implement nationally, a point prevalence survey (PPS) could be performed across all DHBs. The PPS would provide prevalence data across New Zealand for each of the HAI types listed above so we could understand which infection type has the most opportunity for improvement.

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[17] Kurz A, Sessler DI, Lenhardt R. 1996. Perioperative normothermia to reduce the incidence of surgical-wound infection and shorten hospitalization. Study of Wound Infection and Temperature Group. *New England Journal of Medicine* 334(19):1209–15.

[18] Melling AC, Ali B, Scott EM, et al. 2001. Effects of preoperative warming on the incidence of wound infection after clean surgery: a randomised controlled trial. *Lancet* 358(9285): 876–80.

[19] Wong PF, Kumar S, Bohra A, et al. 2007. Randomized clinical trial of perioperative systemic warming in major elective abdominal surgery. *British Journal of Surgery* 94(4): 421–6.

[20] Madrid E, Urrutia G, Roqué i Figuls M, et al. 2016. Active body surface warming systems for preventing complications caused by inadvertent perioperative hypothermia in adults. *Cochrane Database of Systematic Review* (4): CD009016.

7. Feedback requested

The questions below ask for your views on the proposed option for future data collection and reporting of orthopaedic SSI data and on other options for implementing future surveillance activities to reduce SSIs.

Please provide your feedback to the questions through this Survey Monkey link: www.surveymonkey.com/r/orthopaedicSSIIP

1. Do you agree with the option of having a light surveillance protocol for orthopaedic SSI data collection reporting? Y / N / Neutral

   Comments:

2. If you answered 'no' to the previous question, please explain why.

   Comments:

3. What alternative procedure(s) would you prefer to report nationally?
   - Caesarean sections
   - Colorectal surgery
   - Spine surgery
   - Vascular surgery
   - Other (please list in Comments section below)
   - None

   Comments:

4. Which of the procedures listed in the previous question does your DHB currently collect surveillance data on?
   - Caesarean sections
   - Colorectal surgery
   - Spine surgery
   - Vascular surgery
   - None

5. What alternative process measure(s) would you prefer to report nationally? (Choose up to three process measures.)
   - Glycaemic control
   - Anti-coagulant management
   - Normothermia
   - Pre-operative interventions for obese patients
   - Anti-staph bundle for all orthopaedic and cardiac surgery
   - Anti-staph bundle for other surgery
   - Antibiotic prophylaxis and skin prep QSMs across all procedures
   - Perioperative oxygenation
   - Other (please list in Comments section below)
   - None

Comments:

6. Which of the process measures listed in the previous question does your DHB currently collect surveillance data on?
   - Glycaemic control
   - Anti-coagulant management
   - Normothermia
   - Pre-operative interventions for obese patients
   - Anti-staph bundle for all orthopaedic and cardiac surgery
   - Anti-staph bundle for other surgery
   - Antibiotic prophylaxis and skin prep QSMs across all clean procedures
   - Perioperative oxygenation
   - None

   Comments:

7. Would you prefer to have a suite of measures (procedures or process measures) to choose from for SSI surveillance rather than the same procedure and/or process measure across New Zealand? Y / N

   Why or why not?

8. If you prefer to focus on HAI surveillance other than SSIs, please select your preference(s) below.
   - Peripheral intravenous catheter infections (PIVC infections)
   - Catheter associated urinary tract infection (CAUTI)
   - Clostridioides (Clostridium) difficile infections
   - Other (please list is Comments section below)
   - None

   Comments:

9. If you prefer to focus on HAI surveillance other than SSIs (one of the infections listed in the previous question), would you support having a point prevalence survey across New Zealand to identify which HAI holds the greatest opportunity for improvement? Y / N

10. Would you be interested in participating in a collaborative, which the Commission plans and facilitates and where multiple DHBs work on a common project to implement a bundle to reduce SSI risk for a specific procedure (eg, colorectal surgery) with the opportunity to customise it locally? Y / N

Comments:

11. Other feedback or comments

Appendix 1: Current clinical interventions (process measures) and outcome measure for orthopaedic SSIIP

The SSIIP has four clinical interventions, three of which are programme quality and safety markers (QSMs).

- Intervention 1 *(current QSM):* Antibiotic timing

  For primary procedures, an antibiotic should be administered in the hour before the first incision (‘knife-to-skin’), or two hours if receiving vancomycin. The target for this QSM is 100 percent compliance.

- Intervention 2 *(current QSM):* Right antibiotic in the right dose

  The right antibiotic in the right dose is cefazolin (≥2 g) or cefuroxime (≥1.5 g) as an alternative. The target for this QSM is 95 percent compliance.

- Intervention 3: Postoperative antibiotic duration

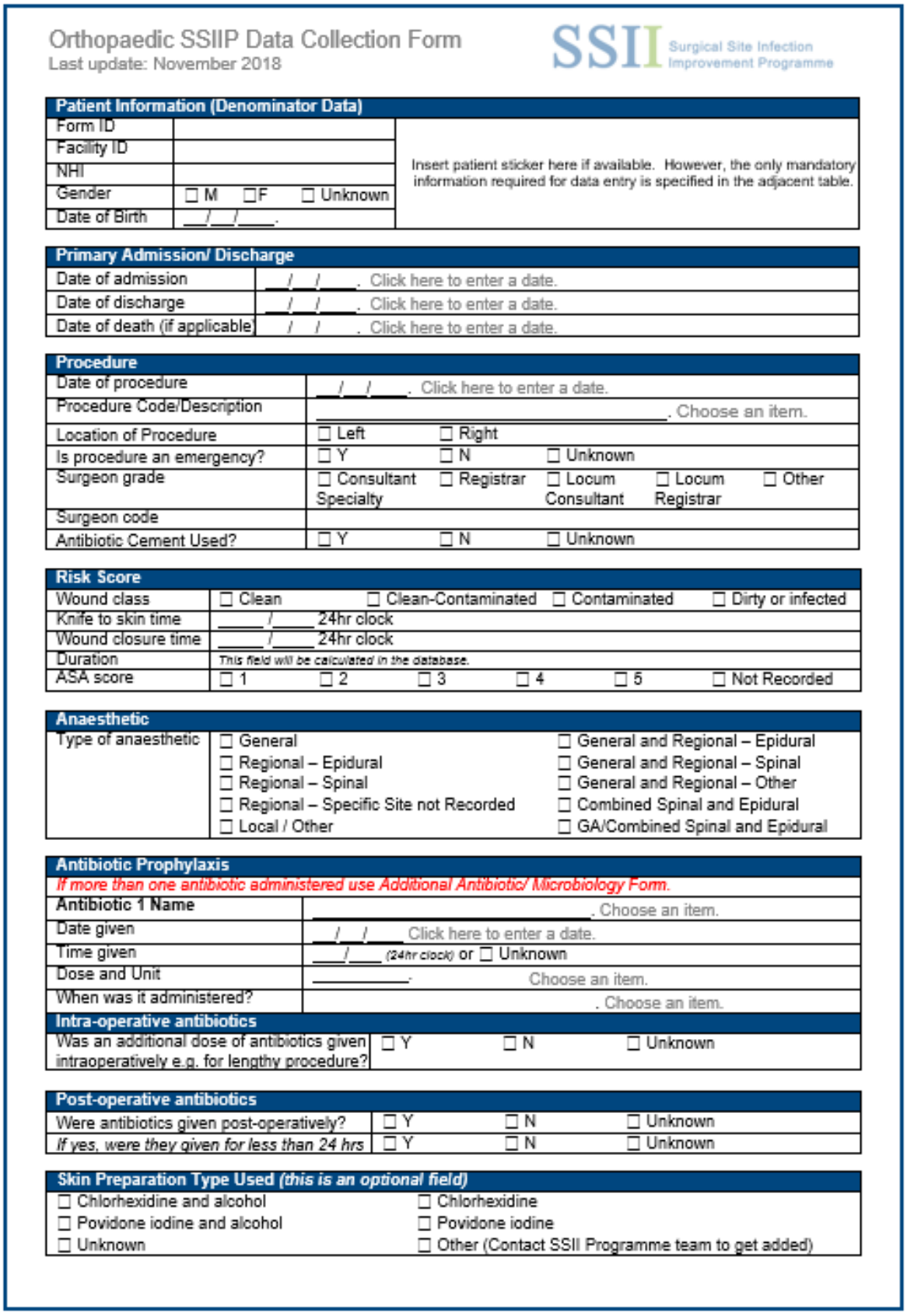
  Surgical antibiotic prophylaxis is discontinued within 24 hours of surgery end time. This measure involves three doses of cefazolin or cefuroxime administered eight hours postoperatively.

- Intervention 4 *(retired QSM):* Skin preparation

  Appropriate skin antisepsis in surgery using alcohol/chlorhexidine or alcohol/povidone iodine. The alcohol-based antiseptic solution should contain at least 70 percent alcohol. The target for this QSM is 100 percent compliance although reporting of this QSM is no longer required for orthopaedic data collection.

The outcome measure for the orthopaedic SSIIP is SSIs per 100 hip and knee arthroplasty operations.

Appendix 2: Current orthopaedic SSI data collection form



Orthopaedic SSIIP Data Collection Form
Last update: November 2018

SSII Surgical Site Infection Improvement Programme

Patient Information (Denominator Data)		
Form ID		Insert patient sticker here if available. However, the only mandatory information required for data entry is specified in the adjacent table.
Facility ID		
NHI		
Gender	☐ M ☐F ☐ Unknown	
Date of Birth	___/___/____.	

Primary Admission/ Discharge	
Date of admission	___/___/____. Click here to enter a date.
Date of discharge	___/___/____. Click here to enter a date.
Date of death (if applicable)	/ / . Click here to enter a date.

Procedure					
Date of procedure	___/___/____. Click here to enter a date.				
Procedure Code/Description	_____. Choose an item.				
Location of Procedure	☐ Left	☐ Right			
Is procedure an emergency?	☐ Y	☐ N	☐ Unknown		
Surgeon grade	☐ Consultant Specialty	☐ Registrar	☐ Locum Consultant	☐ Locum Registrar	☐ Other
Surgeon code					
Antibiotic Cement Used?	☐ Y	☐ N	☐ Unknown		

Risk Score					
Wound class	☐ Clean	☐ Clean-Contaminated	☐ Contaminated	☐ Dirty or infected	
Knife to skin time	_____/_____ 24hr clock				
Wound closure time	_____/_____ 24hr clock				
Duration	*This field will be calculated in the database.*				
ASA score	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5 ☐ Not Recorded

Anaesthetic		
Type of anaesthetic	☐ General	☐ General and Regional – Epidural
	☐ Regional – Epidural	☐ General and Regional – Spinal
	☐ Regional – Spinal	☐ General and Regional – Other
	☐ Regional – Specific Site not Recorded	☐ Combined Spinal and Epidural
	☐ Local / Other	☐ GA/Combined Spinal and Epidural

Antibiotic Prophylaxis	
If more than one antibiotic administered use Additional Antibiotic/ Microbiology Form.	
Antibiotic 1 Name	_____. Choose an item.
Date given	___/___/____ Click here to enter a date.
Time given	____/____ *(24hr clock)* or ☐ Unknown
Dose and Unit	_____. Choose an item.
When was it administered?	. Choose an item.

Intra-operative antibiotics			
Was an additional dose of antibiotics given intraoperatively e.g. for lengthy procedure?	☐ Y	☐ N	☐ Unknown

Post-operative antibiotics			
Were antibiotics given post-operatively?	☐ Y	☐ N	☐ Unknown
If yes, were they given for less than 24 hrs	☐ Y	☐ N	☐ Unknown

Skin Preparation Type Used *(this is an optional field)*	
☐ Chlorhexidine and alcohol	☐ Chlorhexidine
☐ Povidone iodine and alcohol	☐ Povidone iodine
☐ Unknown	☐ Other (Contact SSII Programme team to get added)

Patient BMI		
Height _____ or ☐ Unknown	Weight _____ or ☐ Unknown	BMI _____ or ☐ Unknown

Pre-operative anti-Staphylococcal bundle					
Did the patient receive anti-Staphylococcal aureus bundle?	☐ No bundle protocol	☐ Y		☐ N	☐ Unknown
If pre-screening was performed on the patient what was the result? *(Select "MRSA Positive" if mixed result.)*	☐ N/A *(No pre-screening)*	☐ No S.aureus	☐ MSSA Positive	☐ MRSA Positive	☐ Unknown
Skin Decolonisation – compliance	☐ Full *(all doses)*	☐ Partial *(some doses)*	☐ Not *(no doses)*	☐ N/A *(not in bundle)*	☐ Unknown
Nasal Decolonisation – compliance	☐ Full *(all doses)*	☐ Partial *(some doses)*	☐ Not *(no doses)*	☐ N/A *(not in bundle)*	☐ Unknown

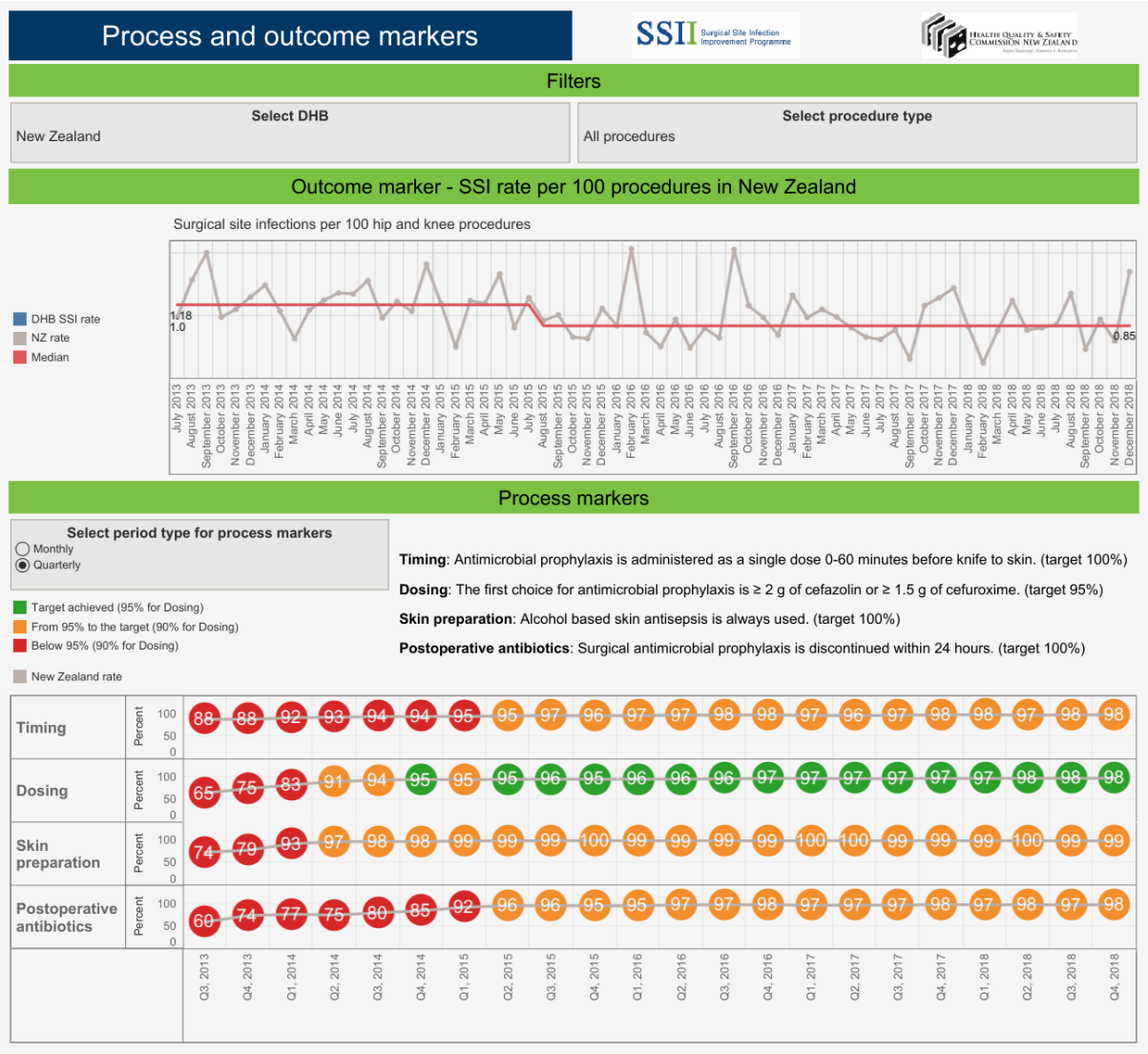
Readmission	
Has patient been readmitted?	☐ Y ☐ N
If yes, date of readmission.	__/__/____. Click here to enter a date.
Was readmission due to SSI?	☐ Y ☐ N

SSI Details (Numerator Data)	
Has SSI criteria been met for this procedure?	☐ Y ☐ N
When was SSI diagnosed?	☐ During initial admission ☐ During readmission up to 30 days post procedure ☐ During readmission up to 90 days post procedure
Date of Infection	__/__/____. Click here to enter a date.
Type of SSI (check decision making flow charts)	☐ Superficial (must occur within **30 days** post procedure) ☐ Deep (must occur within **90 days** post procedure) ☐ Organ/space (must occur within **90 days** post procedure)

Microbiology					
If more than one clinical sample taken please use Additional Antibiotic/ Microbiology Form.					
Clinical Sample taken?	☐ Y ☐ N				
Site of Sample One	☐ Blood	☐ Tissue	☐ Aspirate	☐ Wound swab	☐ Other
Clinically significant organism?	☐ Y ☐ N				
If yes, identify organism.	☐ Acinetobacter baumanii ☐ Enterococcus faecalis ☐ Escherichia coli ☐ Klebsiella pneumoniae ☐ Serratia marcescens ☐ Staphylococcus epidermidis ☐ Streptococcus agalactiae (GpB) ☐ Not specified _____		☐ Candida albicans ☐ Enterococcus faecium ☐ Klebsiella oxytoca ☐ Pseudomonas aeruginosa ☐ Staphylococcus aureus ☐ Streptococcus pyogenes (GpA) ☐ Other (please state)		
Is the organism an MDRO?	☐ Y ☐ N				
If yes, which of the following?	☐ MRSA	☐ ESBL	☐ VRE	☐ CRO *(includes CRO, CRE, CPE, NDM)*	☐ Other

Notes (For your own reference. This is not reviewed by the SSII programme)

Appendix 3: National rate for process and outcome markers



*Note: If '100' is in orange, it indicates that the data point is rounded to 100 but not every (100%) procedure was compliant so it is not presented in green. (This same reasoning applies for '95' in red.)