STARS Education and Research Alliance

CREATING KNOWLEDGE | TRANSFORMING CARE

The University Of Queensland
AUSTRALIA

Metro North Health

Queensland Government

STARS Critically Appraised Topic (CAT) Group: Reduction of Surgical Site Infections (SSIs)

Specific Question:

What are the most effective ways to reduce surgical site infections after adult elective surgery?

Clinical bottom line

The research on which interventions are most effective at reducing the incidence of a surgical site infection is not definitive. The recommendation is to use a care bundle that only contains evidence-based interventions, keeping the number of interventions low to aid implementation and compliance. However, there is no definition informing the essential components to be included in the care bundle.

Why is this important?

Surgical Site Infections (SSIs) are an acquired complication that need to be taken seriously. They are a source of considerable morbidity for patients, with potential health, quality of life and economic impacts for not only patients, but also their support. Requirements for management may include re-operations, antibiotics and potential lifelong sequalae. It has been identified through quality audits and benchmarking activities that SSIs at STARS are more prevalent in STARS patients who have undergone surgery than populations in other hospitals.

An SSI is defined as: an infection occurring within 30 days after the operation and only involving the skin and subcutaneous tissue of the incision that is associated with at least one of the following:

- Purulent drainage, with or without laboratory confirmation, from the surgical site.
- Organisms isolated from an aseptically obtained culture of fluid or tissue from the surgical site.
- At least one of the following signs or symptoms of infection: pain or tenderness, localised swelling, redness or heat, and superficial incision is deliberately opened by the surgeon and is culture-positive or not cultured. A culture-negative finding does not meet this criterion.

Diagnosis of SSI by the surgeon or attending physician.

If the SSI is assessed by a surgeon within 3 days and determined not to be an infection, it is then the designated SSI is removed from the quality system. There is considerable variation in who diagnoses these infections, including General Practitioners, but some are also identified through emergency presentations. The STARS surgical team have identified that there is an opportunity to better understand best practice from the current evidence base and they are keen to look at the entire surgical pathway: pre-operative care, intra-operative care and post-operative care. Presently they are capturing further data, such as the type of skin preparation used, and the time points of follow up by surgical teams. Additionally, the Infection Management and Prevention Service (IMPS) have been working with the Anti-Microbial Stewardship (AMS) pharmacists to guide optimal dosing of antibiotics. A preliminary search of the literature identified a large volume of research investigating interventions for treating SSIs. The use of intervention/care bundles* was evident during these searches. Members of the CAT group reported that they had also identified other facilities using care bundles from searches of the grey literature. For this reason, it was decided to assess care bundles as a strategy.

*A Care Bundle is a set of three or more evidence-informed practices performed together to ensure improved quality of care (Lavallee et al., 2017).

Inclusion Criteria

Adult patients
Elective Surgery
Surgical Site Infections
General interventions

CAT Lead: Kara Gadischke and Jennifer Powell. Email: STARS_NSQIP@health.qld.gov.au
Date CAT completed: 21/10/2024; To be reviewed 21/10/2026

Infection up to 30 days post op.

Search dates

Most current studies, from 2019-2024 publication year range.

Type of Study

Highest quality evidence – including systematic reviews, meta-analyses, umbrella reviews and other reviews that have used a systematic methodology. (These will include primary studies such as RCTs).
Also interested in publications reporting outcomes of Quality Improvement to reduce SSIs in hospitals.

PICOT

	Description	Search terms
Population and Setting	Adult Elective surgical patients	
Intervention or Exposure (ie what is being tested)	Strategies to reduce SSIs, (including bundled interventions)	SSIs Reduce/prevent Bundled
Comparison, if any	No intervention	
Outcomes of interest	Reduction of SSIs	
Types of studies	Higher levels of evidence, including systematic reviews, meta-analyses and umbrella reviews, and publications reporting outcomes of QI to reduce SSIs in hospitals.	Systematic reviews, Meta-analyses, Umbrella reviews, etc. Quality Improvement/QI

Databases Searched

PubMed, CINAHL Complete, Embase, Cochrane Library

Date of search

20 August 2024

Search Strategies (including subject headings)

Search strategy, include key concepts and limits:
((bundle OR reduction OR prevention**) AND (**Surgical Site Infections OR ((surgical site/wound) AND (infection))**) AND (**higher levels of evidence/relevant study types including systematic reviews and meta-analyses OR quality improvement**) AND (**publication year range**) AND (**English language**) AND (**Humans**))**

PubMed 709 results
Includes MeSH
("Patient Care Bundles"[Mesh] OR “bundle”[tiab] OR “bundles”[tiab] OR “bundled”[tiab] OR “prevention”[tiab] OR “prevent”[tiab] OR “prevents”[tiab] OR “preventing”[tiab] OR “prevented”[tiab] OR “preventative”[tiab] OR “reduction”[tiab] OR “reduce”[tiab] OR “reduces”[tiab] OR “reducing”[tiab] OR “reduced”[tiab]) AND ("Surgical Wound Infection"[Mesh] OR “surgical site infection”[ti] OR “surgical site infections”[ti] OR “surgical wound infection”[ti] OR “surgical wound infections”[ti] OR (("Surgical Wound"[Mesh] OR “surgical wound”[ti] OR “surgical site”[ti]) AND ("Infections"[Mesh] OR “infection”[ti] OR “infections”[ti]))) AND ("Systematic Reviews as Topic"[Mesh] OR "Systematic Review" [Publication Type] OR "Meta-Analysis as Topic"[Mesh] OR "Meta-Analysis" [Publication Type] OR "Quality Improvement"[Mesh] OR "systematic review"[ti] OR "systematic reviews"[ti] OR "systematic literature review"[ti] OR "systematic scoping review"[ti] OR "systematic narrative review"[ti] OR "systematic evidence review"[ti] OR "systematic qualitative review"[ti] OR "systematic quantitative review"[ti] OR "systematic critical review"[ti] OR "systematic mixed studies review"[ti] OR "systematic mapping review"[ti] OR "Cochrane review"[ti] OR "Cochrane reviews"[ti] OR "systematic search and review"[ti] OR "systematic integrative review"[ti] OR "systematically"[tiab] OR "meta

analysis"[ti] OR "meta analyses"[ti] OR “meta-analysis”[ti] OR “meta-analyses”[ti] OR "metanalysis"[ti] OR "metanalyses"[ti] OR “metaanalysis”[ti] OR “metaanalyses”[ti] OR "meta review"[ti] OR "meta reviews"[ti] OR "meta-review"[ti] OR "meta-reviews"[ti] OR "metareview"[ti] OR "metareviews"[ti] OR "umbrella review"[ti] OR "umbrella reviews"[ti] OR “overview”[ti] OR “overview”[ti] OR “review of reviews”[ti] OR “quality improvement”[ti] OR “QI”[ti]) AND (eng[la] OR und[la]) NOT (animals [mh] NOT humans [mh]) AND 2019:2024[dp]

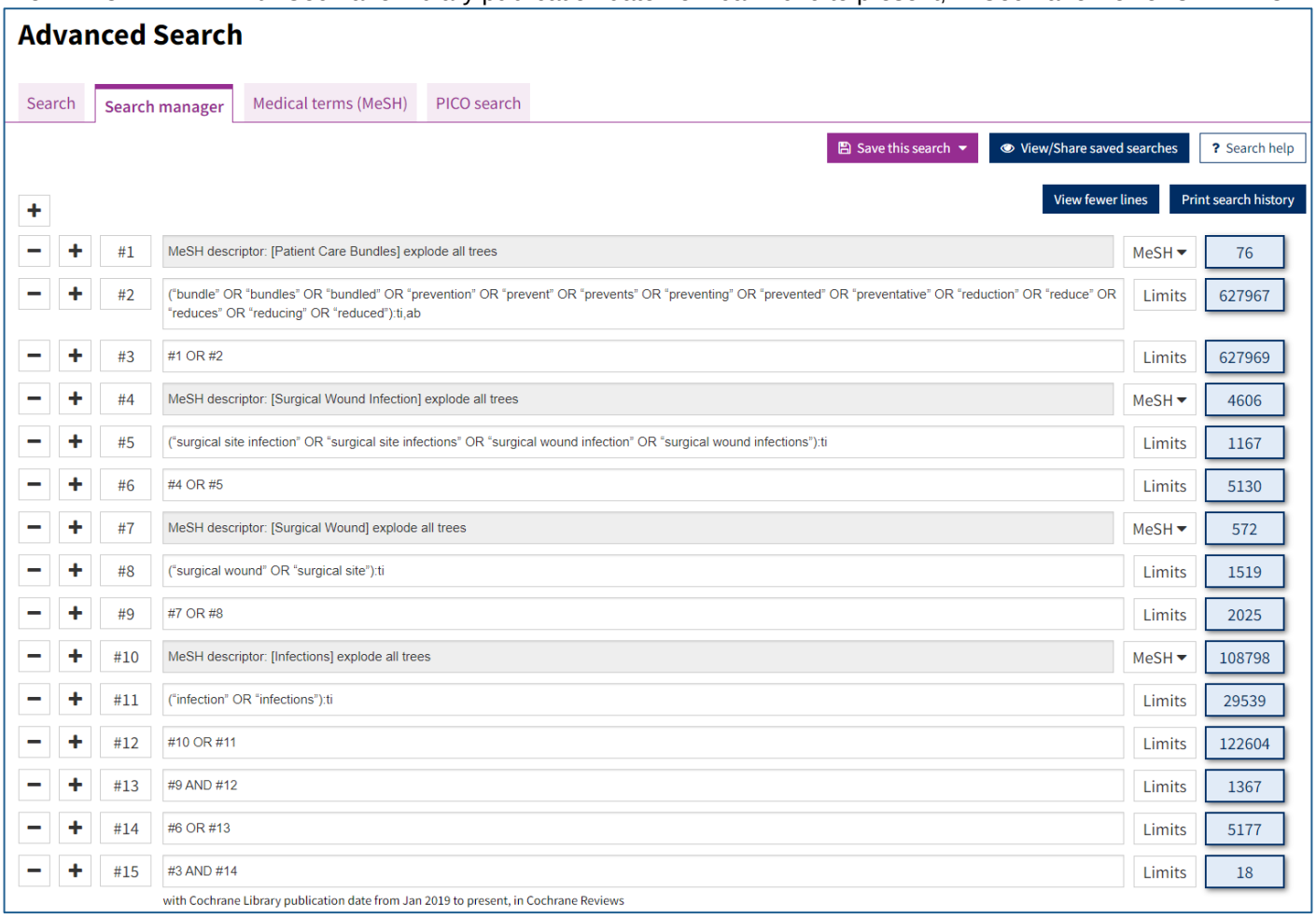
CINAHL Complete (EBSCOhost) 404 results
Includes CINAHL Subject Headings
(TI(“bundle” OR “bundles” OR “bundled” OR “prevention” OR “prevent” OR “prevents” OR “preventing” OR “prevented” OR “preventative” OR “reduction” OR “reduce” OR “reduces” OR “reducing” OR “reduced”) OR AB(“bundle” OR “bundles” OR “bundled” OR “prevention” OR “prevent” OR “prevents” OR “preventing” OR “prevented” OR “preventative” OR “reduction” OR “reduce” OR “reduces” OR “reducing” OR “reduced”)) AND (MH "Surgical Wound Infection" OR TI(“surgical site infection” OR “surgical site infections” OR “surgical wound infection” OR “surgical wound infections”) OR ((MH "Surgical Site+" OR MH "Surgical Wound" OR TI(“surgical wound” OR “surgical site”)) AND (MH "Infection+" OR TI(“infection” OR “infections”)))) AND (MH "Systematic Review" OR MH "Meta Analysis" OR MH "Quality Improvement+" OR TI("systematic review" OR "systematic reviews" OR "systematic literature review" OR "systematic scoping review" OR "systematic narrative review" OR "systematic evidence review" OR "systematic qualitative review" OR "systematic quantitative review" OR "systematic critical review" OR "systematic mixed studies review" OR "systematic mapping review" OR "Cochrane review" OR "Cochrane reviews" OR "systematic search and review" OR "systematic integrative review" OR "systematically" OR "meta analysis" OR "meta analyses" OR “meta-analysis” OR “meta-analyses” OR "metanalysis" OR "metanalyses" OR “metaanalysis” OR “metaanalyses” OR "meta review" OR "meta reviews" OR "meta-review" OR "meta-reviews" OR "metareview" OR "metareviews" OR "umbrella review" OR "umbrella reviews" OR “overview” OR “overview” OR “review of reviews” OR “quality improvement” OR “QI”) OR AB("systematically")) AND (LA English) NOT ((MH "Animals+" OR MH "Animal Studies" OR TI animal model*) NOT MH "Human") AND PY 2019-2024

Embase (Elsevier) 475 results
Includes Emtree, and limited to relevant publication types (articles, articles in press and reviews)
('care bundle'/exp/mj OR “bundle”:ti,ab OR “bundles”:ti,ab OR “bundled”:ti,ab OR “prevention”:ti,ab OR “prevent”:ti,ab OR “prevents”:ti,ab OR “preventing”:ti,ab OR “prevented”:ti,ab OR “preventative”:ti,ab OR “reduction”:ti,ab OR “reduce”:ti,ab OR “reduces”:ti,ab OR “reducing”:ti,ab OR “reduced”:ti,ab) AND ('surgical infection'/exp/mj OR “surgical site infection”:ti OR “surgical site infections”:ti OR “surgical wound infection”:ti OR “surgical wound infections”:ti OR (('surgical wound'/exp/mj OR 'surgical site'/exp/mj OR “surgical wound”:ti OR “surgical site”:ti) AND ('infection'/exp/mj OR “infection”:ti OR “infections”:ti))) AND ('systematic review (topic)'/exp OR 'systematic review'/exp OR 'meta analysis (topic)'/exp OR 'meta analysis'/exp OR 'total quality management'/exp OR "systematic review":ti OR "systematic reviews":ti OR "systematic literature review":ti OR "systematic scoping review":ti OR "systematic narrative review":ti OR "systematic evidence review":ti OR "systematic qualitative review":ti OR "systematic quantitative review":ti OR "systematic critical review":ti OR "systematic mixed studies review":ti OR "systematic mapping review":ti OR "Cochrane review":ti OR "Cochrane reviews":ti OR "systematic search and review":ti OR "systematic integrative review":ti OR "systematically":ti,ab OR "meta analysis":ti OR "meta analyses":ti OR “meta-analysis”:ti OR “meta-analyses”:ti OR "metanalysis":ti OR "metanalyses":ti OR “metaanalysis”:ti OR “metaanalyses”:ti OR "meta review":ti OR "meta reviews":ti OR "meta-review":ti OR "meta-reviews":ti OR "metareview":ti OR "metareviews":ti OR "umbrella review":ti OR "umbrella reviews":ti OR “overview”:ti OR “overview”:ti OR “review of reviews”:ti OR “quality improvement”:ti OR “QI”:ti) AND [english]/lim NOT (‘animal experiment’/de NOT (‘human experiment’/de OR ‘human’/de)) AND [2019-2024]/py AND ([article]/lim OR [article in press]/lim OR [review]/lim)

Cochrane Library (Wiley) Cochrane Reviews – 18 results
Advanced search > Search manager
Includes MeSH

ID	Search	Hits
#1	MeSH descriptor: [Patient Care Bundles] explode all trees	76
#2	(“bundle” OR “bundles” OR “bundled” OR “prevention” OR “prevent” OR “prevents” OR “preventing” OR “prevented” OR “preventative” OR “reduction” OR “reduce” OR “reduces” OR “reducing” OR “reduced”):ti,ab	627967
#3	#1 OR #2	627969
#4	MeSH descriptor: [Surgical Wound Infection] explode all trees	4606
#5	(“surgical site infection” OR “surgical site infections” OR “surgical wound infection” OR “surgical wound infections”):ti	1167
#6	#4 OR #5	5130

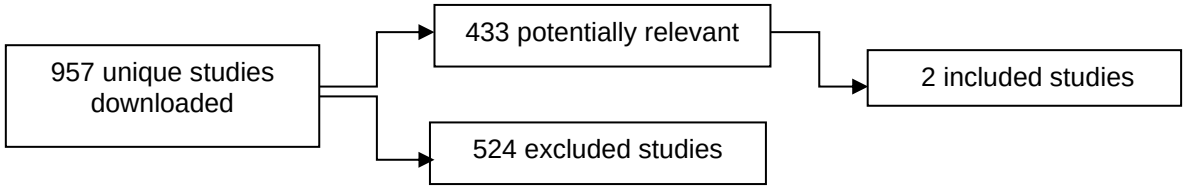
#7	MeSH descriptor: [Surgical Wound] explode all trees	572
#8	(“surgical wound” OR “surgical site”):ti	1519
#9	#7 OR #8	2025
#10	MeSH descriptor: [Infections] explode all trees	108798
#11	(“infection” OR “infections”):ti	29539
#12	#10 OR #11	122604
#13	#9 AND #12	1367
#14	#6 OR #13	5177
#15	#3 AND #14 with Cochrane Library publication date from Jan 2019 to present, in Cochrane Reviews	18



Search process

Developed search in PubMed and translated for other health databases. Exported results to EndNote Library. Removed duplicates using the SR Accelerator Deduplicator tool - https://sr-accelerator.com/#/deduplicator. Imported deduplicated results into new EndNote Library for identifying potentially relevant results. For potentially relevant results, copied formatted references in an annotated style into Word document for CAT Group to select studies for critical appraisal.

Results



2 included papers:

- Wolfhagen, N., et al. (2022). "Perioperative care bundles for the prevention of surgical-site infections: Meta-analysis." Br J Surg 109(10): 933-942.

- Liu, Z., Dumville, J. C., Norman, G., Westby, M. J., Blazeby, J., McFarlane, E., Welton, N. J., O'Connor, L., Cawthorne, J., George, R. P., Crosbie, E. J., Rithalia, A. D., & Cheng, H. Y. (2018). Intraoperative interventions for preventing surgical site infection: An overview of Cochrane Reviews. The Cochrane Database of Systematic Reviews, 2(2), CD012653. https://doi.org/10.1002/14651858.CD012653.pub2

First Author, year and type of study	Population and setting	Intervention or exposure tested	Assessment of quality
Wolfhagen, 2022 A systematic review, reanalysis, and meta-analysis (Included 4 RCTs, 1 controlled before–after study, and 13 interrupted time series studies (ITS))	surgical patients of all ages	care bundles, with at least one intraoperative intervention, compared with standard care	Robust research methodology - followed PRISMA statement for systematic review and meta-analysis. Overall GRADE rating of high quality. A systematic review and reanalysis was performed according to the Cochrane Effective Practice and Organization of Care (EPOC) guidelines[21], with the aim of evaluating the effects of implementation of a care bundle on the incidence of SSI among patients undergoing any type of surgery. This relatively recent systematic review and meta-analysis provides high-quality synthesis of evidence regarding the effectiveness of perioperative care bundles in preventing SSIs. The authors investigated the intervention components, identifying the total number of interventions in one bundle ranged from 3 to 17. The most common were surgical site preparation, timing and selection of antibiotic prophylaxis, hair removals with clippers, use of a separate closing tray.
Liu, 2018 Overview of Cochrane Reviews (Included 30 reviews with 349 included trials, totalling 73,053 participants)	all populations undergoing surgery in an operating theatre	interventions for preventing surgical site infection (included gloving, use of disposable face masks, patient oxygenation protocols, use of skin antiseptics for hand washing and patient skin preparation, vaginal preparation, microbial sealants, methods of surgical	Robust research following Cochrane methodology – included highest level of evidence (Cochrane Reviews), assessment of Risk of bias (ROBIS) and certainty assessment (GRADE)). Overall GRADE level of high quality. Includes GRADE assessment - Overall, the GRADE certainty of evidence for outcomes was low or very low. (There was high or moderate certainty evidence regarding interventions involving prophylactic antibiotics, adhesive drapes, and duration of antibiotics.) GRADE certainty of evidence – low overall. Out of 77 comparisons, 7 high/moderate certainty. 39 low, 31 very low.

		incision, antibiotic prophylaxis and methods of skin closure)	Limitation – published in 2018, doesn't include more recent reviews.

Key Findings

A care bundle is defined as a group of three to five evidence-based interventions that are delivered together. A summary of the findings are presented below with results presented as risk ratio (RR) and 95% Confidence Interval (CI):

Liu et al. investigated individual components to a care bundle by conducting a meta-synthesis through an overview of Cochrane Reviews:
1.Prophylactic intravenous antibiotics administered before caesarean incision reduce SSI risk compared with administration after cord clamping
- 10 trials, 5041 participants; RR 0.59, 95% CI 0.44 to 0.81
2. Preoperative antibiotics reduce SSI risk compared with placebo after breast cancer surgery.
- 6 trials, 1708 participants; RR 0.74, 95% CI 0.56 to 0.98
3. Antibiotic prophylaxis probably reduce SSI risk in caesarean sections compared with no antibiotics.
- 82 relevant trials, 14,407 participants; RR 0.40, 95% CI 0.35 to 0.46
4. Antibiotic prophylaxis probably reduces SSI risk for hernia repair compared with placebo or no treatment
- 17 trials, 7843 participants; RR 0.67, 95% CI 0.54 to 0.84

5. There was no clear difference in the risk of SSI between iodine-impregnated adhesive drapes compared with no adhesive drapes
- 2 trials, 1113 participants; RR 1.03, 95% CI 0.66 to 1.60
6. Use of adhesive drapes was associated with an increase in SSI risk compared to no drapes.
- 5 trials, 3082 participants, RR 1.23, 95% CI 1.02 to 1.48

7. There was no clear difference in SSI risk between short-term compared with long-term duration antibiotics in colorectal surgery
- 7 trials; 1484 participants; RR 1.05 95% CI 0.78 to 1.40
8. No clear difference in SSI risk with strict (with insulin infusion) vs conventional glycaemic control – 2 trials, RR 0.48 - 0.86, 95% CI 0.04 to 5.03

9. Increased global blood flow prevents SSIs compared to no intervention. - 5 trials, RR 0.40, 95% CI 0.19 to 0.82

Authors concluded: As there remains uncertainty on the use of a number of prophylactic SSI prevention options, health professionals are likely to follow local and national guidelines until more information becomes available.

Wolfhagen et al. conducted a systematic review with meta-analysis with pooled data to investigate the level of change which indicated a reduction in SSIs. They presented their findings as the full bundle with results presented as the standardized level of change as studies were observational cohort studies:

1. Pre-op MRSA screening and decolonisation and supervised CHG showering; intra-op glucose monitoring; post-op patient education -4.00(-7.9,-0.10)
2. Pre-op CHG cloths, CHG show, patient education; intra-op SAP redosing, CHG Skin prep; post-op hand hygiene measures (signage, cleansing agent, hand wipes for patients), dressing removal within 48hrs, pt education, follow up phone calls -0.692(-1.69, 0.31)
3. Pre-op patient education, CHG shower, CHG surgical site prep; intra-op SAP, CHG skin prep, vaginal iodine, hair removal with clippers, double gloves, closing tray, glove change; post-op euglycaemia for diabetic patients, dressing removal, patient education, follow up phone call. -1.57 (-3.29, 0.16)
4. Intra-op CHG skin prep, wound protetor, SAP redosing, triclosan-coated suture -1.25 (-3.18, 0.69)

5. Intra-op SAP, Hair removal with clippers; post-op euglycemia for cardiac patients, urinary catheter POD 1; peri-op normothermia, beta-blocker for those on treatment, VTE prohylaxis. 0.08 (-1.35, 1.50)
6. Peri-op MRSA screening and decoloniation; intra-op CHG skin prep, cefazolin for CP bypass. -0.43 (-1.25, 0.40)
7. Peri-op patient education, CHG shower, CHG cloths; intra-op Preoperative: patient education, CHG cloths; Intra-op SAP following SCIP, SAP redosing, CHG skin preparation, closing tray, glove change; post-op good hand hygiene, hand-cleansing agent available, dressing removal POD2, CHG shower after dressing removal, patient education, discharge with CHG, follow-up telephone call. −0.24 (−1.20, 0.73)
8. Pre-op patient education, smoking cessation, CHG cloths, MBP and oral non-absorbable antibiotics, diabetic screening (HbA1c), hair removal with clippers; intra-op SAP following SCIP, weight-based SAP, SAP redosing, CHG skin preparation, double gloves, wound irrigation; post-op silver dressings POD 5; peri-op normothermia, peri-op blood glucose control, supplementary oxygen (FiO2, 80%) until 4 h after surgery. −0.85 (−1.83, 0.14)
9. Intra-op glove change, redrape, surgical field, closing tray. −1.25 (−3.01, 0.60)
10. Pre-op hair removal with clippers; Intra-op SAP timing, CHG skin preparation, normothermia†, local bupivacaine anaesthesia; post-op ambulate evening of surgery, regular diet, removal urinary catheters POD 1, minimal narcotic regimen; peri-op glucose control, supplementary oxygen (intraoperative FiO2 100%, 6 h postoperative FiO2 80%). −0.11 (−2.28, 2.06)
11. Pre-op hair removal with clippers; intra-op SAP timing, CHG skin preparation. −1.64 (−1.25, −0.04)
12. Pre-op screening HbA1c and consultation if raised, MBP and oral non-absorbable antibiotics, CHG shower, preoperative risk assessment using MSK SSI prediction tool; Intra-op SAP following SCIP, SAP redosing, hair removal with clippers, closing tray, normothermia (measured in postoperative unit only), Post-op shower POD 2. −4.79 (−6.90, −2.68)
13. Pre-op SAP with additional vancomycin; Intra-op wound irrigation; Peri-op nasal mupirocin and CHG body decontamination (5 days). −3.93 (−6.79, −1.08)

Of the 13 studies, 12 reported a significant decrease in SSI incidence after bundle implementation, and 1 reported an increase in SSI incidence. After reanalysis, only 4 of the 12 studies still showed a statistically significant level change after bundle implementation, indicating a direct effect of the care bundle. Meta-analysis of the ITS demonstrated a pooled effect estimate of the level change of −1.16 (95 per cent CI 1.78 to −0.53) indicating a significant decrease in SSI incidence after bundle implementation.

Authors concluded: The present study suggests that bundles comprising a higher proportion of evidence-based interventions may be more beneficial for patients. Furthermore, there was no evidence of a larger effect from bundles consisting of a larger number of interventions. The IHI[8] recommends the use of small evidence-based bundles, as smaller bundles are easier to implement. Future care bundles should focus on evidence-based interventions and research on these bundles should include measurement of compliance. Existing care bundles may be revised to exclude non-evidence-based interventions, and more attention should be given to adequate implementation of the evidence-based components of the bundle.

Summary

Based on current research evidence available, specific prophylactic antibiotic interventions are useful, for example, there is strong evidence that administering antibiotics before surgery reduces SSI risk

after breast cancer surgery (high-certainty evidence) and antibiotics used to prevent wound infections probably reduces SSI risk for hernia repair.

The research suggests that bundles that include a higher proportion of evidence-based interventions may be more effective, with smaller bundles easier to implement and maintained.

Implications for practice/research

The implementation of a care bundle in STARS should be considered to reduce the number of SSIs. The bundle will need to consist of only evidence-based components and a limited number of elements. The research suggests that in some conditions there is a likely benefit for using pre-surgical antibiotics, so we would suggest this is one of the components of the bundle. We recommend that clinical guidelines specific to different surgery procedures are followed to choose the other components. The literature indicates that the use of any care bundle has benefit. It does not appear that there is a risk of harm if there is no care bundle implemented.

A service evaluation of current practices would inform further trials and/or implementation studies. Future work should measure patient and staff engagement.

What would you tweet? (140 characters)

Despite significant heterogeneity, there is high-level evidence that demonstrates that care bundles used as an intervention to reduce SSIs are effective when compared to usual care.

Critical Appraisal Topic Group Team Members

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References

1. Lavallee, F.F., et al. (2017). The effects of care bundles on patient outcomes: A systematic review and meta-analysis. Implementation Science 12 (142), 1-13.
2. Cox, J., et al. (2023). "The Role of Patient Engagement in Surgical Site Infection Reduction: A Process Improvement Project." Advances in Skin & Wound Care 36(11): 599-603.
3. Groenen, H., et al. (2024). "Incisional Wound Irrigation for the Prevention of Surgical Site Infection: A Systematic Review and Network Meta-Analysis." JAMA Surg 159(7): 792-800.
4. Hatharaliyadda, B., et al. (2024). "Surgical Site Infection Prevention Using “Strike Teams”: The Experience of an Academic Colorectal Surgical Department." Journal for Healthcare Quality: Promoting Excellence in Healthcare 46(1): 22-30.

5. Liu, Z. et al. (2024). Intraoperative interventions for preventing surgical site infection: an overview of Cochrane Reviews. Cochrane Database of Systematic Reviews 2018, Issue 2. Art. No.: CD012653. DOI: 10.1002/14651858.CD012653.pub2. Accessed 11 September 2024.
6. Wolfhagen, N., et al. (2022). Perioperative care bundles for the prevention of surgical-site infections: meta-analysis, British Journal of Surgery 109(10), Pages 933–942.
7. Ribero, L., et al. (2024). "Surgical site infection prevention bundle in gynecology oncology surgery: a key element in the implementation of an enhanced recovery after surgery (ERAS) program." International journal of gynecological cancer: official journal of the International Gynecological Cancer Society.

Appendix: Additional key papers selected by CAT Group:

Reference	Study type	Aspects investigated
Codner, J. A., et al. (2023). "A Self-Sustaining Antibiotic Prophylaxis Program to Reduce Surgical Site Infections." Surgical Infections 24(8): 716-724.	quality improvement implementation	perioperatively surgical antibiotic prophylaxis compliance with antibiotic administration protocols
Cox, J., et al. (2023). "The Role of Patient Engagement in Surgical Site Infection Reduction: A Process Improvement Project." Advances in Skin & Wound Care 36(11): 599-603.	process improvement project used a preintervention/postintervention design	postoperatively inpatients undergoing colorectal, plastic, or general surgery patient engagement patient education discharge plan
Groenen, H., et al. (2024). "Incisional Wound Irrigation for the Prevention of Surgical Site Infection: A Systematic Review and Network Meta-Analysis." JAMA Surg 159(7): 792-800.	systematic review and network meta-analysis (included RCTs comparing incisional prophylactic intraoperative incisional wound irrigation with no irrigation or comparing irrigation using different types of solutions, with SSI as a reported outcome)	intraoperatively incisional wound irrigation all types of surgery
Hatharaliyadda, B., et al. (2024). "Surgical Site Infection Prevention Using “Strike Teams”: The Experience of an Academic Colorectal Surgical Department." Journal for Healthcare Quality: Promoting Excellence in Healthcare 46(1): 22-30.	quality improvement implementation	perioperatively colorectal surgery bundle adherence multidisciplinary
Ribero, L., et al. (2024). "Surgical site infection prevention bundle in gynecology oncology surgery: a key element in the implementation of an enhanced recovery after surgery (ERAS) program." International Journal of Gynecological Cancer: Official Journal of the International Gynecological Cancer Society.	literature review	perioperatively gynaecology oncology surgery bundle Enhanced Recovery After Surgery (ERAS)

Guidelines – current guidelines for prevention of SSIs include:

- **National Institute for Health and Care Excellence (NICE) (published 2019, updated 2020) - Surgical Site Infections: Prevention and Treatment** https://www.nice.org.uk/guidance/ng125

- **World Health Organization (2018) - Global Guidelines for the Prevention of Surgical Site Infection**
- **CDC (2017) - Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017**
- **Asia Pacific Society of Infection Control (APSIC) –2018 APSIC guidelines for the prevention of surgical site infections**
- **SHEA/IDSA/APIC Practice Recommendation (expert guidance document) - Strategies to prevent surgical site infections in acute-care hospitals: 2022 Update**
- **Australian Guidelines for the Prevention and Control of Infection in Healthcare**