

AORN Guideline for Preoperative Patient Skin Antisepsis
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
1	Dumville J.C., McFarlane E., Edwards P., Lipp A., Holmes A. and Liu, Z. Preoperative skin antiseptics for preventing surgical wound infections after clean surgery. 2015	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Alcohol-containing products had the highest probability of being effective, but quality of evidence was low.	IA
2	Webster J., Osborne, S. Preoperative bathing or showering with skin antiseptics to prevent surgical site infection. 2015	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Cochrane review of seven RCTs conducted between 1987 and 2009 concluded that CHG bathing prior to surgery is not associated with significant reduction in SSIs	IA
3	World Health Organization (WHO). Global Guidelines for the Prevention of Surgical Site Infection 2016	Guideline	n/a	n/a	n/a	n/a	A comprehensive range of evidence-based recommendations for pre-, intra- and postoperative periods for prevention of SSI.	IVB
4	National Institute for Health and Care Excellence (NICE). Surgical site infections: prevention and treatment 2019	Guideline	n/a	n/a	n/a	n/a	Recommendations on method to be used before, during, and after surgery to minimize risk of infection.	IVA
5	Lefebvre, A., Saliou, P., Lucet JC et al. Preoperative hair removal and surgical site infections: Network meta-analysis of randomized controlled trials. <i>Journal of Hospital Infections</i> 2015 91 (2), 100-108.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Significantly fewer SSIs with clipping, chemical depilation, or no depilation. No benefit of depilation to prevent SSI, and higher risk of SSI when shaving is used for depilation.	IA
6	Guideline for sterile technique. In: <i>Guidelines for Perioperative Practice</i> . Denver, CO: AORN, Inc; 2020: 917-958.	Guideline	n/a	n/a	n/a	n/a	Guidance for sterile technique.	IVA
7	SHEA/IDSA Practice Recommendation. Compendium of Strategies to Prevent Healthcare-Associated Infections in Acute Care Hospitals: 2014 Update	Consensus	n/a	n/a	n/a	n/a	Comprehensive recommendations for implementing surgical site infection prevention efforts.	IVA
8	Siegal, JD, Rhinehart E, Jacksons, M & Chiarello, L. Management of Multidrug-resistant organisms in healthcare settings, 2006. Last updated February 15, 2017	Guideline	n/a	n/a	n/a	n/a	Provides guidance for management of MRSA, VRE, and other MDROs in health care organizations in the United States.	IVA
9	Bratzler, D. W., Dellinger, E. P., Olsen, K. M., et al. Clinical practice guidelines for antimicrobial prophylaxis in surgery 2013	Guideline	n/a	n/a	n/a	n/a	American Society of Health-System Pharmacist recommendations for antimicrobial prophylaxis in surgical patients.	IVA
10	Edmiston, C. E., Jr, Ledebore, N. A., Buchan, B. W., Spencer, M., Seabrook, G. R. and Leaper, D. Is Staphylococcal Screening and Suppression an Effective Interventional Strategy for Reduction of Surgical Site Infection? 2016	Literature Review	n/a	n/a	n/a	n/a	The relative risk for MRSA or MSSA SSIs should be basis for active universal or targeted surveillance.	VA
11	Ban, Kristen A., Minei, Joseph P., Laronga, Christine, et al. Executive Summary of the American College of Surgeons/Surgical Infection Society Surgical Site Infection Guidelines-2016 Update. 2017	Guideline	n/a	n/a	n/a	n/a	Summary of literature supporting preoperative, intraoperative and postoperative SSI guidelines.	IVB

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12	Septimus, E. J., Schweizer, M. L. Decolonization in Prevention of Health Care-Associated Infections 2016	Literature Review	n/a	n/a	n/a	n/a	Strongest evidence for decolonization is for use in surgical patients to prevent SSIs. Mupirocin for nasal decolonization remains gold standard, but there are concerns about resistance. CHG for skin decolonization has strongest evidence, but due to widespread use monitoring for resistance should occur.	VA
13	Anderson, M. J., David, M. L., Scholz, M., et al. Efficacy of skin and nasal povidone-iodine preparation against mupirocin-resistant methicillin-resistant Staphylococcus aureus and S. aureus within the anterior nares 2015	Quasi-experimental	Healthy volunteers, research laboratory, United States	Two applications of povidone-iodine solution	Two applications of saline	Reduction of resident <i>S. aureus</i>	Povidone-iodine skin and nasal antiseptic may be an alternative for reducing anterior nares bioburden prior to surgery.	IIB
14	Moroski, N. M., Woolwine, S. and Schwarzkopf, R. Is preoperative staphylococcal decolonization efficient in total joint arthroplasty 2015	Nonexperimental	Patients undergoing primary or revision total joint arthroplasty, university hospital, United States	Screened for <i>S. aureus</i> carriage and treated if positive with 5 day course of intranasal mupirocin twice per day	None	MRSA or MSSA positivity on day of surgery	Significant reduction of MRSA and MSSA colonization was noted with mupirocin.	IIB
15	Rezapoor, M., Nicholson, T., Tabatabaee, R. M., Chen, A. F., Maltenfort, M. G. and Parvizi, J. Povidone-iodine-Based Solutions for Decolonization of Nasal Staphylococcus aureus: A Randomized, Prospective, Placebo-Controlled Study 2017	RCT	Patients undergoing primary or revision total joint arthroplasty (hip, knee, shoulder), femoroacetabular osteoplasty or pelvic osteotomy university hospital, United States	Nasal decolonization with specifically manufactured 5% povidone-iodine-based skin and nasal antiseptic (SNA)	Nasal decolonization with off-the-shelf 10% povidone-iodine (PI) or saline	Nasal culture for <i>Staphylococcus aureus</i> at 4 hours (right nares) and 24 hours (left nares)	SNA was significantly more effective at decolonizing <i>S. aureus</i> over a 4 hour interval. However no significant difference was seen in any group at 24 hours.	IB
16	Schweizer, M., Perencevich, E., McDanel, J., et al. Effectiveness of bundled intervention of decolonization and prophylaxis to decrease gram positive surgical site infection after cardiac or orthopedic surgery. BMJ 2013;346	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Seventeen studies found that in patients undergoing cardiac operations and total joint replacement, nasal decolonization was associated with a significantly lower risk of <i>S. aureus</i> SSIs when all patients underwent decolonization, as well as when only <i>S. aureus</i> carriers underwent decolonization.	IIA
17	Ma, N., Cameron, A., Tivey, D., Grae, N., Roberts, S. and Morris, A. Systematic review of a patient care bundle in reducing staphylococcal infections in cardiac and orthopaedic surgery 2017	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Major cardiac and orthopedic surgeries can reduce SSIs by 50% with use of preoperative care bundles.	IIA

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18	Bode, LG, Kluytmans JA, Wertheim HF, et al. Preventing surgical-site infections in nasal carriers of <i>Staphylococcus aureus</i> . <i>N Engl J Med</i> . 2010;362:9-17.	RCT	Patients undergoing car	Mupirocin ointment bid and daily bathing with CHG soap for 5 days	Placebo ointment and soap	Hospital-acquired <i>S aureus</i> infection	Patients undergoing the decolonization protocol had significantly lower incidence of hospital-acquired <i>S aureus</i> infection compared to placebo group (3.4% to 7.7%). Decolonization had greatest effect on deep SSI reduction.	IA
19	George, S., Leasure, A. R. and Horstmanshof, D. Effectiveness of Decolonization With Chlorhexidine and Mupirocin in Reducing Surgical Site Infections: A Systematic Review 2016	Systematic Review	n/a	n/a	n/a	n/a	In patients colonized with <i>S aureus</i> , the combination of CHG and mupirocin can contribute to SSI reduction. Additional RCTs are needed on the benefit of universal decolonization.	IIA
20	Bode, L. G., van Rijen, M. M., Wertheim, H. F., et al. Long-term Mortality After Rapid Screening and Decolonization of <i>Staphylococcus Aureus</i> Carriers: Observational Follow-up Study of a Randomized, Placebo-controlled Trial 2016	Nonexperimental	Follow-up of 2010 RCT of patients undergoing cardiothoracic, orthopedic and vascular procedures, university hospital, The Netherlands	n/a	n/a	One and three year mortality rates	Detection and decolonization of <i>S. aureus</i> carriage reduced 1-year mortality rate of patients.	IIIA
21	Liu, Z., Norman, G., Iheozor-Ejiofor, Z., Wong, J. K., Crosbie, E. J. and Wilson, P. Nasal decontamination for the prevention of surgical site infection in <i>Staphylococcus aureus</i> carriers 2017	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	There is limited rigorous RCT evidence to evaluate the clinical effectiveness of nasal decontamination in SSI prevention. Therefore the potential benefit and harms of using decolonization for prevention of SSI remains uncertain.	IA
22	Ramos, N., Stachel, A., Phillips, M., Vigdorichik, J., Slover, J. and Bosco, J. A. Prior <i>Staphylococcus Aureus</i> Nasal Colonization: A Risk Factor for Surgical Site Infections Following Decolonization 2016	Nonexperimental	Patients undergoing total hip or knee arthroplasty or spinal fusion, medical center, United States	Nasal PI day of surgery or nasal mupirocin bid for 5 days; CHG wipes night before surgery	No treatment	Surgical site infection (SSI) rates	Decolonization may not provide full protection against infection, as infection risk was not lowered to noncolonized patient baseline. SSI rate for colonized group was 4.35% and noncolonized group was 2.39%.	IIIA
23	Kohler, P., Sommerstein, R., Schonrath, F., et al. Effect of perioperative mupirocin and antiseptic body wash on infection rate and causative pathogens in patients undergoing cardiac surgery 2015	Quasi-experimental	Patients undergoing cardiac procedures with sternotomy, tertiary hospital, Switzerland	Mupirocin bid and daily bathing with CHG soap for 5 days	No screening or decolonization	Overall SSI incidence; type of SSIs	Significant decrease in superficial incisional SSIs, but not in deep or organ space SSIs. Postoperative treatment may be critical to superficial SSI reduction.	IIA
24	Reiser, M., Scherag, A., Forstner, C., et al. Effect of pre-operative octenidine nasal ointment and showering on surgical site infections in patients undergoing cardiac surgery 2017	Quasi-experimental	Patients undergoing elective coronary artery bypass graft (CABG), university hospital, Germany	Octenidine (OCT) nasal ointment t.i.d. before surgery and shower with OCT soap night before and day of surgery	No treatment	Surgical site infection at sternal site and harvest site	Preoperative decolonization with OCT did not reduce overall SSI rates, but did significantly reduce harvest site and organ space sternal SSIs.	IIA

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25	Saraswat, M. K., Magruder, J. T., Crawford, T. C., et al. Preoperative Staphylococcus Aureus Screening and Targeted Decolonization in Cardiac Surgery 2017	Quasi-experimental	Patients undergoing cardiac surgery, university hospital, United States	Colonized patients applied nasal mupirocin b.i.d. and daily CHG baths for 5 days	No screening or decolonization	Postoperative methicillin resistant <i>S aureus</i> (MRSA) colonization, intensive care unit MRSA transmission, and surgical site infections (SSI)	Screening with targeted decolonization led to reduced MRSA colonization, transmission, and SSIs. Decolonization length correlated with decreased postoperative MRSA colonization.	IIA
26	Schweizer, M. L., Chiang, H. Y., Septimus, E., et al. Association of a bundled intervention with surgical site infections among patients undergoing cardiac, hip, or knee surgery 2015	Quasi-experimental	Patients undergoing elective and emergent cardiac surgery, THA and TKA, 20 hospitals, United States	Colonized patients applied nasal mupirocin b.i.d. and daily CHG baths for 5 days	No screening or decolonization	<i>S aureus</i> deep incisional or organ space SSIs	A significant decrease in complex SSIs occurred with <i>S aureus</i> screening, decolonization, and targeted antibiotic prophylaxis.	IIA
27	Mullen, A., Wieland, H. J., Wieser, E. S., Spannhake, E. W. and Marinos, R. S. Perioperative participation of orthopedic patients and surgical staff in a nasal decolonization intervention to reduce Staphylococcus spp surgical site infections 2017	Quasi-experimental	Patients undergoing spine surgery, orthopedic and spine hospital, United States	Nurse-administered alcohol-based nasal antiseptic preoperatively and postoperatively, CHG bath and CHG wipe.	Patient-administered nasal mupirocin preoperatively, CHG bath and CHG wipe	Surgical site infection rate; treatment adherence	Significant decrease in SSI (1.76 to 0.33). Ninety-five percent compliance with patient nasal decolonization.	IIB
28	Romero-Palacios, Alberto, Petruccelli, Danielle, Main, Cheryl, Winemaker, Mitch, de Beer, Justin and Mertz, Dominik. Screening for and decolonization of Staphylococcus aureus carriers before total joint replacement is associated with lower S aureus prosthetic joint infection rates 2019	Quasi-experimental	Patients undergoing primary or revision hip and knee total joint replacement, academic orthopedic hospital, Canada	Nasal and throat screening for <i>S aureus</i> and decolonization of carriers for 5 days.	No screening or decolonization	Deep and organ space prosthetic joint infection (PJI) within 1 year of procedure	Significant reduction in PJI due to <i>S aureus</i> with active screening and decolonization, however there was no change in overall PJI.	IIB
29	Sporer, S. M., Rogers, T. and Abella, L. Methicillin-Resistant and Methicillin-Sensitive Staphylococcus aureus Screening and Decolonization to Reduce Surgical Site Infection in Elective Total Joint Arthroplasty 2016	Quasi-experimental	Patients undergoing elective total joint arthroplasty (TJA), medical center, United States	Colonized patients applied nasal mupirocin b.i.d. and daily CHG baths for 5 days	No screening or decolonization	SSI incidence; MRSA and/or MSSA SSI incidence	MRSA and MSSA nares screening, along with decolonization protocol decreased SSI rate by 69%.	IIA
30	Tsang, S. T. J., McHugh, M. P., Guerendiain, D., et al. Evaluation of Staphylococcus aureus eradication therapy in orthopaedic surgery. 2018	Quasi-experimental	Patients undergoing joint replacement surgery, university hospital, United Kingdom	Decolonization treatment for positive <i>S aureus</i>	No treatment if negative	<i>S aureus</i> clearance 48 to 96 hours after decolonization and at discharge	Decolonization well tolerated and reduced preoperative MSSA decolonization of nares and groin, which was maintained for at least 10 days from treatment.	IIA
31	Langenberg, J. C., Thomas, A. R., Donker, J. M., van Rijen, M. M., Kluytmans, J. A. and van der Laan, L. Evaluation of Staphylococcus aureus eradication therapy in vascular surgery 2016	Quasi-experimental	Patients undergoing vascular surgery, hospital, The Netherlands	Screened for <i>S aureus</i> carriage and treated if positive	Screened for <i>S aureus</i> carriage, but no treatment	Incidence of <i>S aureus</i> surgical site infection	<i>S aureus</i> treatment reduces infection pressure of <i>S aureus</i> , resulting in reduction of SSIs caused by <i>S aureus</i> .	IIB
32	Agarwala, S., Lad, D., Agashe, V. and Sobti, A. Prevalence of MRSA colonization in an adult urban Indian population undergoing orthopaedic surgery 2016	Nonexperimental	Patients admitted for orthopaedic surgery, university hospital, India	Screen and if positive treat with mupirocin to nose, axillae and groin tid for 3 days	None	Positivity for MRSA; SSI with MRSA	Routine screening and treatment for colonization reduces MRSA SSI incidence.	IIIA

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33	Thakkar, V., Ghobrial, G. M., Maulucci, C. M., et al. Nasal MRSA colonization: impact on surgical site infection following spine surgery 2014	Nonexperimental	Patients undergoing spinal surgery who were screened for nasal MRSA with 30 days of surgery, university hospital, United States	n/a	n/a	SSI incidence; wound culture growth	Spinal SSI with MRSA had a strong correlation with preoperative nasal MRSA isolation.	IIIB
34	Baratz, M. D., Hallmark, R., Odum, S. M. and Springer, B. D. Twenty Percent of Patients May Remain Colonized With Methicillin-resistant Staphylococcus aureus Despite a Decolonization Protocol in Patients Undergoing Elective Total Joint Arthroplasty 2015	Quasi-experimental	Patients undergoing elective primary and revision hip and knee arthroplasty, orthopedic hospital, United States	PCR screen for MRSA/MSSA; if positive: nasal 2% mupirocin and 4% CHG for 5 days	No screening or decolonization	Carrier status after decolonization; Incidence of surgical site infection (SSI)	Despite intervention, 22% of patients remained colonized with MRSA. No decrease in proportion of patients developing an SSI between the two groups, but there was slight decrease in <i>S. aureus</i> as infecting organism.	IIA
35	Herwaldt, LA, Cull JJ, French P, et al. Preoperative risk factors for nasal carriage of Staphylococcus aureus. Infect Control Hops Epidemiol. 2004 Jun; 24(6);481-484.	Nonexperimental	Patients undergoing general, cardiothoracic, and neurologic procedures, two medical centers, United States	n/a	n/a	Risk factors associated with persistent <i>S aureus</i> nasal carriage	Male gender, obesity, and history of cerebrovascular accidents were associated with <i>S aureus</i> carriage for all surgery types.	IIIA
36	Campbell, K. A., Cunningham, C., Hasan, S., Hutzler, L. and Bosco, J. A.,3rd. Risk Factors for Developing Staphylococcus aureus Nasal Colonization in Spine and Arthroplasty Surgery 2015	Nonexperimental	Patients undergoing elective spinal fusion and total joint procedures, university hospital, United States	n/a	n/a	Patient demographics, body mass index, presence of asthma, COPD or diabetes, tobacco use, ASA score, renal disease, HIV status, and immunosuppressive medication use.	Obesity and asthma are significant risk factors for MRSA colonization.	IIIA
37	Botelho-Nevers, E., Berthelot, P., Verhoeven, P. O., et al. Are the risk factors associated with Staphylococcus aureus nasal carriage in patients the same than in healthy volunteers? Data from a cohort of patients scheduled for orthopedic material implantation 2014	Nonexperimental	Patients undergoing scheduled orthopedic implant material,	n/a	n/a	Risk factors associated with persistent <i>S</i>	Obesity (BMI> 30) was risk factor for persistent carriage and patients with this risk factor undergoing orthopedic surgery	IIIB
38	Centers for Disease Control and Prevention. Strategies to prevent hospital-onset <i>Staphylococcus aureus</i> bloodstream infections in acute care facilities. https://www.cdc.gov/hai/prevent/staph-prevention-strategies.html#	Consensus	n/a	n/a	n/a		Guidance on prevention of blood stream infections which includes practices for SSI prevention in high risk surgery.	IVB
39	Urias, DS, Varghese M, Simunich T, Morrissey S, Dumire, R. Preoperative decolonization to reduce infections in urgent lower extremity repairs. <i>European Journal of Trauma and Emergency Surgery</i> . 2018:1-7. doi:10.1007/s00068-017-0896-1.	Nonexperimental	Patients undergoing traumatic lower extremity fracture repairs, hospital, United States	n/a	n/a	SSI	Significant decrease in SSIs with introduction of universal MRSA decolonization protocol that included CHG bathing and nasal PI.	IIIB
40	Lemaigen, A., Armand-Lefevre, L., Birgand, G., et al. Thirteen-year experience with universal Staphylococcus aureus nasal decolonization prior to cardiac surgery: a quasi-experimental study. 2018	Quasi-experimental	Patients undergoing cardiac surgical procedure, university hospital, France	Universal decolonization (UD) with mupirocin x 3 days and shower night before with PI	No screening or decolonization	Incidence of <i>S aureus</i> - associated sternal wound infection (SWI)	Universal nasal decolonization significantly decreased incidence of SWI caused by <i>S aureus</i> .	IIA

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41	Phillips, M., Rosenberg, A., Shopsin, B., et al. Preventing surgical site infections: a randomized, open-label trial of nasal mupirocin ointment and nasal povidone-iodine solution 2014	RCT	Patients undergoing arthroplasty or spinal fusion, university hospital, United States	Two applications of povidone-iodine solution in each nostril within two hours of surgery	Twice daily nasal application of 2% mupirocin ointment for 5 days prior to surgery	Deep incisional SSI within 3 months of surgery; <i>S. aureus</i> as causative agent	Nasal povidone-iodine may be considered as an alternative to mupirocin in multifaceted approach to reduce SSIs.	IA
42	Hetem DJ, Vogely CH, Severs TT, Troelstra A, Kusters JC, Bonten, MJM. Acquisition of high-level mupirocin resistance in CoNS following nasal decolonization with mupirocin. <i>J Antimicrob Chemother.</i> 2015;70(4):1182-1184.	Quasi-experimental	Patients undergoing orthopedic, cardiothoracic, and neurosurgical procedures, tertiary teaching hospital, The Netherlands	Mupirocin bid and da	No decolonization protocol	Mupirocin-resistance (MupR) in CoNS and <i>S aureus</i> .	Implementation of universal decolonization strategy led to widespread mupirocin resistance in coagulase-negative <i>Staphylococcus</i> (CoNS), but no resistance in <i>S aureus</i> .	IIA
43	Stambough, J. B., Nam, D., Warren, D. K., et al. Decreased Hospital Costs and Surgical Site Infection Incidence With a Universal Decolonization Protocol in Primary Total Joint Arthroplasty 2017	Quasi-experimental	Patients undergoing elective total joint arthroplasty (TJA), medical center, United States	Universal decolonization protocol without screening	Targeted screening with decolonization protocol if positive	Incidence of SSIs within 90 days; cost effectiveness	A significant decrease in overall SSI rate and SSIs caused by <i>S aureus</i> organisms was found with universal decolonization and promoted economic gains due to limitation of future reoperation and hospitalization.	IIA
44	Torres, E. G., Lindmair-Snell, J. M., Langan, J. W. and Burnikel, B. G. Is Preoperative Nasal Povidone-Iodine as Efficient and Cost-Effective as Standard Methicillin-Resistant <i>Staphylococcus aureus</i> Screening Protocol in Total Joint Arthroplasty? 2016	Nonexperimental	Patients undergoing primary or revision TKA or THA, hospital, United States	No screening. All patients received 5% PI nasal antiseptic before surgery, daily CHG baths for 5 days, and CHG wipe to operative leg day of surgery	Screened for MRSA, if positive, 2% mupirocin intranasally twice daily and daily CHG baths for 5 days	SSI within 3 months of surgery; cost	A significant cost savings with no difference in SSI rates, suggesting nasal PI has both financial and clinical benefits.	IIIA
45	Loftus, RW, Dexter F, Goodheart M J, et al. The effect of improving basic preventive measures in the perioperative arena on <i>Staphylococcus aureus</i> transmission and surgical site infections: A randomized clinical trial. <i>JAMA Netw Open.</i> 2020;3(3):e201934.	RCT	Patients undergoing plastic, orthopedic, general abdominal procedures, academic hospital, United States	Enhanced hand hygiene, vascular care, environmental cleaning, and patient decolonization (N = 106)	Basic hand hygiene, vascular care, environmental cleaning and patient decolonization (N=130)	<i>S aureus</i> transmission; SSIs	Enhanced bundle significantly reduced number of transmitted <i>S aureus</i> isolates and SSIs.	IA
46	Hong, J. C., Saraswat, M. K., Ellison, T. A., et al. <i>Staphylococcus Aureus</i> Prevention Strategies in Cardiac Surgery: A Cost-Effectiveness Analysis 2017	Quasi-experimental	Patients undergoing coronary artery bypass graft (CABG) surgery for one year, United States	Universal decolonization (UD)	Targeted decolonization (TD); No decolonization (ND)	Cost; quality adjusted life years (QALYs); SSI probability	UD resulted in reduced costs and more QALYs compared TD and ND and prevented 19 SSIs in 1,000 patients.	IIA
47	del Diego Salas, J., Orly de Labry Lima, A., Espin Balbino, J., Bermudez Tamayo, C. and Fernandez-Crehuet Navajas, J. An economic evaluation of two interventions for the prevention of post-surgical infections in cardiac surgery 2016	Quasi-experimental	Patients undergoing cardiac surgery, university hospital, Spain	Patients positive for MRSA colonization received nasal mupirocin twice a day for 2 weeks	All patients received nasal mupirocin treatment and CHG wash night prior to surgery.	Incidence of SSIs within 30 days of surgery; direct cost of treatment	Universal mupirocin prophylaxis had lower incidence of SSI and cost.	IIA

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48	Williams, D. M., Miller, A. O., Henry, M. W., Westrich, G. H. and Ghomrawi, H. M. K. Cost-Effectiveness of Staphylococcus aureus Decolonization Strategies in High-Risk Total Joint Arthroplasty Patients 2017	Nonexperimental	Patients undergoing total joint arthroplasty (TJA), specialty hospital, United States			Hospital, patient and societal cost; risk of periprosthetic joint infection (PJI)	In high risk patients, <i>S aureus</i> decolonization may be cost-effective at reducing PJI.	IIIB
49	Masroor, N., Golladay, G. J., Williams, J., et al. Healthcare Worker Perceptions of and Barriers to Universal Staphylococcal Decolonization in Elective Orthopaedic Joint Surgeries 2016	Qualitative	Healthcare workers (HCW) caring for elective joint procedure patients, medical center, United States	n/a	n/a	HCW knowledge, perception and barriers to universal staphylococcal decolonization (USD)	Comprehensive implementation of USD is necessary and includes understanding by all perioperative providers of rationale and impact of USD.	IIIB
50	Kavanagh, Kevin T., Calderon, Lindsay E., Saman, Daniel M. and Abusalem, Said K. The use of surveillance and preventative measures for methicillin-resistant staphylococcus aureus infections in surgical patients 2014	Literature Review	n/a	n/a	n/a	n/a	The two recommendations for controlling MRSA are: screen and treat carriers or to universally treat everyone. However, second option may worsen bacterial resistance and change patient and facility microbiome.	VA
51	Shrem, G., Egozi, T., Naeh, A., Hallak, M. and Walfisch, A. Pre-cesarean Staphylococcus aureus nasal screening and decolonization: a prospective randomized controlled trial 2016	RCT	Women undergoing elective or urgent cesarean delivery, medical center, Israel	Colonized patients applied nasal mupirocin b.i.d for 5 days	Screened for <i>S aureus</i> carriage, but no treatment	SSI incidence within 30 days of surgery	Screening for nasal <i>S aureus</i> and decolonization prior to cesarean delivery does not appear to be an effective intervention for reducing SSI rates.	IA
52	Sasi, S. P., Sistla, S. C., Sistla, S., et al. Decolonisation of MRSA and its effect on surgical site infections--a study in a tertiary care institute 2015	Quasi-experimental	Patients undergoing elective general surgery procedures, tertiary hospital, India	Colonized patients applied mupirocin to colonized sites t.i.d. and took two CHG baths for 5 days	No screening or decolonization	SSI development within 30 days of surgery	There was no reduction in SSI rate for patients who underwent decolonization.	IIA
53	Takahashi, Y., Takesue, Y., Uchino, M., et al. Value of pre- and postoperative methicillin-resistant Staphylococcus aureus screening in patients undergoing gastroenterological surgery. 2014	Quasi-experimental	Patients undergoing gastroenterological surgery, university hospital, Japan	Mupirocin, contact isolation, antibiotic	No treatment if negative	Incidence of postoperative nasal MRSA acquisition; MRSA infections	The screening-based strategy for preoperative MRSA carriers prevented MRSA SSIs. However, postoperative nasal acquisition was a significant factor in MRSA infection.	IIIB
54	Lefebvre, J., Buffet-Bataillon, S., Henaux, P. L., Riffaud, L., Morandi, X. and Haegelen, C. Staphylococcus aureus screening and decolonization reduces the risk of surgical site infections in patients undergoing deep brain stimulation surgery 2017	Quasi-experimental	Patients undergoing deep brain stimulation(DBS) surgery, university hospital, France	Screening for nasal <i>S aureus</i> , treat if positive for 5 days with mupirocin t.i.d. and daily bath with 4% CHG	No screening or decolonization	SSI incidence	Detection and decolonization of <i>S aureus</i> carriage significantly reduced SSI incidence in DBS patients.	IIA
55	Sousa, R. J., Barreira, P. M., Leite, P. T., Santos, A. C., Ramos, M. H. and Oliveira, A. F. Preoperative Staphylococcus aureus Screening/Decolonization Protocol Before Total Joint Arthroplasty-Results of a Small Prospective Randomized Trial 2016	RCT	Patients undergoing elective primary total hip (THA) or knee arthroplasty (TKA), hospital, Portugal	<i>S. aureus</i> positive cultures receiving decolonization	<i>S aureus</i> positive cultures not receiving decolonization	PJI within first year after surgery; PJI with <i>S aureus</i> only	A clear benefit for screening and decolonization was not demonstrated.	IB

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56	Malcolm, T. L., Robinson le, D., Klika, A. K., Ramanathan, D., Higuera, C. A. and Murray, T. G. Predictors of Staphylococcus aureus Colonization and Results after Decolonization 2016	Nonexperimental	Patients undergoing total hip arthroplasty (HA) or total knee arthroplasty (TKA), four hospitals, United States	n/a	n/a	Incidence of revision arthroplasty following primary THA or TKA	<i>S aureus</i> decolonization can be an effective strategy for reducing the revision rate due to THA and TKA SSIs.	IIIA
57	Kline, Susan E., Neaton, James D., Lynfield, Ruth, et al. Randomized controlled trial of a self-administered five-day antiseptic bundle versus usual disinfectant soap showers for preoperative eradication of Staphylococcus aureus colonization. 2018	RCT	Patients undergoing outpatient elective surgery testing positive for <i>Staphylococcus aureus</i> (MRSA, MSSA) at any of 4 body sites, university hospital, United States	CHG soap once a day, CHG mouthwash twice a day, mupirocin nasal ointment twice a day, for 5 days	2 preoperative showers with antiseptic of surgeon's choice, night before and morning of surgery	Detection posttreatment of SA colonization (MRSA, MSSA) at any of 4 body sites.	Significant difference in SA eradication was seen in antiseptic decolonization bundle.	IA
58	Grimmer, L. E., Stafford, T. S., Milman, S. and Ng, T. Efficacy of pre-operative nasal staphylococcus aureus screening and chlorhexidine chest scrub in decreasing the incidence of post-resection empyema 2014	Quasi-experimental	Patients undergoing major pulmonary resection, hospital, United States	Screening for nasal <i>S aureus</i> , treat with mupirocin for 5 days if positive, and CHG chest scrub night before surgery	No screening, treatment, or chest scrub	Incidence of empyema	Screening for nasal <i>S aureus</i> , mupirocin treatment for positive patients, and preoperative CHG chest scrub did not decrease empyema.	IIB
59	Smith, Mary A., Dahlen, Nancy R., Bruemmer, Ann BSN, MSN, C.N.O.R., et al. Clinical Practice Guideline Surgical Site Infection Prevention 2013	Guideline	n/a	n/a	n/a	n/a	Evidence-based recommendations for prevention of SSIs when caring for orthopedic surgery patients.	IVB
60	Bebko, Serge P., Byers, Patricia, Green, David M. and Awad, Samir S. Identification of methicillin-susceptible or methicillin-resistant Staphylococcus aureus carrier status preoperatively using polymerase chain reaction in patients undergoing elective surgery with hardware implantation.	Nonexperimental	Patients undergoing surgery with hardware implantation, VA Medical Center, United States	n/a	n/a	Sensitivity, specificity, and accuracy	PCR screening of nose and axillia is a reliable predictive measure for MRSA and MSSA colonization when quick turnaround is needed.	IIIB
61	Bebko, Serge P., Green, David M. and Awad, Samir S. Effect of a preoperative decontamination protocol on surgical site infections in patients undergoing elective orthopedic surgery with hardware implantation. 2015	Quasi-experimental	Patients undergoing elective orthopedic surgery with hardware, VA hospital, United States	CHG wipes and oral rinse, intranasal povidone-iodine	No decolonization protocol	SSI within 30 days of operation	SSI rate and MRSA nasal carriage was significantly lower in intervention group compared to control group.	IIA
62	Steed LL, Costello J, Lohia S, Jones T, Spannhake EW, Nguyen S. Reduction of nasal <i>Staphylococcus aureus</i> carriage in health care professionals by treatment with a nonantibiotic alcohol-based nasal antiseptic. <i>Am J Infect Contrl.</i> 2014;42(28): 841-846	RCT	HCP volunteers, university hospital, United States	Nasal antiseptic applied tid	Nasal placebo applied tid	<i>S aureus</i> and total bacterial growth (CFUs) from nasal swabs	<i>S aureus</i> and total bacterial carriage were effectively reduced in health care personnel who underwent nasal decolonization with the nasal antiseptic.	IB
63	Maslow, J., Hutzler, L., Cuff, G., Rosenberg, A., Phillips, M. and Bosco, J. Patient experience with mupirocin or povidone-iodine nasal decolonization 2014	Qualitative	Patients receiving mupirocin ointment (MO) or povidone-iodine solution (PI)	n/a	n/a	Adverse events and patient experience	Patients using PI reported significantly fewer adverse events than MO. Two-thirds of patients felt nasal PI or MO was somewhat or very helpful.	IIIA
64	Standards of perioperative nursing. https://www.aorn.org/guidelines/clinical-resources/aorn-standards	Guideline	n/a	n/a	n/a	n/a	Standards for perioperative nursing practice.	IVB

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65	Tschelaut, L., Assadian, O., Strauss, R., et al. A survey on current knowledge, practice and beliefs related to preoperative antimicrobial decolonization regimens for prevention of surgical site infections among Austrian surgeons. 2018	Qualitative	Surgeons from multiple disciplines, hospitals, Austria	n/a	n/a	Preoperative decolonization frequency; knowledge of decolonization procedure	Preoperative decolonization is performed routinely but with a variety of modalities, antimicrobial compounds, and staff. Health care personnel informed about decolonization benefit were more likely to institute that practice.	IIIA
66	Munoz-Gallego, I., Infesta, L., Viedma, E., Perez-Montarelo, D. and Chaves, F. Chlorhexidine and mupirocin susceptibilities in methicillin-resistant Staphylococcus aureus isolates from bacteraemia and nasal colonisation 2016	Nonexperimental	MRSA isolates from blood and nasal samples of adult patients, university hospital, Spain	n/a	n/a	Susceptibility to mupirocin and chlorhexidine	Reduced susceptibility to chlorhexidine was minimal. However, resistance to mupirocin was found in 15.6% of blood isolates and 15.1% of nasal isolates.	IIIA
67	Deeny SR, Worby CJ, Tosas Auguet O, et al. Impact of mupirocin resistance on the transmission and control of healthcare-associated MRSA. <i>J Antimicrob Chemother.</i> 2015;70(12):3366-3378.	Nonexperimental	MRSA patient isolates, 2 acute care hospitals, London	n/a	n/a	Mupirocin-resistant (MupR) and mupirocin susceptible (MupS) strain transmission rates and prevalence	The prevalence of mupirocin resistance increased 50% to 75% during universal decolonization and increased 10% during targeted decolonization.	IIIA
68	Hetem, D. J., Bootsma, M. C. and Bonten, M. J. Prevention of Surgical Site Infections: Decontamination With Mupirocin Based on Preoperative Screening for Staphylococcus aureus Carriers or Universal Decontamination? 2016	Nonexperimental	Single ward, university hospital, The Netherlands	n/a	n/a	Prevalence of mupirocin-resistant <i>S aureus</i>	Using a mathematical model to compare universal decolonization (UD) to targeted decolonization (TD), UD seems to be associated with a low risk of mupirocin resistance to <i>S aureus</i> .	IIIB
69	Veiga DF, Damasceno CA, Veiga Filho J, et al. Influence of povidone-iodine preoperative showers on skin colonization in elective plastic surgery procedures. <i>Plastic & Reconstructive Surgery.</i> 2008;121(1): 115-118.	RCT	Clean plastic procedures	10% PI shower 2 hours before surgery	No instruction	Skin cultures	Single PI showers (2hrs before surgery) are effective in reducing staph colonization for clean plastic procedures on thorax and abdomen.	IA
70	Tanner Judith, Gould Dinah, Jenkins Philip, Hilliam Rachel, Mistry Neetesh, Walsh Susannah. A fresh look at preoperative body washing. <i>J INFECT PREV.</i> 2012;13(1): 11-15. doi:10.1177/1757177411428095.	RCT	Healthy volunteers	4% CHG Octenisan	Plain soap	Skin cultures	CHG prep body wash more effective than soap in reducing CFU immediately and at 6hrs, CHG > Octenisan in groin.	IB
71	Kamel C, McGahan L, Polisen J, Mierzwinski-Urban M, Embil JM. Preoperative skin antiseptic preparations for preventing surgical site infections: a systematic review. <i>Infection Control & Hospital Epidemiology.</i> 2012;33(6): 608-617.	Systematic Review	n/a	n/a	n/a	n/a	Antiseptic showers reduce colonization and may prevent SSI, but data is inconclusive on effectiveness and which antiseptic is best.	IIA
72	Colling, K., Statz, C., Glover, J., Banton, K. and Beilman, G. Pre-operative antiseptic shower and bath policy decreases the rate of S. aureus and methicillin-resistant S. aureus surgical site infections in patients undergoing joint arthroplasty 2015	Quasi-experimental	Patients undergoing hip and knee arthroplasties, two affiliated hospitals, United States	Chlorhexidine shower or bath night before and morning of surgery	No preoperative antiseptic shower or bath	Rate of surgical site infection (SSI); causative organism	Rate of SSIs caused by <i>S. aureus</i> and MRSA was significantly decreased in preoperative antiseptic group.	IIA
73	Cai Y., Xu K., Hou W., Yang Z. and Xu, P. Preoperative chlorhexidine reduces the incidence of surgical site infections in total knee and hip arthroplasty: A systematic review and meta-analysis. 2017	Systematic Review	n/a	n/a	n/a	n/a	Preoperative bathing with CHG cloth appears to reduce risk of infection, incidence of revision surgery, and length of stay for total knee and hip arthroplasty patients.	IIA

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74	Kapadia B.H., Elmallah R.K. and Mont, M. A. A Randomized, Clinical Trial of Preadmission Chlorhexidine Skin Preparation for Lower Extremity Total Joint Arthroplasty. 2016	RCT	Patients undergoing hip and knee arthroplasty, community hospital, United States	2% CHG cloths night before and morning of surgery	Bath with soap and water night before surgery.	Periprosthetic infection rate at 1-year.	A lower periprosthetic infection rate was found with CHG cloth when compared to soap and water.	IB
75	Kapadia, Bhaveen, Jauregui, Julio, Murray, Daniel, et al. Does Preadmission Cutaneous Chlorhexidine Preparation Reduce Surgical Site Infections After Total Hip Arthroplasty? 2016	Quasi-experimental	Patients undergoing primary or revision total hip arthroplasty (THA), university hospital, United States	2% CHG cloths applied night before and morning of surgery	2% CHG cloths were not used	Incidence of deep or organ space SSI within 1 year of procedure	The 2% CHG cloth group had fewer deep or organ space SSIs. However, when stratified by NHSN risk categories of low, medium and high, no differences were detected.	IIA
76	Berri-os-Torres, Sandra I., Umscheid, Craig A., Bratzler, Dale W., et al. Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017	Guideline	n/a	n/a	n/a	n/a	CDC and HICPAC recommendations for prevention of SSIs.	IVA
77	Jakobsson J, Perlkvist A, Wann-Hansson C. Searching for evidence regarding using preoperative disinfection showers to prevent surgical site infections: a systematic review. Worldviews on Evidence-Based Nursing. 2011;8(3): 143-152.	Systematic Review	n/a	n/a	n/a	n/a	More evidence is needed on the number of showers that are best to prevent SSIs. Wise to follow previous recommendation of 3-5 showers in meantime.	IIA
78	Edmiston C.E., Krepel C.J., Spencer M.P., et al. Preadmission application of 2% chlorhexidine gluconate (CHG): Enhancing patient compliance while maximizing skin surface concentrations. 2016	RCT	Volunteers, medical center, United States	Consecutive application of 2% chlorhexidine gluconate (CHG) cloth with electronic alert	Consecutive application of 2% chlorhexidine gluconate (CHG) cloth with no electronic alert	Skin surface concentrations of CHG from 5 sites	Participants receiving electronic reminder had a significant increase in CHG skin surface concentrations.	IB
79	Franco, Lucia M. d. C., Cota, Glauca F., Pinto, Tatiana S. and Ercole, Flavia F. Preoperative bathing of the surgical site with chlorhexidine for infection prevention: Systematic review with meta-analysis 2017	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Controlled clinical trials are needed to determine effect of preoperative CHG bathing on clean surgery infection rates before adopting this intervention.	IA
80	Chlebicki MP, Safdar N, O'Horo JC, Maki DG. Preoperative chlorhexidine shower or bath for prevention of surgical site infection: a meta-analysis. Am J Infect Control. 2013;41(2): 167-173.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Analysis doesn't support routine preoperative whole body bathing with CHG to prevent SSI, although the low risk and low cost of bathing may be worth the marginal benefits.	IIA
81	Hsieh C.S., Cheng H.C., Lin J.S., Kuo S.J. and Chen, Y. L. Effect of 4% chlorhexidine gluconate preinfection skin scrub prior to hepatectomy: a double-blinded, randomized control study. 2014. <i>Int Surg</i> ; 99: 787-794.	RCT	Patients undergoing hepatectomy, hospital, Taiwan	Scrub for 3 minutes with sterile washcloth containing 4% CHG followed by standard 3-step skin prep	Scrub for 3 minutes with sterile washcloth containing normal saline (NS) followed by standard 3-step skin prep	Microbial colonization; SSI	CHG used before standardized skin prep was as effective as NS in reduction of microbial colonization and SSIs.	IB

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82	Karki S, Cheng AC. Impact of non-rinse skin cleansing with chlorhexidine gluconate on prevention of healthcare-associated infections and colonization with multi-resistant organisms: a systematic review. <i>J Hosp Infect.</i> 2012;82(2): 71-84. doi:10.1016/j.jhin.2012.07.005 [doi].	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Non-rinse CHG application significantly reduces the risk of CLABSI, SSI and colonization with VRE or MRSA, but not infection. Additional studies are recommended to confirm their findings because of the observational nature of the studies and variations in the quality of data collection and analysis.	IIIA
83	Eck, Carola F., Neumann, Julie A., Limpivasthi, Orr and Adams, Christopher R. Lack of level I evidence on how to prevent infection after elective shoulder surgery 2018	Systematic Review	n/a	n/a	n/a	n/a	Level I evidence supports CHG wipes for preoperative cleansing and skin preparation, as well as CHG with alcohol and PI with alcohol for prevention of infection in elective shoulder surgery.	IIIA
84	Edmiston CE Jr, Seabrook GR, Johnson CP, Paulson DS, Beausoleil CM. Comparative of a new and innovative 2% chlorhexidine gluconate-impregnated cloth with 4% chlorhexidine gluconate as topical antiseptic for preparation of the skin prior to surgery.. <i>Am J</i> , 2007	RCT	Healthy volunteers	2% CHG Cloth	4% CHG skin preparation	FDA criteria for preoperative topical skin preparation (ie, bacterial load on skin)	CHG cloths significantly reduced microbial counts, including abdominal prepped sites, and exceeded FDA testing requirement. 4% CHG failed in inguinal sites at 10min, 2% cloths reduced microbial counts better than 4% in inguinal site.	IB
85	Edmiston Jr CE, Krepel CJ, Seabrook GR, Lewis BD, Brown KR, Towne JB. Preoperative Shower Revisited: Can High Topical Antiseptic Levels Be Achieved on the Skin Surface Before Surgical Admission?. <i>J Am Coll Surg.</i> 2008;207(2): 233-239. http://www.scopus.com	RCT	60 Healthy volunteers	2% CHG cloths at morning, evening, and both	4% CHG soap at morning, evening, and both	CHG levels on skin	2% CHG cloths met effective CHG levels and the cloths had better coverage; 4% CHG soap met effective CHG levels but left gaps in antiseptic coverage.	IB
86	Graling PR, Vasaly FW. Effectiveness of 2% CHG cloth bathing for reducing surgical site infections.. <i>AORN J.</i> 2013;97(5): 547-551.	Quasi-experimental	General, Vascular, Ortho	2% CHG Cloth baths, >2mo	No bathing protocol	SSI	Preoperative bathing with 2% CHG for general and vascular surgery patients, resulted in a statistically significant reduction in overall infection in cloth group.	IIB
87	Johnson AJ, Kapadia BH, Daley JA, Molina CB, Mont MA. Chlorhexidine reduces infections in knee arthroplasty.. <i>The Journal of Knee Surgery.</i> 2013;26(3): 213-218.	Quasi-experimental	Orthopedic surgery, Total Knee	2% CHG wipes, night before and morning of surgery	No bathing protocol	SSI, Compliance with Bathing	Preadmission CHG protocol seems to be effective to prevent SSI in total knee procedures.	IIB
88	Zywiel MG, Daley JA, Delanois RE, Naziri Q, Johnson AJ, Mont MA. Advance pre-operative chlorhexidine reduces the incidence of surgical site infections in knee arthroplasty.. <i>Int Orthop.</i> 2011;35(7): 1001-1006.	Quasi-experimental	Orthopedic surgery, Knee	2% CHG cloths, 2 baths night before and morning of surgery	No bathing protocol	SSI	Using CHG cloths the night before and morning of elective knee arthroplasty appeared to reduce SSI when compared to in-hospital skin prep only.	IIB

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89	Johnson AJ, Daley JA, Zywiol MG, Delanois RE, Mont MA. Preoperative chlorhexidine preparation and the incidence of surgical site infections after hip arthroplasty. <i>J Arthroplasty</i> . 2010;25(6 Suppl): 98-102.	Quasi-experimental	Orthopedic surgery, Total Hip	2% CHG wipes, night before and morning of surgery	No bathing protocol	SSI, Compliance with Bathing	Home washing with CHG cloths appeared to be simple and cost effective method to reduce hip SSI rates.	IIB
90	Farber NJ, Chen AF, Bartsch SM, Feigel JL, Klatt BA. No infection reduction using chlorhexidine wipes in total joint arthroplasty. <i>Clinical Orthopaedics & Related Research</i> . 2013;471(10): 3120-3125.	Quasi-experimental	Orthopedic surgery, Total Joint	2% CHG wipes, 1 hour before surgery	No bathing protocol	SSI	2% CHG wipes in presurgical setting were not associated with reduced SSI. Wipes for total joint arthroplasty are unnecessary.	IIA
91	Berrondo C., Ahn J.J. and Shnorhavorian, M. Pre-operative skin antisepsis with chlorhexidine gluconate baths and wipes does not prevent postoperative surgical site infection in outpatient pediatric urologic inguinal and scrotal surgery. 2019	Quasi-experimental	Pediatric hernia, hydrocele repair and/or orchiopexy patients, university hospital, United States	4% CHG soap or 2% CHG cloth night before and day of surgery	No preoperative CHG bath	Surgical site infection; cost of CHG baths/wipes	Preoperative bathing did not reduce SSIs and incurred an additional patient cost of \$3.29 (2018 USD).	IIA
92	Makhni, Melvin C., Jegede, Kolawole, Lombardi, Joseph, et al. No Clear Benefit of Chlorhexidine Use at Home Before Surgical Preparation. 2018	Quasi-experimental	Volunteers, spine hospital, United States	2% CHG cloths on right side of neck the night before and morning of surgery, followed by standardized skin prep	No CHG cloths on left side of neck, followed by standardized skin prep	Posterior neck bacterial counts	Use of 2% CHG cloths did not decrease bacterial burden so may not offer an additional benefit.	IIC
93	ACOG Practice Bulletin No. 195: Prevention of Infection After Gynecologic Procedures. 2018	Consensus	n/a	n/a	n/a	n/a	Review of recommended interventions, including antibiotic prophylaxis, for prevention of infection after gynecologic procedures.	IVB
94	Edmiston, Charles E. J., Krepel, Candace J., Edmiston, Sarah E., et al. Empowering the surgical patient: a randomized, prospective analysis of an innovative strategy for improving patient compliance with preadmission showering protocol. 2014	RCT	Volunteers, medical center, United States	2 or 3 showers with 4% chlorhexidine gluconate (CHG) using electronic patient alert system (EAS)	2 or 3 showers with 4% chlorhexidine gluconate (CHG) using no electronic	CHG skin-surface concentration from 5 anatomic sites; residual CHG in used bottle	CHG skin concentrations were significantly higher in EAS group. Wide variation in amount of CHG used in all groups.	IB
95	Edmiston, Charles E. J., Lee, Cheong J., Krepel, Candace J., et al. Evidence for a Standardized Preadmission Showering Regimen to Achieve Maximal Antiseptic Skin Surface Concentrations of Chlorhexidine Gluconate, 4%, in Surgical Patients 2015	RCT	Volunteers, medical center, United States	3 showers with 118 ml of 4% chlorhexidine gluconate, with no pause, 1 minute pause or 2 minute pause before rinsing	2 showers with 118 ml of 4% chlorhexidine gluconate with no pause, 1 minute pause or 2 minute pause	Skin surface concentrations of CHG from 5 anatomic sites	A minimum of 2 sequential showers with 118 ml of CHG and 1 minute pause before rinsing led to maximal CHG skin concentrations.	IB
96	Guideline for medical device and product evaluation. In: <i>Guidelines for Perioperative Practice</i> . Denver, CO: AORN, Inc; 2020: 705-713.	Guideline	n/a	n/a	n/a	n/a	Guidance for product selection.	IVB
97	Boyce, John M. Best products for skin antisepsis 2019	Expert Opinion	n/a	n/a	n/a	n/a	More research is needed to determine optimal preoperative bathing and skin preparation agents. Surveillance for development of resistance to frequently used antiseptics should occur.	VA
98	Persichino, Jon, Lee, Hayley, Sutjita, Made, Talavera, Karla, San-Agustin, Glenn and Gnass, Silvia. Reducing the Rate of Surgical Site Infections After Breast Surgery With the Use of Larger Volumes of 4% Chlorhexidine Gluconate Solution as Preoperative Antiseptic Showering. <i>Infection Control & Hospital Epidemiology</i> . 2017;38(3):373-375.	Quasi-experimental	Breast surgery patients, academic hospital, United States	Preoperative bathing with 118 ml of 4% chlorhexidine gluconate (CHG)	Preoperative bathing with 15 ml of 4% chlorhexidine	Surgical site infection rate	Large volumes of 4% CHG significantly reduced mastectomy SSI rates, but not in all breast surgeries.	IIB

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99	Supple, L, Kumaraswami, M, Kundrapu S, Sunkesula V et al. Chlorhexidine only works if applied correctly: Use of a simple colorimetric assay to provide monitoring and feedback on effectiveness of chlorhexidine application. <i>Inf Control Hosp Epidemiol</i> 2015;36:1095-7.	Organizational Experience	Males undergoing major surgery, VA medical center, United States	n/a	n/a	n/a	Colorimetric assay identified preoperative bathing deficiencies and when results shared with nursing staff, CHG application improved.	VB
100	Qvistgaard, Maria, Almerud Osterberg, Sofia, Heikkila, Kristiina, Thoren, Ann-Britt and Lovebo, Jenny. Patients' experiences with at-home preoperative skin disinfection before elective hip replacement surgery. 2017	Qualitative	Patients undergoing elective hip replacement surgery, orthopedic ward, Sweden	n/a	n/a	Preoperative home bathing experience	Patient performing bathing at home is a big responsibility. Patients needing additional support must be identified and guided.	IIIB
101	Arrowsmith, V. A., Taylor, R. Removal of nail polish and finger rings to prevent surgical infection (Review) .2014	Systematic Review	n/a	n/a	n/a	n/a	There are no outcome studies for SSI related to healthcare workers wearing of nail polish and finger rings. There is insufficient evidence to determine if nail polish affects the number of bacteria on skin post-surgical hand scrub.	IA
102	McNeil SA, Foster CL, Hedderwick SA, Kauffman CA. Effect of hand cleansing with antimicrobial soap or alcohol-based gel on microbial colonization of artificial fingernails worn by health care workers. <i>Clin Infect Dis</i> . 2001;32(3): 367-372.	Quasi-experimental	Healthcare Workers	Artificial Nails	Natural Nails	Hand and Nail cultures	Significantly more HCWs with artificial nails than controls had pathogens remaining after hand cleansing with soap or gel.	IIB
103	Guideline for hand hygiene. In: <i>Guidelines for Perioperative Practice</i> . Denver, CO: AORN, Inc; 2020: 273-297.	Guideline	n/a	n/a	n/a	n/a	Guidance for hand hygiene in the perioperative setting.	IVB
104	Kulkarni V., Murray A., Mittal R., Spence D., O'Kane G. and Incoll, I. Microbial counts in hands with and without nail varnish after surgical skin preparation: a randomized control trial. 2018	RCT	Volunteer adult dialysis patients, hospital, Australia	Clear nail varnish applied 7 days prior to hand immersion in 10% PI for 2 minutes	No nail varnish for 7 days prior to hand immersion in 10% PI for 2 minutes	Microbial counts of fingers following PI hand immersion	No significant difference was found in microbial count from fingers of varnished or unvarnished nails leading authors to extrapolate that nail varnish would not be associated with increase risk of SSI.	IB
105	Leclair JM, Winston KR, Sullivan BF, O'Connell JM, Harrington SM, Goldmann DA. Effect of preoperative shampoos on resident scalp flora. <i>Today's OR Nurse</i> . 1988;10(3): 15-21.	RCT	Neurosurgery, >1mo	Shampoo CHG, prep CHG; No shampoo, prep CHG;	Shampoo PI, prep PI; No shampoo, prep PI	Scalp cultures, wound cultures, SSI	Preoperative shampoos suppressed resident flora on scalp, CHG may be better than iodophors because of residual effect.	IB
106	Scheer, V. M., Bergman Jungstrom, M., Lerm, M., Serrander, L. and Kalen, A. Topical benzoyl peroxide application on the shoulder reduces Propionibacterium acnes: a randomized study 2018	RCT	Volunteers, university hospital, Sweden	5% benzoyl peroxide gel (BPO) applied preoperatively	Chlorhexidine soap (CHS) used preoperatively	P. acne presence measured in CFUs after surgical skin prep	Topical BPO significantly reduced <i>P acnes</i> presence. BPO before shoulder surgery may be effective in reducing <i>P acnes</i> on skin and preventing recolonization.	IB
107	Kolakowski L., Lai J.K., Duvall G.T., et al. Neer Award 2018: Benzoyl peroxide effectively decreases preoperative Cutibacterium acnes shoulder burden: a prospective randomized controlled trial. 2018	RCT	Patients undergoing primary or revision shoulder surgery, hospital, United States	5% benzoyl peroxide (BPO) applied for 3 consecutive days	4% chlorhexidine gluconate (CHG) applied for 3 consecutive days	Presence of <i>C. acnes</i> using detergent scrub technique	BPO significantly decreased <i>C acnes</i> in deep sebaceous glands.	IB

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108	Sabetta JR, Rana VP, Vadasdi KP, et al. Efficacy of topical benzoyl peroxide on the reduction of <i>Propionibacterium acnes</i> during shoulder surgery. <i>J shoulder Elbow Surg</i> 2015;24:995-1004.	Quasi-experimental	Patients undergoing primary shoulder arthroscopy, teaching hospital, United States	Application of 5% BPO gel to shoulder and axilla 5 times before surgery, over 2 1/2 days	Non-operative shoulder	Skin, joint fluid, and tissue cultures before surgical skin prep, after prep and before skin closure	5% topical BPO applied before surgical skin preparation can reduce the rate of residual <i>C. acnes</i> .	IIB
109	Dizay H.H., Lau D.G. and Nottage, W. M. Benzoyl peroxide and clindamycin topical skin preparation decreases <i>Propionibacterium acnes</i> colonization in shoulder arthroscopy. 2017	Quasi-experimental	Patients undergoing shoulder arthroscopy, Sports Clinic, United States	Preoperative application of 5% benzoyl peroxide and clindamycin 1.2%(BPO/C)	No application of BPO/C	<i>Propionibacterium acnes</i> (<i>P. acnes</i>) skin colonization	BPO/C reduced <i>P. acnes</i> skin colonization and should be considered for use before shoulder arthroscopy.	IIB
110	Saltzman MD, Nuber GW, Gryzlo SM, Marecek GS, Koh JL. Efficacy of surgical preparation solutions in shoulder surgery.. <i>Journal of Bone & Joint Surgery - American Volume</i> . 2009;91(8): 1949-1953.	RCT	Orthopedic surgery, Shoulder	3 preps	Chloraprep v duraprep v PI	Cultures	Chloraprep was more effective than Duraprep and PI for eliminating bacteria (CNS) on the shoulder, and PI was least effective against CNS.	IA
111	Lee, MJ, Pottinger PS, Butler-Wu S, et al. <i>Propionibacterium</i> persists in the skin despite standard surgical preparation. <i>J Bone JT Surg Am</i> , 2014, 96:1447-1450.	Quasi-experimental	Ten male volunteers who had upper back skin preparation with CHG and alcohol, United States	Skin preparation with 2% chlorhexidine gluconate and 70% isopropyl alcohol)	n/a	Growth of <i>C. acnes</i> in dermal biopsy	70% of subjects who had dermal biopsy after CHG skin preparation had <i>C. acnes</i> present.	IIC
112	Hancock D.S., Rupasinghe S.L., Elkinson I., Bloomfield M.G. and Larsen, P. D. Benzoyl peroxide + chlorhexidine versus chlorhexidine alone skin preparation to reduce <i>Propionibacterium acnes</i> : a randomized controlled trial. 2018	RCT	Volunteers, hospital, New Zealand	Benzoyl peroxide with 2% CHG with alcohol prior to surgery	2% CHG with alcohol prior to surgery	Partial and complete inhibition of <i>P. acnes</i>	Addition of benzoyl peroxide does not seem to increase surgical preparation efficacy for inhibiting growth of <i>P. acnes</i> .	IB
113	Tanner, J, Norrie P, Melen K. Preoperative hair removal to reduce surgical site infection. <i>Cochrane Database Systematic Review</i> . 2011 9(11)	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	No statistical difference in SSI rates, and insufficient sample available. Evidence suggests clippers may be associated with less SSI than razors.	IA
114	Cruse, PJ. A five-year prospective study of 23,649 surgical wounds. <i>Arch Surg</i> . 1973;107(2): 206-210.	Nonexperimental	Adult	n/a	n/a	Infection	Shaving should be kept to a minimum. Infection rates results: shave 2.3%, clip 1.7%, no removal 0.9%.	IIIA
115	Broekman ML, van Beijnum J, Peul WC, Regli L. Neurosurgery and shaving: what's the evidence? <i>J Neurosurg</i> . 2011;115(4):670-678.	Systematic Review	n/a	n/a	n/a	n/a	There is no evidence to suggest that hair should be removed routinely in neurosurgery. Shaving may increase infection, more is research needed.	IIIA
116	Sebastian S. Does preoperative scalp shaving result in fewer postoperative infections when compared to no scalp shaving. <i>J Neurosci Nurs</i> . 2012;44(3)149-156.	Systematic Review	n/a	n/a	n/a	n/a	Cranial surgeries should be performed without shaving.	IIIA
117	Marecek, Geoffrey S., Weatherford, Brian M., Fuller, Eric B. and Saltzman, Matthew D. The effect of axillary hair on surgical antisepsis around the shoulder. 2015	RCT	Male volunteers, simulated OR, United States	Axilla hair clipped with surgical clippers followed by shoulder skin preparation 2% CHG with 70% isopropyl alcohol	Shoulder skin preparation 2% CHG with 70% isopropyl alcohol	Axilla culture growth of <i>Propionibacterium acnes</i> (<i>P. acnes</i>)	Hair removal had no effect on <i>P. acnes</i> burden. 2% CHG with alcohol was effective at removing <i>P. acnes</i> from axilla.	IB

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118	Shi, Dingmei, Yao, Yao and Yu, Weifei. Comparison of preoperative hair removal methods for the reduction of surgical site infections: a meta-analysis 2017	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	When hair removal is necessary, the evidence suggests clipping is more effective in reducing SSIs than shaving or depilatory cream.	IIA
119	Guideline for a safe environment of care. In: <i>Guidelines for Perioperative Practice</i> . Denver, CO: AORN, Inc; 2020: 115-148.	Guideline	n/a	n/a	n/a	n/a	Guidance for providing a safe environment of care.	IVB
120	Kowalski, Todd J., Kothari, Shanu N., Mathiason, Michelle A. and Borgert, Andrew J. Impact of Hair Removal on Surgical Site Infection Rates: A Prospective Randomized Noninferiority Trial. 2016	RCT	Patients undergoing general surgery, tertiary hospital, United States	Hair removed with surgical clipper before transfer to OR	No hair removal	SSI using CDC criteria within 30 days of surgery	SSI rates were similar whether hair was clipped or not clipped.	IA
121	Ng, W, Alexander, D, Kerr B, et al. A hairy tale: Successful patient education strategies to reduce prehospital hair removal by patients undergoing elective caesarean section. <i>J Hosp Infect</i> . 2013;83(1):64-67.	Nonexperimental	Adult, Cesarean Section	n/a	n/a	Compliance	The rate of patient's self hair removal improved from 41% (2008) to 27% (2011) by educational campaign of posters and prenatal education. All prenatal patients were instructed not to shave after 36 weeks gestation. The researchers showed a decrease in SSI using this education as part of a multimodal approach of EBP implementation.	IIIB
122	DailyMed. US National Library of Medicine. Chlorhexidine gluconate and isopropyl alcohol. (Chloraprep). https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=8541f219-c060-399a-e053-2991aa0ab05c . Accessed July 10, 2020.	Regulatory	n/a	n/a	n/a	n/a	Database of product labels and package inserts, includes antiseptic products.	n/a
123	DailyMed. US National Library of Medicine. Iodine povacrylex and isopropyl alcohol. (Duraprep) https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=22a10a54-6a04-48b3-9ec4-b26526183daf . Accessed July 10, 2020.	Regulatory	n/a	n/a	n/a	n/a	Database of product labels and package inserts, includes antiseptic products.	n/a
124	Kose, Gulsah, Tastan, Sevinc, Kutlay, Murat and Bedir, Orhan. The effects of different types of hair shaving on the body image and surgical site infection in elective cranial surgery. 2016	RCT	Patients undergoing elective cranial surgery, military hospital, Turkey	Hair clipped in 2-cm-wide strip along incision line (strip clipping)	Hair clipped 5 cm along incision line (regional clipping)	SSI incidence using CDC protocol; patient perception of body image	No difference in SSI rate found between two groups. However, patient's body image was negatively affected by regional clipping.	IA
125	Basevi V., Lavender, T. Routine perineal shaving on admission in labour. 2014	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	More evidence is needed before recommendation for perineal shaving upon admission for women in labor can be made.	IA
126	Grober ED, Domes T, Fanipour M, Copp JE. Preoperative hair removal on the male genitalia: clippers vs. razors. <i>J Sex Med</i> . 2013;10(2):589-594.	RCT	GU	Clipping	Shaving with Razor	Quality of hair removal; Skin trauma	Hair removal with razor on scrotum caused less skin trauma and better quality hair removal than clippers, with no apparent increase in SSI.	IB
127	Sexual Medicine Society of North America, Inc. Razors and Preoperative Preparation of the Male Genitalia	Position Statement	n/a	n/a	n/a	n/a	Due to delicate, irregular and elastic skin of male genitalia, surgeons should have choice of razor or clipper for hair removal.	IVB

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128	Edmiston, Charles E. J., Griggs, Russell K., Tanner, Judith, Spencer, Maureen, Seabrook, Gary R. and Leaper, David. Perioperative hair removal in the 21st century: Utilizing an innovative vacuum-assisted technology to safely expedite hair removal before surgery. 2016	RCT	Male volunteers, simulated OR, United States	Surgical clippers fitted with vacuum-assisted hair collection device (SCVAD)	Standard surgical clippers (SSC)	Particulate dispersion, microbial contamination, clipping and clipping cleanup time	Significant reduction in residual hair, microbial contamination, and cleanup time with SCVAD compared to SSC.	IIB
129	Harris, PN, Ashhurst-Smith C, Berenger SJ et al. Adhesive tape in the health care setting: another high-risk fomite. <i>Medical Journal of Australia</i> , 2012. 196 (1) 34.	Nonexperimental	Partially used tape rolls, 3 hospitals, Australia	n/a	n/a	Bacterial species	Contamination of partially used adhesive tape, included VRE and MRSA. Visible contamination was noted on sides of tape.	IIIB
130	Leng, P., Huang, W. L., He, T., Wang, Y. Z. and Zhang, H. N. Outbreak of <i>Serratia marcescens</i> postoperative infection traced to barbers and razors 2015	Case Report	n/a	n/a	n/a	n/a	Strong microbiologic and epidemiologic evidence linked barbers and their razors as source of outbreak.	VA
131	Kim, EJ, Wan BP, Yoon, JK, Cho, WS et al. Outbreak investigation of <i>Serratia marcescens</i> neurosurgical site infections associated with a contaminated shaving razors. <i>Antimicrobial Resistance and Infection Control</i> . 2020;9(64); 1-7.	Case Report	n/a	n/a	n/a	n/a	An outbreak of <i>S marcescens</i> neurosurgical infections was associated with contaminated razors and brushes.	VA
132	Dai, Yuanyuana, Zhang, Chengfanga, Ma, Xiaolinga, et al. Outbreak of carbapenemase-producing <i>Klebsiella pneumoniae</i> neurosurgical site infections associated with a contaminated shaving razor used for preoperative scalp shaving 2014	Case Report	n/a	n/a	n/a	n/a	Use of same shaving razor by barber on multiple patients was likely the source of outbreak.	VB
133	Noorani, A., Rabey, N., Walsh, S. R. and Davies, R. J. Systematic review and meta-analysis of preoperative antisepsis with chlorhexidine versus povidone-iodine in clean-contaminated surgery 2010	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	CHG is preferred for antisepsis before clean-contaminated procedures.	IIB
134	Ayoub, Firas, Quirke, Michael, Conroy, Ronan and Hill, Arnold. Chlorhexidine-alcohol versus povidone-iodine for pre-operative skin preparation: A systematic review and meta-analysis 2015	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Chlorhexidine with alcohol was superior to povidone-iodine in prevention of SSIs in clean and clean-contaminated surgeries.	IA
135	Anggrahita T., Wardhana A. and Sudjtmiko, G. Chlorhexidine-alcohol versus povidone-Iodine as preoperative skin preparation to prevent surgical site infection: A meta-analysis. 2017	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Use of chlorhexidine-alcohol resulted in fewer SSIs and positive skin cultures compared to povidone-iodine.	IA
136	Harnoss, J. C., Assadian, O., Kramer, A., et al. Comparison of chlorhexidine-isopropanol with isopropanol skin antisepsis for prevention of surgical-site infection after abdominal surgery 2018	Quasi-experimental	Patients undergoing elective midline laparotomy, university hospital, Germany	CHG with 70% isopropanol alcohol (IPA)	70% isopropanol alcohol (IPA)	Incidence of superficial and deep SSIs at postoperative day(POD)10	A significant difference on POD 10 between groups. The CHG was independent factor in SSI incidence.	IIB
137	Madej T., Plotze K., Birkner C., Jatzwauk L., Klaus M. and Waldow, T. Reducing Mediastinitis after Sternotomy with Combined Chlorhexidine-Isopropyl Alcohol Skin Disinfection: Analysis of 3,000 Patients. 2016	Quasi-experimental	Patients undergoing cardiac surgery with median sternotomy, university hospital, Germany	2% chlorhexidine gluconate and 70% isopropyl alcohol (IPA)	55% isopropyl alcohol applied three times	Incidence of post-sternotomy mediastinitis within 30 days of surgery.	Skin disinfection with chlorhexidine gluconate in alcohol when compared to alcohol alone does effectively reduces post-sternotomy mediastinitis.	IIA
138	Privitera, Gaetano P., Costa, Anna L., Brusaferrero, Silvio, et al. Skin antisepsis with chlorhexidine versus iodine for the prevention of surgical site infection: A systematic review and meta-analysis 2017	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Moderate quality evidence supports CHG for preoperative skin antisepsis. High quality evidence shows use of CHG is associated with fewer positive skin cultures.	IIB

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139	Hakkarainen T.W., Dellinger E.P., Evans H.L., et al. Comparative effectiveness of skin antiseptic agents in reducing surgical site infections: A report from the Washington state surgical care and outcomes assessment program. 2014	Quasi-experimental	Patients undergoing clean-contaminated surgery, 47 hospitals, United States	Antiseptics with and without isopropyl alcohol	none	Incidence of SSI; effect of isopropyl alcohol on SSI incidence	One antiseptic was not more effective than another at reducing SSIs. Additionally, isopropyl alcohol in antiseptic agents did not reduce risk for SSIs.	IIA
140	Maiwald M, Chan ES-Y. The forgotten role of alcohol: a systematic review and meta-analysis of the clinical efficacy and perceived role of chlorhexidine in skin antisepsis. <i>Plos One</i> . 2012.;7(9);e44277	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	The role of alcohol in antiseptics has been overlooked. Perceived efficacy of CHG may be the efficacy of CHG-alcohol combinations.	IIA
141	Charles, Daniel B. S., Heal, Clare F., Delpachitra, Meth, et al. Alcoholic versus aqueous chlorhexidine for skin antisepsis: the AVALANCHE trial 2017	RCT	Patients undergoing excision of both benign and malignant skin lesions, 4 general practice offices, Australia	0.5% chlorhexidine in 70% ethanol	0.5% chlorhexidine aqueous solution	Surgical site infection within 30 days of excision; incidence of adverse reactions	No significant difference in efficacy of alcohol-based or aqueous CHG was found on prevention of minor skin excision SSIs. No difference in adverse events was found between the two groups.	IA
142	Young, Heather L., Reese, Sara, Knepper, Bryan, Miller, Amber, Mauffrey, Cyril and Price, Connie S. The Effect of Preoperative Skin Preparation Products on Surgical Site Infection 2014	Nonexperimental	Patients undergoing surgery that included SSI surveillance, hospital, United States	n/a	n/a	Variables associated with presence of SSI	CHG with alcohol was associated with fewer SSIs than CHG alone.	IIIB
143	Da Costa A., Tulane C., Dauphinot V., et al. Preoperative skin antiseptics for prevention of cardiac implantable electronic device infections: A historical-controlled interventional trial comparing aqueous against alcoholic povidone-iodine solutions. 2015	Quasi-experimental	Patients undergoing cardiac implantable electronic device (CIED), university hospital, France	10% alcohol povidone-iodine, rinse and dry, followed by surgeon application of 10% alcohol povidone-iodine twice	4% aqueous povidone-iodine, then 10% aqueous povidone-iodine, rinse and dry, followed by surgeon application of	CIED infections	CIED infection remained unaltered whether using alcoholic or aqueous povidone-iodine solution	IIA
144	Digison MB. A review of anti-septic agents for preoperative skin preparation. <i>Plast Surg Nurs</i> . 2007;27(4):185-189.	Literature Review	n/a	n/a	n/a	n/a	Perioperative RNs should be informed of antiseptic product characteristics and select products based on efficacy and safety.	VB
145	Murkin CE. Pre-operative antiseptic skin preparation.. <i>British Journal of Nursing</i> . 2009;18(11): 665-669.	Literature Review	n/a	n/a	n/a	n/a	Perioperative RNs should emphasize the importance of skin preparation and the correct application techniques.	VA
146	Broach, R. B., Paulson, E. C., Scott, C. and Mahmoud, N. N. Randomized Controlled Trial of Two Alcohol-based Preparations for Surgical Site Antisepsis in Colorectal Surgery 2017	RCT	Patients undergoing clean contaminated colorectal surgery, university hospital, United States	2% chlorhexidine with 70% alcohol	Iodine povacrylex alcohol (IPA)	Superficial or deep SSI within 30 days using CDC criteria	The difference in SSI rate between IPA (18.7%) and chlorhexidine-alcohol (15.9%) was 2.8%.	IA
147	Hannan, Margaret M., O'Sullivan, Katie E., Higgins, Ann M., et al. The Combined Impact of Surgical Team Education and Chlorhexidine 2% Alcohol on the Reduction of Surgical Site Infection following Cardiac Surgery 2015	Quasi-experimental	Patients undergoing elective cardiac surgery, hospital, Ireland	2% CHG with 70% alcohol and surgical team education	Povidone-iodine with alcohol (PA)	SSI incidence	The use of CHG with alcohol and team education resulted in significantly lower SSI rates compared to PA.	IIB

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148	Yammine K, Harvey A. Efficacy of preparation solutions and cleansing techniques on contamination of the skin in foot and ankle surgery: A systematic review and meta-analysis. <i>Bone & Joint Journal</i> . 2013;95(4): 498-503.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	PI-alcohol was more effective than CHG-alcohol in reducing flora; many studies showed difficulty eliminating bacteria on the foot, especially the forefoot areas. Although some studies did not clearly describe scrubbing techniques, the use of vigorous scrubbing may reduce fungal contamination of the foot.	IB
149	Peel, T. N., Dowsey, M. M., Buising, K. L., Cheng, A. C. and Choong, P. F. M. Chlorhexidine-alcohol versus iodine-alcohol for surgical site skin preparation in an elective arthroplasty (ACAISA) study: a cluster randomized controlled trial 2019	RCT	Patients undergoing elective hip or knee arthroplasty, university hospital, Australia	0.5% chlorhexine with 70% ethanol	1% iodine with 70% ethanol	Superficial wound complications; surgical site infection	No difference in superficial wound complications. Iodine-alcohol prevented more SSIs than chlorhexidine alcohol.	IA
150	Swenson BR, Hedrick TL, Metzger R. et al. Effects of preoperative skin preparation on postoperative wound infection rates: a prospective study of 3 skin preparation protocols. <i>Infect Control Hops Epidemiol</i> . 2009;30(10):964-971.	Quasi-experimental	General Surgery	3 groups: (1) PI scrub, alcohol paint, PI paint	(2) Chloraprep, (3) Duraprep	SSI	Iodophor-based compounds may be superior to chlorhexidine for this purpose in general surgery patients.	IIB
151	Raja, Shahzad G., Rochon, Melissa, Mullins, Clair, et al. Impact of choice of skin preparation solution in cardiac surgery on rate of surgical site infection: a propensity score matched analysis 2018	Quasi-experimental	Cardiac surgery patients, community hospital, United Kingdom	2% CHG with alcohol	10% Povidone-iodine (PI) with alcohol	Incidence of all SSIs (superficial, deep incisional, organ space)	Overall rate of SSIs similar in both groups. However, PI alcohol was marginally more effective against organ space SSIs.	IIA
152	Charehbili, Ayoub, Swijnenburg, Rutger-Jan, van de Velde, Cornelis, van den Bremer, Jephtha and van Gijn, Willem. A retrospective analysis of surgical site infections after chlorhexidine-alcohol versus iodine-alcohol for pre-operative antisepsis. 2014	Nonexperimental	Patients undergoing breast, colon or vascular surgery, university hospital, Netherlands	0.5% chlorhexidine gluconate in 70% isopropyl alcohol	1% iodine in 70% alcohol	Surgical site infection as defined by CDC	A significant difference in SSI rates was not found between groups.	IIIA
153	Ngai, Ivan M., Van Arsdale, Anne, Govindappagari, Shrvaya, et al. Skin Preparation for Prevention of Surgical Site Infection After Cesarean Delivery: A Randomized Controlled Trial 2015	RCT	Patients undergoing nonemergent cesarean delivery, medical center, United States	Povidone-iodine with alcohol (PA) and chlorhexidine with alcohol (CA)	Povidone-iodine with alcohol (PA) or chlorhexidine with alcohol (CA)	Surgical site infection within first 30 days postpartum	Similar rates of SSIs found when either solution was applied separately or sequentially, leading authors to conclude that there was no particular method of skin prep that was better than the other.	IA
154	Shadid, M. B., Speth, M. J. G. M., Voorn, G. P. and Wolterbeek, N. Chlorhexidine 0.5%/70% Alcohol and Iodine 1%/70% Alcohol Both Reduce Bacterial Load in Clean Foot Surgery: a Randomized, Controlled Trial 2019	RCT	Patients undergoing elective foot surgery, hospital, Netherlands	Chlorhexidine 0.5% with 70% alcohol	Iodine 1% with 70% alcohol	Wound complication rates at 2 and 6 weeks. Positive cultures before surgery.	No significant difference in postoperative complication rates or number of positive foot cultures between solutions.	IB
155	Savage JW, Weatherford BM, Sugrue PA, et al. Efficacy of surgical preparation solutions in lumbar spine surgery. <i>Journal of Bone & Joint Surgery - American Volume</i> . 2012;94(6): 490-494.	RCT	Orthopedic surgery, Lumbar Spine	Chloraprep	Duraprep	Cultures	Chloraprep and Duraprep were equivalent for removing bacterial pathogens in the lumbar spine.	IA
156	Carvajal J., Carvajal M. and Hernandez, G. Back to Basics: Could the Preoperative Skin Antiseptic Agent Help Prevent Biofilm-Related Capsular Contracture?. 2019	Quasi-experimental	Patients undergoing breast augmentation with silicone implants, ambulatory surgical center, Columbia	4% chlorhexidine gluconate (CHG)	10% povidone-iodine (PI)	Capsular contracture (CC)	Capsular contracture was higher in PI group and absent in CHG group.	IIB

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157	Letzelter, Joseph H., J., Bradford Hacquebord, Jacques. An Overview of Skin Antiseptics Used in Orthopaedic Surgery Procedures 2019	Literature Review	n/a	n/a	n/a	n/a	Each part of body has its own microbiota which may display different responses to same skin antiseptic. A recommendation chart provides skin antiseptic for different anatomic areas.	VA
158	Tolcher, Mary C., Whitham, Megan D., El-Nashar, Sherif A. and Clark, Steven L. Chlorhexidine Alcohol Compared with Povidone Iodine Preoperative Skin Antisepsis for Cesarean Delivery: A Systematic Review and Meta-Analysis 2019	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Risk of SSI in cesarean delivery was significantly reduced using CHG with alcohol compared with povidone-iodine solution with or without alcohol.	IA
159	Hadiati D.R., Hakimi M., Nurdiati D.S. and Ota, E. Skin preparation for preventing infection following caesarean section. 2018	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	There is insufficient evidence to determine what different agents and skin preparation methods are most effective for preventing postcesarean surgical site infection, or reducing undesirable outcomes for mother and baby. There is a need for more high-quality research.	IA
160	Dior,Uri P.; Kathusinghe,Shamitha; Cheng,Claudia; Reddington,Charlotte; Daley,Andrew J.; Ang,Catarina; Healey,Martin. Effect of surgical skin antiseptics on surgical site infections in patients undergoing gynecological laparoscopic surgery: A double-blind randomized clinical trial. <i>JAMA</i> . July 2020	RCT	Patient undergoing gynecological laparoscopies, university hospital, United States	Alcohol-based chlorhexidine; Alcohol-based povidone-iodine	Water-based povidone-iodine	SSI 30 days after surgery	None of the 3 antiseptics provided a greater SSI reduction than the other.	IA
161	Elshamy E., Ali Y.Z.A., Khalafallah M. and Soliman, A. Chlorhexidine-alcohol versus povidone-iodine for skin preparation before elective cesarean section: a prospective observational study. 2018	Quasi-experimental	Patients undergoing elective cesarean delivery, hospital, Saudia Arabia	2% CHG wit 70% alcohol	Povidone-iodine	Superficial and deep SSI withing 1 month per CDC definitions; readmission	Skin preparation with either agent resulted in comparable SSI rates.	IIA
162	Uppal, Shitanshu B. S., Bazzi, Ali, Reynolds, R. K., et al. Chlorhexidine-Alcohol Compared With Povidone-Iodine for Preoperative Topical Antisepsis for Abdominal Hysterectomy 2017	Quasi-experimental	Patients undergoing abdominal hysterectomy, medical center, United States	Chlorhexidine-alcohol	Povidone-iodine (PI)	Surgical site infection (superficial, deep or organ space) within 30 days of surgery	CHG with alcohol is associated with lower incidence of SSI compared with PI.	IIA
163	Park H.M., Han S.S., Lee E.C., et al. Randomized clinical trial of preoperative skin antisepsis with chlorhexidine gluconate or povidone-iodine. 2017	RCT	Patients undergoing clean-contaminated abdominal surgery, cancer center, South Korea	4% chlorhexidine soap, followed by 2% chlorhexidine solution	7.5% povidone-iodine soap, followed by 10% povidone-iodine solution	Occurrence of SSI within 30 days of surgery	There was no difference in SSI rates between the two groups.	IA
164	Srinivas A., Kaman L., Raj P., et al. Comparison of the efficacy of chlorhexidine gluconate versus povidone iodine as preoperative skin preparation for the prevention of surgical site infections in clean-contaminated upper abdominal surgeries. 2015	RCT	Patients undergoing clean-contaminated upper abdominal surgery, hospital, India	0.5% chlorhexidine gluconate in 70% isopropyl alcohol	5% povidone-iodine paint	Incidence of surgical site infections within 30 days of surgery	SSI incidence was lower with the use of CHG in 70% alcohol compared to PI.	IA

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165	Kaoutzanis, Christodoulos M. D., Kavanagh, Crystal M. M. D., Leichtle, Stefan W. M. D., et al. Chlorhexidine With Isopropyl Alcohol Versus Iodine Povacrylex With Isopropyl Alcohol and Alcohol-Versus Nonalcohol-Based Skin Preparations: The Incidence of and Readmissions for Surgical Site Infections After Colorectal Operations 2015	Nonexperimental	Patients undergoing clean-contaminated colorectal procedures, multiple hospitals, United States	2% CHG with 70% alcohol; Alcohol-based skin preparation (ABSP) agents	0.7% iodine povacrylex with 74% isopropyl alcohol; Nonalcohol-based skin	Incidence of SSI and readmission within 30 days of procedure	A significant decrease in SSI or readmission was not found for any of the skin preparation agents.	IIIA
166	Kleeff J., Erkan M., Jager C., Menacher M., Gebhardt F. and Hartel, M. Umbilical Microflora, Antiseptic Skin Preparation, and Surgical Site Infection in Abdominal Surgery. 2015	Quasi-experimental	Patients undergoing open elective abdominal surgery, university hospital, Germany	Povidone-iodine	None	Umbilical bacterial culture before and after povidone-iodine; SSI within 30 days of surgery	Antiseptic skin prep did not completely eradicate umbilical microflora in one quarter of patients. Seven patients developed SSI, with only one causative organism same as umbilical flora.	IIB
167	Spaziani, Erasmo, Di Filippo, Annalisa, Orelli, Simone, et al. Pre-Operative Skin Antisepsis with Chlorhexidine Gluconate and Povidone-Iodine to Prevent Port-Site Infection in Laparoscopic Cholecystectomy: A Prospective Study 2018	Nonexperimental	Patients undergoing laparoscopic cholecystectomy, university hospital, Italy	Povidone-iodine skin antiseptic, immediately followed by chlorhexidine with alcohol. Dry for 4 minutes.	None	Incidence of all types of surgical site infection within 30 days.	Proposed combined skin antisepsis is effective in reducing port-site infections	IIIB
168	Said, Nesma S. Comparison between Uses of Chlorhexidine Gluconate versus Povidone Iodine for Skin Preparation to Prevent Infection after Cardiothoracic Surgery 2017	Quasi-experimental	Patients undergoing open heart surgery, university hospital, Egypt	4% CHG with isopropyl alcohol	10% povidone iodine (PI)	Signs, symptoms and laboratory findings from wound; side effects of antiseptic	The PI group had the most signs and symptoms of wound infection, as well as side effects. No organisms found in CHG group, whereas organisms such as <i>S aureus</i> were found in PI group.	IIA
169	Qintar M., Zardkoohi O., Hammadah M., et al. The impact of changing antiseptic skin preparation agent used for cardiac implantable electronic device (CIED) procedures on the risk of infection. 2015	Quasi-experimental	Patients undergoing cardiac implantable electronic device (CIED) procedures, university hospital, United States	Povidone-iodine skin antiseptic	Chlorhexidine-alcohol skin antiseptic	Pocket or envascular systemic infection requiring removal of CIED within one year of procedure.	No significant difference in infection rate among both groups, leading researchers to conclude antiseptic agent was not associated with risk of developing CIED infection.	IIB
170	Asundi A., Stanislawski M., Mehta P., et al. Real-world effectiveness of infection prevention interventions for reducing procedure-related cardiac device infections: Insights from the veterans affairs clinical assessment reporting and tracking program. 2019	Nonexperimental	Patients undergoing cardiac implantable electronic device (CIED) procedures, VA hospitals, United States	n/a	n/a	CIED infections within 6 months; measures associated with increased odds of infection	Intraoperative skin cleaning with chlorhexidine and receipt of beta-lactam antimicrobial prophylaxis were effective prevention interventions.	IIIA
171	Casey A., Itrakjy A., Birkett C., et al. A comparison of the efficacy of 70% v/v isopropyl alcohol with either 0.5% w/v or 2% w/v chlorhexidine gluconate for skin preparation before harvest of the long saphenous vein used in coronary artery bypass grafting. 2015	RCT	Patients undergoing harvest of long saphenous vein, university hospital, United Kingdom	0.5% chlorhexidine gluconate(CHG) in 70% isopropyl alcohol	2% chlorhexidine gluconate(CHG) in 70% isopropyl alcohol	Bacterial counts at skin incision; surgical site infection	2% CHG with isopropyl alcohol reduced number of organisms on patient's skin compared to 0.5% CHG with isopropyl alcohol.	IB

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172	Davis, Frank M. a., Sutzko, Danielle C. a., Grey, Scott F. b., et al. Predictors of surgical site infection after open lower extremity revascularization 2017	Nonexperimental	Patients undergoing elective or urgent lower extremity bypass (LEB) procedures, 35 hospitals, United States	n/a	n/a	Predictors of SSI acquisition	Noniodine-based skin preparation, controlling intraoperative glucose, and decreasing length of surgery contributed to SSI reduction.	IIIA
173	Xu, Peter Z., Fowler, John R. and Goitz, Robert J. Prospective Randomized Trial Comparing the Efficacy of Surgical Preparation Solutions in Hand Surgery. 2017	RCT	Patients undergoing elective soft tissue hand procedures, hospital, United States	CHG with alcohol <i>or</i> PI with alcohol	Povidone-iodine (PI)	Postpreparation bacterial count; infection within 6 weeks of surgery	PI alone and PI with alcohol were superior to CHG with alcohol in reducing bacterial count.	IB
174	Becerro de Bengoa Vallejo R, Losa Iglesias ME, Alou Cervera L, Sevillano Fernandez D, Prieto Prieto J. Preoperative skin and nail preparation of the foot: comparison of the efficacy of 4 different methods in reducing bacterial load. J Am Acad Dermatol. 2009;61(6):986–992	RCT	Orthopedic surgery, Foot/Ankle	5 min scrub 7.5% PI, paint 10% PI; same as #1, but with 3 min prewash 70% alcohol	5 min scrub 4% CHG., paint with 70% alcohol; immersion in 4% CHG and water, 3 min prewash with 70% alcohol, 5 min scrub 7.5% PI,	Bacterial load	Nails on the foot had some degree of contamination with all preparation techniques, although the combination of alcohol and povidone-iodine had the best reduction of bacterial load.	IB
175	Ritter B., Herlyn P.K.E., Mittlmeier T. and Herlyn, A. Preoperative skin antisepsis using chlorhexidine may reduce surgical wound infections in lower limb trauma surgery when compared to povidone-iodine - a prospective randomized trial. 2019	RCT	Patients undergoing elective or emergency trauma surgery of lower extremities, university hospital, Germany	2% chlorhexidine gluconate with 70% alcohol	1% povidone-iodine and 50% 2-propanol	Occurrence of SSI within 6 months after surgery; wound healing disorders (WHD)	Rates of SSI and WHDs were significantly higher in povidone-iodine with alcohol group.	IB
176	Heckmann N., Sivasundaram L., Heidari K.S., et al. Propionibacterium Acnes Persists Despite Various Skin Preparation Techniques. 2018	Quasi-experimental	Volunteers, simulated OR, United States	Paint with 2% CHG with IPA; Scrub with 2% CHG with IPA; Scrub with 4% CHG with IPA	Paint with 70% isopropyl alcohol (IPA)	<i>P. acnes</i> presence in punch biopsy of dermis	<i>P. acnes</i> remained regardless of which skin preparation and technique were used.	II B
177	Blonna, Davide, Allizond, Valeria, Bellato, Enrico, et al. Single versus Double Skin Preparation for Infection Prevention in Proximal Humeral Fracture Surgery. 2018	Quasi-experimental	Patients undergoing surgery for displaced proximal humeral fracture (PHF), university hospital, Italy	4% chlorhexidine gluconate followed by 1% povidone-iodine and 50% isopropyl alcohol	1% povidone-iodine and 50% isopropyl alcohol	Bacterial load of coagulase-negative staphylococci (CoNS), <i>Propionibacterium acnes</i> (<i>P. acnes</i>) and <i>Staphylococcus aureus</i>	Both methods significantly reduced <i>S. aureus</i> and <i>P. acnes</i> , but the double skin prep was more effective at reducing CoNS.	II B
178	Yoshii, Toshitaka, Hirai, Takashi, Yamada, Tsuyoshi, et al. A Prospective Comparative Study in Skin Antiseptic Solutions for Posterior Spine Surgeries: Chlorhexidine-Gluconate Ethanol Versus Povidone-iodine 2018	Quasi-experimental	Patients undergoing posterior spine surgery, university hospital, Japan	0.5% chlorhexidine (CHG) in ethanol	10% povidone-iodine (PI)	Bacterial loads from skin adjacent to incision before skin prep, after skin prep, and after wound closure.	CHG-ethanol and PI were equally effective at eliminating bacterial load from surgical site. However, CHG-ethanol showed a long-lasting effect.	II B

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179	Ghobrial, George M., Wang, Michael Y., Green, Barth A., et al. Preoperative skin antisepsis with chlorhexidine gluconate versus povidone-iodine: a prospective analysis of 6959 consecutive spinal surgery patients 2017	Quasi-experimental	Patients undergoing all types of spinal surgery, hospital, United States	70% isopropyl alcohol followed by CHG with alcohol (2 applicators)	70% isopropyl alcohol followed by PI scrub and paint	SSI defined as reoperation at the same surgical location	Neither CHG with alcohol or PI scrub and paint had a significant impact on SSI.	IIA
180	DailyMed. US National Library of Medicine. Chlorhexidine gluconate 4% liquid. (Cardinal health) https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=4a645652-ae2f-3811-e054-00144ff8d46c . Accessed July 10, 2020.	Regulatory	n/a	n/a	n/a	n/a	Database of product labels and package inserts, includes antiseptic products.	n/a
181	Sviggum HP, Arendt KW, Mauermann ML, Horlocker TT, Hebl JR. Neurologic complications after chlorhexidine antiseptics for spinal anesthesia. <i>Reg Anesth Pain Med</i> 2012;37(2):139-144.	Nonexperimental	Non-experimental	n/a	n/a	New or progressive neurological deficits	Spinal anesthesia with CHG-alcohol skin antiseptics resulted in 0.04% neurological complications.	IIIB
182	Eason E, Wells G, Garber G, et al. Antisepsis for abdominal hysterectomy: a randomized controlled trial of povidone-iodine gel. <i>BJOG</i> . 2004;111(7):695-699.	RCT	Adults, Gynecological	PI Gel	No prep	SSI	Povidone-iodine gel for vaginal antisepsis in abdominal hysterectomy decreased the risk of abscess, but did not show a significant reduction in overall infections.	IA
183	Rastogi S., Glaser L, Friedman J, et al. Tolerance of Chlorhexidine Gluconate Vaginal Cleansing Solution: A Randomized Controlled Trial. <i>Journal of Gynecologic Surgery</i> 2020 36:1, 13-19	RCT	Women undergoing hysteroscopy, university hospital, United States	4% chlorhexidine gluconate (CHG)/isopropyl alcohol	7.5% povidone-iodine	Presence and severity of vaginal dryness, vaginal burning, vaginal itching, unusual vaginal discharge, and burning or pain	When compared to PI, CHG resulted in adverse vaginal and urinary symptoms in immediate postoperative period as well as 24-48 hours postoperatively	IB
184	Culligan PJ, Kubik K, Murphy M, Blackwell, Snyder J. A randomized trial that compared povidone iodine and chlorhexidine as antiseptics for vaginal hysterectomy. <i>Am J Obstet Gynecol</i> 2005;192:422.	RCT	Adults, Gynecological	4% CHG vaginal preparation	10% PI vaginal preparation	Bacterial colony counts; SSI	Significant decrease in bacterial colony counts from vaginal flora at 30 minutes with CHG. No difference in SSI rate.	IA
185	Al-Niaimi, Ahmed, Rice, Laurel W., Shitanshu, Uppal, et al. Safety and tolerability of chlorhexidine gluconate (2%) as a vaginal operative preparation in patients undergoing gynecologic surgery 2016	Quasi-experimental	Patients undergoing gynecologic surgery with vaginal prep, university hospital, United States	2% chlorhexidine gluconate vaginal prep	Povidone-iodine vaginal prep	Postoperative vaginal irritation; Allergic reaction	2% chlorhexidine gluconate did not cause increase in vaginal irritation when compared with povidone-iodine. No allergic reactions were reported.	IIIB
186	Amstey MS, Jones AP. Preparation of the vagina for surgery. A comparison of povidone-iodine and saline solution. <i>JAMA</i> . 1981;245(8): 839-841.	Nonexperimental	Adults, Gynecological	n/a	n/a	Cultures	Sterile saline for vaginal antisepsis was as effective as povidone-iodine.	IIIB
187	Lewis LA, Lathi RB, Crochet P, Nezhat C. Preoperative vaginal preparation with baby shampoo compared with povidone-iodine before gynecologic procedures. <i>Journal of Minimally Invasive Gynecology</i> . 2007;14(6): 736-739.	Quasi-experimental	Adults, Gynecological	Shampoo 1:10	PI 7.5%	SSI	Baby shampoo is as effective as povidone-iodine for antisepsis before gynecological procedures for preventing postoperative infections.	IIA
188	Haas D.M., Morgan S. and Contreras, K. Vaginal preparation with antiseptic solution before cesarean section for preventing postoperative infections. 2014	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Preoperative vaginal cleansing with PI or CHG before performing cesarean delivery may be considered to reduce risk of infection of the uterus.	IA

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189	Caissutti, C., Saccone G, Aullo F et al. Vaginal cleansing before cesarean delivery: A systematic review and meta-analysis, 2017 <i>Obstet Gynecol</i> , 130(3) 527-528.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Vaginal cleansing with PI prior to cesarean delivery for women in labor and with ruptured membranes significantly reduced postoperative endometritis.	IA
190	Aref, Nisreen K. Vaginal cleansing prior to caesarian section: To do or not to do?: A randomized trial. 2019	RCT	Patients undergoing elective cesarean delivery, hospital, Saudia Arabia	Preoperative vaginal cleansing for 1 minute with 10% povidone-iodine	No preoperative vaginal cleansing	Postoperative infectious morbidity (endometritis, fever, wound infection)	Significant reduction in overall infectious morbidity in the intervention group, with greatest reduction in endometritis.	IB
191	Lakhi, Nisha A., Tricorico, Gabrielle, Osipova, Yevgeniya and Moretti, Michael L. Vaginal cleansing with chlorhexidine gluconate or povidone-iodine prior to cesarean delivery: a randomized comparator-controlled trial 2019	RCT	Women undergoing nonemergent cesarean delivery,	4% CHG vaginal preparation	10% PI vaginal preparation	SSI incidence within 14 days of procedure; patient reported side-effects	Rate of SSI was significantly lower with CHG vaginal preparation. No patient-reported adverse reactions with either preparation.	IA
192	La Rosa, Mauricio, Jauk, Victoria, Saade, George, et al. Institutional Protocols for Vaginal Preparation With Antiseptic Solution and Surgical Site Infection Rate in Women Undergoing Cesarean Delivery During Labor. 2018	Quasi-experimental	Women undergoing cesarean delivery during labor, multiple hospitals, United States	Antiseptic vaginal preparation before cesarean delivery as outlined in institutional policy	No vaginal preparation before cesarean delivery	Rate of SSI within 6 weeks of C-section, defined by CDC criteria	Institutions with vaginal preparation policies did not have lower rates of SSIs.	IIA
193	Quiroga LP, Lansing V, Laspina F et al. A prospective study demonstrating the effect of 5% povidone-iodine application for anterior segment intraocular surgery in Paraguay. <i>Arq Bras Oftalmol</i> . 2010;73(2):125–128	Nonexperimental	Eye	5% PI irrigation, cultures taken at 3 time points	n/a	Bacterial load	Conjunctival irrigation with a 5% povidone-iodine solution effectively reduces conjunctival flora.	IIIA
194	Wu PC, Li M, Chang SJ et al. Risk of endophthalmitis after cataract surgery using different protocols for povidone-iodine preoperative disinfection. <i>J Ocul Pharmacol Ther</i> . 2006;22(1):54–61.	Quasi-experimental	Eye	Antisepsis with PI 5% and 10%	n/a	Endophthalmitis	Preoperative skin disinfection with 10% PI and conjunctival disinfection with 5% PI significantly reduced the relative risk of postoperative endophthalmitis.	IIA
195	Baillif S, Roure-Sobas C, Le-Duff F, Kodjikian L. Aqueous humor contamination during phacoemulsification in a university teaching hospital. <i>J Fr Ophthalmol</i> . 2012;35(3):153–156	Nonexperimental	Eye	n/a	n/a	Anterior chamber cultures; endophthalmitis	Careful antisepsis can lower anterior chamber contamination.	IIIB
196	The American Academy of Ophthalmology Cataract and Anterior Segment Panel. (Olsen, RJ, Braga-Mele, R, Chen SH, et al.) Preferred Practice Patterns Guidelines. Cataract in the adult eye preferred practice pattern. 2016. http://www.aao.org/preferred-practice-pattern/cataract-in-adult-eye-ppp	Guideline	n/a	n/a	n/a	n/a	For adult patients undergoing cataract surgery recommendation is topical PI 5% drops instilled into conjunctival sac preoperatively	IVA
197	Li B, Nentwich MM, Hoffmann LE, et al. Comparison of the efficacy of povidone-iodine 1.0%, 5.0%, and 10.0% irrigation combined with topical levofloxacin 0.3% as preoperative prophylaxis in cataract surgery. <i>Journal of Cataract & Refractive Surgery</i> . 2013;	RCT	Eye	PI- 1%, 5%, 10%	no PI, no surgery	Bacterial load	10% povidone-iodine was more effective than 1% and 5% PI for reducing conjunctival bacterial load before surgery.	IA
198	Nguyen, Chu L., Oh, Lawrence J., Wong, Eugene and Francis, Ian C. Povidone-iodine 3-minute exposure time is viable in preparation for cataract surgery. 2017	Quasi-experimental	Patients undergoing phacoemulsification cataract surgery by 1 surgeon, private hospital, Australia	10% povidone-iodine(PI) applied to cornea, eyelids, periorbital skin for 3 minutes, then lids dried	None	Adverse events related to PI; postoperative endophthalmitis; visual outcomes	No incidences of adverse events, endophthalmitis or unsatisfactory visual outcomes, leading researchers to conclude three minute exposure of 10% PI is viable in cataract surgery.	II B

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199	Razavi B, Zollinger R, Kramer A, et al. Systemic iodine absorption associated with the use of preoperative ophthalmic antiseptics containing iodine.. <i>Cutaneous & Ocular Toxicology</i> . 2013;32(4): 279-282.	Quasi-experimental	Eye	1.25% PI, 10% PI	Iodine-free antiseptic	Ioduria	Conjunctival and perioperative application of 1.25% povidone-iodine resulted in no significant ioduria, although 10% PI did show significant ioduria. Iodism from topical PI application may effect thyroid function, but further research is needed.	IIB
200	Garcia, Giancarlo A. A. B., Nguyen, Christine V. M. D., Yonkers, Marc A. M. D., Ph.D., Tao, Jeremiah P. M. D. and F.A.C.S. Baby Shampoo Versus Povidone-Iodine or Isopropyl Alcohol in Reducing Eyelid Skin Bacterial Load 2018	RCT	Healthy volunteers, eye institute, United States	Diluted baby shampoo	10% povidone-iodine (PI) <i>or</i> 70% isopropyl alcohol (IA)	Postcleansing eyelid skin bacterial load measured in colony-forming units (CFUs)	Baby shampoo achieved comparable diminution in eyelid skin bacterial load to PI and IA	IB
201	21 CFR Part 310 2017. Safety and Effectiveness of Health Care Antiseptics; Topical Antimicrobial Drug Products for Over-the-Counter (OTC) Human Use.	Regulatory	n/a	n/a	n/a	n/a	Provides new safety and effectiveness data on active ingredients in OTC antiseptic products intended for use in healthcare situations.	
202	FDA. Safety Alerts for Human Medical Products > Over-the-Counter Topical Antiseptic Products: Drug Safety Communication - FDA Requests Label Changes and Single-Use Packaging to Decrease Risk of Infection 2013	Regulatory	n/a	n/a	n/a	n/a	Antiseptics should be packaged in single use packaging, to be used one time for one patient. Antiseptics should not be diluted.	
203	FDA. Questions and Answers: FDA requests label changes and single-use packaging for some over-the-counter topical antiseptic products to decrease risk of infection	Regulatory	n/a	n/a	n/a	n/a	Provides clarifications on recommendation for single use and label requirement as sterile or nonsterile. Refer to main recommendation for further guidance.	
204	Pearce BA, Miller LH, Martin MA, Roush DL. Efficacy of clean v sterile surgical prep kits. <i>AORN J</i> . 1997;66(3): 464-470.	RCT	Ambulatory surgery patients, university hospital, United States	Sterile prep kits	Clean prep kits	Cultures	There was no difference in the residual microbial skin flora in the patients prepped with clean or sterile skin prep kits.	IB
205	Sullivan PJ, Healy CE, Hirpara KM et al. An assessment of skin preparation in upper limb surgery. <i>J Hand Surg Eur Vol</i> . 2008;33(4): 513-514.	Quasi-experimental	Orthopedic surgery, Arm	Clear antiseptic	Iodine-based antiseptic	Area of skin missed	Clear antiseptic had more missed spots and more missed areas in finger areas than iodine-based antiseptic.	IIB
206	McDaniel C.M., Churchill R.W. and Argintar, E. Visibility of tinted chlorhexidine gluconate skin preparation on varied skin pigmentations. <i>Orthopedics</i> 2017;40(1):e44-e48.	Quasi-experimental	Volunteers divided into 4 skin pigmentation categories, simulated OR, United States	CHG with 70% isopropyl alcohol with Scrub Teal tint; CHG with 70% isopropyl alcohol with Hi-lite Orange tint following IFU	CHG with 70% isopropyl alcohol with Scrub Teal tint; CHG with 70% isopropyl alcohol with Hi-lite Orange tint without following IFU	Identification of adequacy of skin coverage with prep solution	To reduce risk of SSI from inadequate skin prep coverage, Hi-lite Orange tint should be used for fair and medium-fair skin pigmentation and Scrub Teal tint for medium dark and dark skin pigmentation.	IIC

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207	Quatresooz P, Xhaufaire-Uhoda E, Pierard-Franchimont C, Pierard GE. Regional variability in stratum corneum reactivity to antiseptic formulations.. <i>Contact Derm.</i> 2007;56(5): 271-273.	Nonexperimental	Healthy volunteer	n/a	n/a	Stratum corneum reactivity	Skin does not react in an identical way to the action of chemicals over all anatomic sites, and irritancy varies.	IIIB
208	Sanders, TH, Hawken, SM. Chlorhexidine burns after shoulder arthroscopy. <i>Am J Orthop (Belle Mead NJ).</i> 2012;41(4):172-174.	Case Report	n/a	n/a	n/a	n/a	Increased potential for skin irritation (ie, chemical burns in 3 patients) to CHG from traction of procedure and swelling in shoulder.	VB
209	American Academy of Allergy Asthma and Immunology (AAAAI) Position Statement: The Risk of Severe Allergic Reactions from the Use of Potassium Iodide for Radiation Emergencies	Position Statement	n/a	n/a	n/a	n/a	Contact dermatitis caused by topically applied iodine-containing antibacterials does not indicate an allergy to iodine. Anaphylaxis to these preparations is exceedingly rare and not proven to be due to iodine. Fish or seafood allergy does not indicate allergy to iodine.	IVB
210	Schabelman E, Witting M. The relationship of radiocontrast, iodine and seafood allergies: a medical myth exposed. <i>J Emerg Med.</i> 2010;39(5) 701-707.	Literature Review	n/a	n/a	n/a	n/a	Allergies to shellfish are not related to iodine allergy.	VA
211	Huang, SW. Seafood and iodine: an analysis of a medical myth. <i>Allergy Asthma Proc.</i> 2005; 26(6). 468-469.	Nonexperimental	Pediatric patients and parents, allergy clinic, United States	n/a	n/a	Survey on beliefs regarding relation of seafood allergy to iodine allergy	Education is needed that teaches seafood allergy is not related to iodine allergy and many other foods contain iodine.	IIIC
212	Adachi A, Fukunaga A, Hayashi K et al. Anaphylaxis to polyvinylpyrrolidone after vaginal application of povidone-iodine. <i>Contact Dermatitis.</i> 2003;48(3): 122-136.	Case Report	n/a	n/a	n/a	n/a	A woman with repeated urticaria on the scalp experienced anaphylaxis after vaginal application of povidone-iodine.	VA
213	Castelain F., Girardin P., Moumane L., Aubin F. and Pelletier, F. Anaphylactic reaction to povidone in a skin antiseptic. 2016	Case Report	n/a	n/a	n/a	n/a	A grade II anaphylactic reaction was elicited by a type I allergy to polyvinylpyrrolidone (PVP).	VB
214	Odedra, Katy M., Farooque, Sophie. Chlorhexidine: an unrecognized cause of anaphylaxis 2014	Literature Review	n/a	n/a	n/a	n/a	Due to widespread use of CHG, healthcare workers should identify ways to assess patients at risk for CHG allergy. The routine use of CHG products may need to be reevaluated.	VB
215	Toomey M. Preoperative chlorhexidine anaphylaxis in a patient scheduled for coronary artery bypass graft: A case report. <i>AANA J.</i> 2013;81(3): 209-214. http://www.scopus.com/inward/record.url?eid=2-s2.0-84881497341&partnerID=40&md5=ccd2020de71de5837f6b42a16	Case Report	n/a	n/a	n/a	n/a	65 year old patient undergoing cardiac surgery experienced anaphylaxis after exposure to CHG.	VA
216	Khan RA, Kazi T, O'Donohoe B. Near fatal intra-operative anaphylaxis to chlorhexidine—is it time to change practice?.. <i>BMJ Case Reports.</i> 2011;2011.	Case Report	n/a	n/a	n/a	n/a	49 year old man experienced anaphylactic reaction to CHG applied to urethra.	VA
217	Dick, Alastair G., Dhinsa, Baljinder, Walker, Roland P. and Singh, Samrendu. Delayed Allergic Reaction to ChlorPrep™ in Foot and Ankle Surgery 2019	Case Report	n/a	n/a	n/a	n/a	Health care personnel should be aware of chlorhexidine hypersensitivity and remove the product at end of procedure.	VA

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218	FDA drug safety podcast: FDA warns about rare but serious allergic reactions with the skin antiseptic chlorhexidine gluconate. FDA Drug Safety Podcasts Web site. https://www.fda.gov/drugs/fda-drug-safety-podcasts/fda-drug-safety-podcast-fda-warns-about-rare-serious-allergic-reactions-skin-antiseptic?source=govdelivery&utm_medium=email&utm_source=govdelivery . Accessed 3/16, 2020.	Regulatory	n/a	n/a	n/a	n/a	Rare, but serious allergic reactions to CHG have been reported. FDA requested manufacturer's of OTC antiseptic containing CHG add a warning to the Drug Facts label.	
219	Yoshida, K., Sakurai Y, Kawahara S, et al. Anaphylaxis to polyvinylpyrrolidone in povidone-iodine for impetigo contagiosum in a boy with atopic dermatitis. <i>International Archives of Allergy & Immunology</i> 2008;146(2): 169-173.	Case Report	n/a	n/a	n/a	n/a	9 year old boy experience anaphylaxis twice after application of PI, which was possibly due to broken skin.	VB
220	Leung AM, Braverman LE. Consequences of excess iodine. <i>Nat Rev Endocrinol.</i> 2014;10(3):136-142. doi:10.1038/nrendo.2013.251	Literature Review	n/a	n/a	n/a	n/a	Hypothyroidism or hyperthyroidism is result of supraphysiologic iodine exposure.	VA
221	Lavelle K J, Doedens D J, Kleit S A, et al. Iodine absorption in burn patients treated topically with povidone-iodine. <i>Clin. Pharmacol. Ther.</i> 1975; 17(3): 355-362.	Case Report	n/a	n/a	n/a	n/a	Burn patients with repeated exposure with povidone-iodine systemically absorb iodine.	VB
222	Robertson P, Fraser J, Sheild J, Weir P. Thyrotoxicosis related to iodine toxicity in a paediatric burn patient. <i>Intensive Care Med.</i> 2002;28(9):1369. doi:10.1007/s00134-002-1327-1	Case Report	n/a	n/a	n/a	n/a	Iodine-induced thyrotoxicosis in 22-month-old burn patient from alternate-day Betadine washes to 80% of surface area	VB
223	Pietsch, J., Meakins, J L. Complications of povidone-iodine absorption in topically treated burn patients. <i>Lancet.</i> 1976;1(7954):280-282.	Case Report	n/a	n/a	n/a	n/a	2 burn patients developed metabolic acidosis after topical treatment with povidone iodine.	VA
224	Zamora JL. Chemical and microbiologic characteristics and toxicity of povidone-iodine solutions. <i>Am J Surg.</i> 1986;151(3):400-406.	Literature Review	n/a	n/a	n/a	n/a	Review of chemical and antiseptic properties of povidone-iodine, and to use caution in patients susceptible to iodism.	VA
225	Tomoda C, Kitano H, Uruno T, et al. Transcutaneous iodine absorption in adult patients with thyroid cancer disinfected with povidone-iodine at operation. <i>Thyroid.</i> 2005;15(6):600-603.	RCT	Adults, Thyroid Cancer	CHG	PI	Ioduria	Cutaneously absorbed iodine could potentially interfere with iodine therapy or cause thyroid dysfunction in susceptible patients.	IB
226	Pello J Y, Pons G, Leger F A, et al. Ioban 2 for cesarean section operative field: study of innocuity for the newborn. <i>Therapie</i> 1990; 45:85.	RCT	Women undergoing cesarean section with male infants, hospital, France	CHG 0.5%	70% alcohol and antiseptic-impregnated (IOBAN) adhesive incise drape	Mother's blood and urine iodine concentration; Infant's cord blood iodine (CBI), urine iodine secretion, thyroid stimulating hormone (TSH)	Higher concentration of iodine in the cord blood of newborns in the antiseptic-impregnated adhesive incise drape group, but no significant difference in iodine of 48-hour urine or TSH blood levels on the fifth day.	IB

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227	Vorherr H, Vorherr, U F, Mehta P., et al. Vaginal absorption of povidone-iodine. <i>JAMA</i> . 1980; 244(23):2628-2629.	Nonexperimental	Adults, Gynecological	n/a	n/a	Iodine absorption and thyroid function	Advised against treating vaginitis with repeated applications of povidone-iodine in pregnant women because of the risk of developing iodine-induced goiter and hypothyroidism in the fetus and newborn.	IIIC
228	Kurtoğlu S, Akin L, Akin MA, Çoban D. Iodine overload and severe hypothyroidism in two neonates. <i>J Clin Res Pediatr Endocrinol</i> . 2009;1(6):275-277. doi:10.4274/jcrpe.v1i6.275	Case Report	n/a	n/a	n/a	n/a	Two newborn infants develop hypothyroidism, one due to excessive iodine antiseptic for umbilical care and the other from breast milk (can increase 10 fold) with high iodine level.	VA
229	Vanzi, Valentina C. N. S., Pitaro, Rosanna. Skin Injuries and Chlorhexidine Gluconate-Based Antisepsis in Early Premature Infants: A Case Report and Review of the Literature 2018	Literature Review	n/a	n/a	n/a	n/a	Further research needed to test efficacy and safety of CHG in lower concentrations .	VA
230	Sathiyamurthy S, Banerjee J, Godambe SV. Antiseptic use in the neonatal intensive care unit - a dilemma in clinical practice: An evidence based review. <i>World J Clin Pediatr</i> . 2016;5(2):159-171. Published 2016 May 8. doi:10.5409/wjcp.v5.i2.159	Literature Review	n/a	n/a	n/a	n/a	The use of CHG in neonates may be a better option than PI due to PI association with systemic absorption and hypothyroidism.	VA
231	Paternoster M., Niola M. and Graziano, V. Avoiding Chlorhexidine Burns in Preterm Infants. 2017	Literature Review	n/a	n/a	n/a	n/a	CHG use in neonates should only occur if benefits clearly outweigh the harms.	VB
232	Schick J B, Milstein J M. Burn hazard of isopropyl alcohol in the neonate. <i>Pediatrics</i> . 1981;68(4):587-588.	Case Report	n/a	n/a	n/a	n/a	2 neonates experienced chemical burns after exposure to alcohol.	VB
233	Harpin V., Rutter N. Percutaneous alcohol absorption and skin necrosis in a preterm infant. <i>Arch. Dis. Child</i> . 1982; 57(6): 477-479.	Case Report	n/a	n/a	n/a	n/a	27 week infant developed severe skin necrosis and lethal systemic absorption of alcohol after skin antisepsis with methylated alcohol.	VA
234	Smerdely P, Lim A, Boyages SC et al. Topical iodine-containing antiseptics and neonatal hypothyroidism in very-low-birthweight infants. <i>Lancet</i> . 1989;2(8664):661-664	Nonexperimental	Neonates	n/a	n/a	Urine iodine excretion, thyrotropin and thyroxine levels	Routine use of iodine in very low birth weight infants should be avoided because of demonstrated disturbances in thyroid function.	IIIB
235	Malhotra S, Kumta S, Bhutada A, Jacobson-Dickman E, Motaghedi R. Topical Iodine-Induced Thyrotoxicosis in a Newborn with a Giant Omphalocele. <i>AJP Rep</i> . 2016;6(2):e243-e245. doi:10.1055/s-0036-1584879	Case Report	n/a	n/a	n/a	n/a	Significant topical iodine exposure resulted in hypothyroidism and hyperthyroidism requiring the need for vigilant monitoring of thyroid function.	VA
236	Bryant W.P., Zimmerman D. Iodine-induced hyperthyroidism in a newborn. <i>Pediatrics</i> . 1995;95(3):434-436.	Case Report	n/a	n/a	n/a	n/a	Twenty-two day old infant with iodine induced hyperthyroidism following mediastinal lavage with povidone-iodine.	VB
237	Yilmaz D, Teziç HT, Zorlu P, Firat S, Bilaloğlu E, Kutlu AO. Single dose povidone-iodine on thyroid functions and urinary iodine excretion. <i>Indian J Pediatr</i> . 2003;70(8):675-677. doi:10.1007/BF02724261	Nonexperimental	Pre-term, full-term newborns, and infants, Children's hospital, Turkey	n/a	n/a	Urine iodine excretion, thyrotropin (TSH) and thyroxine (T4) levels	Preterm, full-term newborns, and infants receiving a single application of 10% PI are not at risk for thyroid disorders.	IIIB
238	Weber SM, Hargunani CA, Wax MK. DuraPrep and the risk of fire during tracheostomy. <i>Head Neck</i> . 2006;28(7): 649-652.	Case Report	n/a	n/a	n/a	n/a	Advise not to use Duraprep in hirsuite patient.	VA

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239	Centers for Medicare & Medicaid Services. State Operations Manual Appendix A—Survey Protocol, Regulations and Interpretive Guidelines for Hospitals. Rev. 89. 2020.	Regulatory	n/a	n/a	n/a	n/a	Alcohol-based skin preparations are considered the most effective and rapid-acting skin antiseptic, but they are also flammable and contribute to the risk of fire.	
240	Centers for Medicare & Medicaid Services. State Operations Manual Appendix L - Guidance for Surveyors: Ambulatory Surgical Centers. Rev. 89. 2020.	Regulatory	n/a	n/a	n/a	n/a	Alcohol-based skin preparations are considered the most effective and rapid-acting skin antiseptic, but they are also flammable and contribute to the risk of fire.	
241	Bever G.J., Brodie F.L. and Hwang, D. G. Corneal Injury from Presurgical Chlorhexidine Skin Preparation. 2016	Case Report	n/a	n/a	n/a	n/a	Significant damage occurred with use of 4% chlorhexidine gluconate despite occlusive dressing over patient eyes. Evaluation of use of CHG against risk of SSI should occur when deciding to use.	VA
242	Singh, Shubhi, Blakley, Brian. Systematic review of ototoxic pre-surgical antiseptic preparations - what is the evidence? 2018	Systematic Review	n/a	n/a	n/a	n/a	Evidence on ototoxicity in humans is not strong. Iodine based, non-alcoholic, non-detergent solutions may have least ototoxicity but should be used with caution.	IIB
243	Cronen G, Ringus V, Sigle G, Ryu J. Sterility of surgical site marking. J Bone Joint Surg Am. 2005;87(10): 2193-2195. doi:87/10/2193 [pii]; 10.2106/JBJS.E.00293 [doi].	Quasi-experimental	Healthy Volunteers	Site Mark	No Site Mark	Cultures	Preoperative marking of surgical sites did not affect the sterility of the surgical field, a finding that provides support for the safety of surgical site marking.	IIB
244	Rooney J, Khoo OKS, Higgs AR, Small TJ, Bell S. Surgical site marking does not affect sterility. ANZ J Surg. 2008;78(8): 688-689. http://www.scopus.com/inward/record.url?eid=2-s2.0-49549109202&partnerID=40&md5=9d6ab720757c806915b5794c337443dc.	Quasi-experimental	Healthy Volunteers	Site Mark	No Site Mark	Cultures	Surgical site marking carried out with a non-sterile surgical marking pen did not contaminate the surgical site.	IIB
245	Wilson J, Tate D. Can pre-operative skin marking transfer methicillin-resistant Staphylococcus aureus between patients? A laboratory experiment. J Bone Joint Surg Br. 2006;88(4): 541-542. doi:88-B/4/541 [pii]; 10.1302/0301-620X.88B4.17454 [doi].	Nonexperimental	Markers at different time points in laboratory	n/a	n/a	Cultures	Alcohol based markers didn't transmit MRSA, but water based markers did.	IIIA
246	Wolina, U. Preoperative site marking in dermatosurgery. <i>Journal of cutaneous and aesthetic surgery</i> , 2019, 12, 191-192.	Literature Review	n/a	n/a	n/a	n/a	Skin markers should provide good viability after skin preparation, ensure sterility of sterile field and inks should be non-sensitizing.	VA
247	Bathla S, Nevins EJ, Moori PL, Vimalachandran D. Which pen? A comparative study of surgical markers. <i>J Periop Pract</i> . 2018, 28, 1-2, 21-26.	Quasi-experimental	Volunteers, hospital, United Kingdom	Different color ink, tips, and permeability	none	Visibility after skin preparation	Different skin types require different color ink for clarity, but more studies needed to determine optimum duration of reusable pens.	IIB
248	Mears SC, Dinah AF, Knight TA, Frassica FJ, Belkoff SM. Visibility of surgical site marking after preoperative skin preparation.. <i>Eplasty [Electronic Resource]</i> . 2008;8: e35.	Quasi-experimental	Laboratory	Chloraprep	Duraprep	Erasure of site marking	Antisepsis with chloraprep erased more marks than duraprep.	IIB
249	Thakkar SC, Mears SC. Visibility of surgical site marking: a prospective randomized trial of two skin preparation solutions.. <i>Journal of Bone & Joint Surgery - American Volume</i> . 2012;94(2): 97-102.	RCT	Orthopedic surgery, hip	Chloraprep	Duraprep	Erasure of site marking	CHG-based solution erased marker more than iodine-based solution.	IB
250	Guideline for team communication. In: <i>Guidelines for Perioperative Practice</i> . Denver, CO: AORN, Inc; 2020: 1039-1069.	Guideline	n/a	n/a	n/a	n/a	Guidance for transfer of patient care information.	IVB

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251	Yasuda, T., Hasegawa, T., Yamato, Y., et al. Optimal Timing of Preoperative Skin Preparation with Povidone-Iodine for Spine Surgery: a Prospective, Randomized Controlled Study 2015	RCT	Patients undergoing spine surgery, hospital, Japan	Application of PI antiseptic just before skin incision	Application of PI antiseptic several minutes before starting procedure	Rate of positive cultures taken from wound edges just before closure	Bacteria on skin were significantly reduced by allowing PI to dry for several minutes prior to surgery.	IB
252	Bajaj, T. I., Loh, C. and Borgstrom, D. Diluting chlorhexidine gluconate: one scrub or two? 2014 <i>Surgical Infections</i> ; 15(5): 544-547.	RCT	Healthy volunteers, community hospital, United States	5 dilutions of chlorhexidine gluconate 2 applications of 50% chlorhexidine gluconate dilution	Saline 1 application of 50% chlorhexidine gluconate dilution	Skin bacterial colony-forming units (CFUs) at baseline and 10 minutes after skin prep	Significantly lower CFUs with diluted CHG and two CHG scrubs.	IB
253	Malalasekera, A., Louie, Johnsun, M., Wang, A., van Diepen, D. C., Gottlieb, T. and Chan, L. Is a 10-minute surgical scrub necessary in urologic prosthetic surgery? A randomized study of the effect of a 5- vs 10-minute surgical scrub on bacterial colony counts in the genital skin	RCT	Patients undergoing urologic prosthetic surgery, hospital, Australia	10-minute groin scrub with Povidone-iodine(PI)	5-minute groin scrub with PI	Presence or absence of colony-forming units (CFUs) on prep site	No significant reduction in skin flora CFUs between 5 and 10 minute scrubs. Five-minute scrub may be sufficient when performing urologic prosthetic surgery.	IB
254	Lundberg P.W., Smith A.A., Heaney J.B., et al. Pre-Operative Antisepsis Protocol Compliance and the Effect on Bacterial Load Reduction. 2016	Quasi-experimental	Individuals routinely performing skin prep, four hospitals, United States	Application of chlorhexidine-gluconate isopropyl alcohol for ankle surgery	Application of povidone-iodine scrub and paint for ankle surgery	Protocol compliance; bacterial load (CFUs)	Standardization of prep solution, simplification and education on correct techniques may enhance compliance.	IIB
255	Trick WE, Vernon MO, Hayes RA, et al. Impact of ring wearing on hand contamination and comparison of hand hygiene agents in a hospital. <i>Clin Infect Dis.</i> 2003;36(11): 1383-1390. http://www.journals.uchicago.edu/CID/journal/issues/v36n11/30508/30508.web.pdf	Quasi-experimental	Healthcare Workers	3 groups: (1) alcohol based hand rub, (2) soap and water,	(3) hand wipe	Cultures	Wearing rings may increase hand contamination of healthcare workers, but alcohol based hand rubs resulted in less frequent hand contamination.	IIA
256	Smith, Francis D. Caring for Surgical Patients With Piercings 2016	Literature Review	n/a	n/a	n/a	n/a	Piercings place patients undergoing surgery at risk for SSI, electrical burns, trauma and airway obstruction.	VB
257	Lefebvre, A., Saliou, P., Mimoz, O., et al. Is surgical site scrubbing before painting of value? Review and meta-analysis of clinical studies. <i>Journal of Hospital Infection.</i> (89) 2015	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Further research is needed, but there may not be a need for scrubbing surgical site if skin is clean and/or if patient completed preoperative shower.	IIA
258	Bonneville N, Geiss L, Cavalie L, Ibnoukhatib A, Verdeil X, Bonneville P. Skin preparation before hip replacement in emergency setting versus elective scheduled arthroplasty: bacteriological comparative analysis.. <i>Orthopaedics & traumatology, surgery & research.</i> 2013;99:659-665.	Quasi-experimental	Orthopedic surgery, Hip	Scheduled hip procedures, Preop protocols for two 4% PI whole body showers	Emergency hip procedures, no prewash	Bacterial load on skin	Skin flora in emergency hip procedures was more abundant and different, with more pathogenic non-saprotrophic bacteria. Scrubbing with 4% povidone-iodine in inguinal area was insufficient in the emergency group.	IIA
259	Association of Surgical Technologists. Standards of Practice for Skin Prep of the Surgical Patient 2008	Guideline	n/a	n/a	n/a	n/a	Standards of practice related to patient skin preparation in the perioperative setting.	IVC
260	NFPA 101: Life Safety Code 2017	Guideline	n/a	n/a	n/a	n/a	Flammable prep antiseptics must dry completely.	IVB

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261	Guideline for electrosurgical safety. In: <i>Guidelines for Perioperative Pract.</i> Denver, CO; AORN, Inc; 2020: 83-114.	Guideline	n/a	n/a	n/a	n/a	Guidance for safe use of electrosurgical units, electrocautery devices, and argon-enhanced coagulators.	IVB
262	Wood, A. Abdominal-perineal dual preps [Clinical Issues]. <i>AORN J.</i> 2015;101 (1): 154-155.	Expert Opinion	n/a	n/a	n/a	n/a	Sterile technique principles are key to determining sequence of skin preps.	VA
263	Guideline for surgical attire. In: <i>Guidelines for Perioperative Practice.</i> Denver, CO: AORN, Inc; 2020: 989-1005.	Guideline	n/a	n/a	n/a	n/a	Guidance on selection of attire for the perioperative setting.	IVA
264	Markel, Troy A., Gormley, Thomas, Greeley, Damon, Ostojic, John and Wagner, Jennifer. Wearing long sleeves while prepping a patient in the operating room decreases airborne contaminants 2018	Quasi-experimental	3 hospitals, 3 ORs	Mock skin prep procedures performed with covered arms	Bare arms	Airborne contamination and microbes present	Presence of particulates and shedding was decreased when arms were covered	IIB
265	Stapleton, Erik J. D. O., Frane, Nicholas D. O., Lentz, Jonathon M. D. O., et al. Association of Disposable Perioperative Jackets With Surgical Site Infections in a Large Multicenter Health Care Organization	Quasi-experimental	Patients undergoing clean procedures, 12 hospitals, United States	Disposable jackets worn in perioperative area	No disposable jackets	SSI incidence; cost	Perioperative disposable jackets were not associated with SSI reduction for clean wounds and presented financial burden.	IIA
266	Vagholkar Ketan, Julka Karan. Preoperative Skin Preparation: Which Is The Best Method?. <i>INTERNET J SURG.</i> 2012;28(4): 1-1. doi:10.5580/2c6b.	RCT	Clean Surgery	3 groups: (1) PI 3min scrub, PI paint, (2) PI 5min scrub, PI paint,	(3) PI paint only	Infection	Painting with PI alone can be used for preoperative antisepsis.	IA
267	Weed S, Bastek JA, Sammel MD, Beshara M, Hoffman S, Srinivas SK. Comparing postcesarean infectious complication rates using two different skin preparations.. <i>Obstetrics & Gynecology.</i> 2011;117(5): 1123-1129.	Quasi-experimental	Cesarean Section	Scrub and paint PI	Paint only	Infection	Scrub and paint of PI decreased postoperative cesarean section complications as compared to PI paint alone.	IIA
268	Smid, Marcela C., DottersKatz, Sarah K., Silver, Robert M. and Kuller, Jeffrey A. Body Mass Index 50 kg/m2 and Beyond: Perioperative Care of Pregnant Women With Superobesity Undergoing Cesarean Delivery 2017	Literature Review	n/a	n/a	n/a	n/a	Preoperative cefazolin with a 3-g dose, 2 or more applicators of CHG with alcohol skin preparation, and availability of adequate personnel for patient transfer are evidence-based approaches to reducing maternal and personnel morbidity in this population.	VA
269	Guideline for Retained Surgical Items. In: <i>Guidelines for Perioperative Practice.</i> Denver, CO: AORN, Inc; 2020: 755-806.	Guideline	n/a	n/a	n/a	n/a	Guidance for preventing retention of items used during operative or other invasive procedures.	IVA
270	Naderi N, Maw K, Thomas M, Boyce DE, Shokrollahi K. A quick and effective method of limb preparation with health, safety and efficiency benefits.. <i>Ann R Coll Surg Engl.</i> 2012;94(2): 83-86.	Quasi-experimental	Orthopedic: Hand/Foot	Paint PI with a sterile bag	Paint with sponge	Time, Culture	Painting PI with a sterile bag took less time (24s v 85s) than painting with a sponge and was effective as evident by no growth on culture. Using a bag was more efficient and reduced manual lifting by perioperative team members.	IIB
271	Chang A., Hughes A., du Moulin W., Mukerjee C. and Molnar, R. Randomised comparison of two skin preparation methods in foot and ankle surgery. 2016	Quasi-experimental	Volunteers, university hospital, Australia	2% chlorhexidine with 70% alcohol applied with gauze	2% chlorhexidine with 70% alcohol applied with bag immersion	Bacteria colony-forming units (CFU) from four areas of each foot; time for prep completion	No difference in CFU count between methods. Time for prep was significantly shorter with bag immersion.	IIB

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272	Dingemans, Siem A., Spijkerman, Ingrid J. B., Birnie, Merel F. N., Goslings, J. C. and Schepers, Tim. Preoperative disinfection of foot and ankle: microbiological evaluation of two disinfection methods 2018	Quasi-experimental	Volunteers, university hospital, Netherlands	Five minute submersion in bag with 70% ethanol containing 10% isopropyl alcohol followed by 0.5% chlorhexidine in 70% alcohol paint	0.5% chlorhexidine in 70% alcohol paint	Colony-forming units (CFUs) from four locations (under nailfold, first webspace, sinus tarsi, pre-tibial)	The number of CFUs under the nailfold and first webspace was significantly lower in the bag submersion group.	IIC
273	Best, Brittany A., Best, Timothy J. Skin preparation in the hand surgery clinic: A survey of Canadian plastic surgeons and a pilot study of a new technique 2018	Quasi-experimental	Patients undergoing hand surgery, ambulatory surgical center of community hospital, Canada	Patient-applied 1% chlorhexidine gluconate and 61% alcohol	Nurse-applied 10% povidone paint	Completion time, cost, surgical site infection (SSI) rate	Significant time saving that allowed for 1 additional procedure per clinic day. Institutional cost was decreased marginally, and rate of SSIs did not change.	IIB
274	Seigerman, Daniel A., Rivlin, Michael, Bianchini, Justin, Liss, Frederick E. and Beredjikian, Pedro K. A Comparison of Two Sterile Solution Application Methods During Surgical Preparation of the Hand. 2016	Quasi-experimental	Upper extremities of healthy volunteers, simulated OR, United States	Chloraprep 26ml applicator without gloves	Prep solution on gauze applied with sterile gloves	Measurement of unprepped areas (UPAs).	Statistically greater number of unprepped areas with commercially available sticks when compared to sterile gauze.	IIB
275	Syed U.A.M., Seidl A.J., Hoffman R.A., Bianchini J., Beredjikian P.K. and Abboud, J. A. Preoperative sterilization preparation of the shoulder: A comparative study evaluating gauze sponge and commercially available applicator prep stick. 2018	Quasi-experimental	Male volunteers, simulated OR, United States	Two 4x4 xm gauze sponges	Applicator stick	Skin coverage or amount of unprepped skin	Significantly higher percentage of unprepped skin was found with applicator stick.	IIC
276	Chepla KJ, Gosain AK. Interstitial pneumonitis after betadine aspiration.. J Craniofac Surg. 2012;23(6): 1787-1789.	Case Report	n/a	n/a	n/a	n/a	Seven year-old child developed interstitial pneumonitis from betadine aspiration, leading researchers to advise against irrigation of the mouth with antiseptic even when a throat pack is in place.	VA
277	Choi, WY, Park CW, Son Km, Cheon J S. Aspiration pneumonitis due to povidone-iodine aspiration during a facial bone fracture reduction operation. J Craniofac Surg, 2014, 25,2, e172-4.	Case Report	n/a	n/a	n/a	n/a	When using PI for oral procedures under general anesthesia, aspiration pneumonitis should be considered a risk.	VA
278	Hitosugi, T. Tsukamoto, M, Yokoyama T. Pneumonitis due to aspiration of povidine iodine after preoperative disinfection of the oral cavity. Oral Maxillofac Surg. 2019, 23, 4, 507-511.	Case Report	n/a	n/a	n/a	n/a	When using PI solution for oral disinfection, the risk of PI pulmonary aspiration should be considered.	VA
279	Stankiewicz, Monica, Wyland, Michele. A review of suspected intra-operative antiseptic burns: A quality improvement review 2017	Organizational Experience	Intraoperative incidents for one year, community hospital, Australia	n/a	n/a	n/a	7 antiseptic burns occurred over course of year. Ongoing education and support programs are necessary to protect patients from harm.	VB
280	Sistema Espanol de Notificacion En Seguridad En Anestesia Y Reanimacion.(SENSAR). Surgical burn secondary to the use of alcoholic chlorhexidine. Rev Esp Anestesiol Reanim, 2018, 65, 3 e1-e3.	Case Report	n/a	n/a	n/a	n/a	CHG with alcohol was only allowed to dry a few seconds and had pooled in sternal hollow. Patient was draped and electrocautery was used resulting in fire at head and neck of patient.	VA
281	Borrego L., Hernandez N., Hernandez Z. and Penate, Y. Povidone-iodine induced post-surgical irritant contact dermatitis localized outside of the surgical incision area. Report of 27 cases and a literature review. 2016	Case Report	n/a	n/a	n/a	n/a	Twenty-seven incidences of povidone-iodine-induced dermatitis occurred the day after surgery in areas of pooling or occlusion where protective pad or medical device was against skin.	VA

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282	Jones, Edward L., Overbey, Douglas M., Chapman, Brandon C., et al. Operating Room Fires and Surgical Skin Preparation 2017	Quasi-experimental	Clipped porcine skin, simulated OR, United States	Alcohol-based skin preparations, with and without solution pooling	Nonalcohol-based preparations, with and without solutions pooling	Incidence of fires when using heat source	The risk of fire can be decreased by using nonalcohol-based skin preparations or avoiding pooling of skin preparation solutions.	IIB
283	Chiang, YC, Lin TS, Yeh , MC. Povidone-iodine -related burn under the tourniquet of a child-a case report and literature review. <i>J Reconstr Aesthet Surg.</i> 2011, 64(3):412-415.	Case Report	n/a	n/a	n/a	n/a	Two year-old patient experienced chemical burns from iodine on tourniquet. Special attention should be paid to preventing tourniquet from contacting iodine solution, especially in pediatric patients.	VA
284	Palmanovich E, Brin YS, Laver L, Nyska M, Kish B. Third-degree chemical burns from chlorhexidine local antiseptics.. <i>Israel Medical Association Journal: Imaj.</i> 2013;15(6): 323-324.	Case Report	n/a	n/a	n/a	n/a	55 year old woman experienced chemical burns after antiseptics with CHG and tourniquet.	VA
285	Yang JH, Lim H, Yoon JR, Jeong HI. Tourniquet associated chemical burn. <i>Indian J Orthop.</i> 2012;46(3):356-359. doi:10.4103/0019-5413.96366	Case Report	n/a	n/a	n/a	n/a	Two patients with iatrogenic tourniquet associated burn.	VA
286	Hodgkinson DJ, Irons GB, Williams TJ. Chemical burns and skin preparation solutions. <i>Surg Gynecol Obstet.</i> 1978;147(4): 534-536.	Nonexperimental	Patients with burn injury	n/a	n/a	Skin burn	Patients experienced chemical burn injury to the skin from antiseptics, and preventative measures should be taken.	IIIB
287	Lowe DO, Knowles SR, Weber EA, Railton CJ, Shear NH. Povidone-iodine induced burn: case report and review of the literature. <i>Pharmacotherapy.</i> 2006;26(11): 1641-1645.	Case Report	n/a	n/a	n/a	n/a	38 year old woman experienced chemical burn injury from povidone-iodine, and preventative measures should be taken.	VA
288	Murthy MB, Krishnamurthy B. Severe irritant contact dermatitis induce by povidone iodine solution. <i>Indian J Pharmacol.</i> 2009;41(4):199-200.	Case Report	n/a	n/a	n/a	n/a	28 year old woman experienced chemical burns to the skin after application of povidone iodine.	VB
289	Stinner DJ, Krueger CA, Masini BD, Wenke JC. Time-dependent effect of chlorhexidine surgical prep.. <i>J Hosp Infect.</i> 2011;79(4): 313-316.	Nonexperimental	Agar plates inoculated with <i>S. aureus</i> , laboratory, United States	n/a	n/a	Bacterial load	Recommend using 4% CHG for surgical site preparation and allowing a minimum of 2 min of contact time prior to making the skin incision.	IIIB
290	Ryan, SP, Adams, SB, Allen N et al. Intraoperative fire risk: Evaluating the three minute wait after chlorhexidine-alcohol antiseptic scrub. <i>J Orthop Trauma,</i> 2020.	Quasi-experimental	Swine feet, laboratory, United States	open flame at 30, 60, 90 seconds after antiseptic application	open flame at 0 seconds after antiseptic application	Flammability of chlorhexidine-alcohol	Pooling and persistent wetness are more significant fire risk than dry time when using chlorhexidine-alcohol.	IIB
291	Guideline for safe patient handling and movement. In: <i>Guidelines for Perioperative Practice.</i> Denver, CO: AORN, Inc; 2020: 807-858.	Guideline	n/a	n/a	n/a	n/a	Guidance for safe patient handling in the perioperative setting.	IVB
292	Apfelbaum JL, Caplan RA, Barker SJ, et al. Practice advisory for the prevention and management of operating room fires: an updated report by the American Society of Anesthesiologists Task Force on Operating Room Fires. <i>Anesthesiology.</i> 2013;118(2): 271-290	Guideline	n/a	n/a	n/a	n/a	Flammable skin preparation antiseptics must dry completely.	IVA
293	16.13.3 germicides and antiseptics. In: NFPA #99: Health care facilities code handbook. Quincy, MA: National Fire Protection Association; 2018:99-145	Consensus	n/a	n/a	n/a	n/a	Preventative measures should be taken to prevent antiseptics from fueling a fire.	IVB

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REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
294	Hempel, Susanne, MaggardGibbons, Melinda, Nguyen, David K., et al. Wrong-Site Surgery, Retained Surgical Items, and Surgical Fires : A Systematic Review of Surgical Never Events 2015	Systematic Review	n/a	n/a	n/a	n/a	The per-procedure incidence of surgical fires is unknown. Evidence for preventing surgical fires was insufficient, and the intervention effects were not estimable.	IIIA
295	NFPA 30: Flammable and combustible liquids code. 2018th ed. Quincy, MA: National Fire Protection Association; 2017. https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=30	Guideline	n/a	n/a	n/a	n/a	Preventative measures should be taken to prevent antiseptics from fueling a fire.	IVB
296	ECRI. Surgical fire safety initiatives"part 1 of ECRI Institute's Clinical Guide to Surgical Fire Prevention. 2017	Position Statement	n/a	n/a	n/a	n/a	Preventative measures should be taken to prevent antiseptics from fueling a fire.	IVC
297	ECRI.The team approach to surgical fire prevention"part 2 of ECRI Institute's Clinical Guide to Surgical Fire Prevention. 2017	Position Statement	n/a	n/a	n/a	n/a	Preventative measures should be taken to prevent antiseptics from fueling a fire.	IVC
298	Wood, A. Cyanoacrylate microbial sealants [Clinical Issues]. <i>AORN J.</i> 2014;100(2): 214-215.	Expert Opinion	n/a	n/a	n/a	n/a	Selection and use of microbial sealant should be determined by an interdisciplinary team.	VA
299	Lipp A, Phillips C, Harris P, Dowie I. Cyanoacrylate microbial sealants for skin preparation prior to surgery. <i>Cochrane Database Syst Rev.</i> 2013;8:CD008062.	Systematic Review	n/a	n/a	n/a	n/a	Reduction of SSIs with use of microbial sealant was not found in patients undergoing clean surgery. One participant developed hypersensitivity and three developed scrotal edema.	IA
300	Mermel, Leonard A. Sequential use of povidone-iodine and chlorhexidine for cutaneous antisepsis: A systematic review. <i>Infection Control & Hospital Epidemiology.</i> 2020. 41:98-101.	Systematic Review	n/a	n/a	n/a	n/a	Sequential application of CHG and PI antiseptics may reduce SSIs further than when applied alone.	IIA
301	Morrison, Tiffany N., Chen, Antonia F., Taneja, Mayank, Kucukdurmaz, Fatih, Rothman, Richard H. and Parvizi, Javad. Single vs Repeat Surgical Skin Preparations for Reducing Surgical Site Infection After Total Joint Arthroplasty: A Prospective, Randomized, Double-Blinded Study 2016	RCT	Patients undergoing primary total joint arthroplasty, university hospital, United States	7.5% povidone-iodine scrub then 10% iodine paint and then 75% isopropyl alcohol, followed by application of iodine povacrylex with 74% isopropyl alcohol before iodophor-impregnated drape	7.5% povidone-iodine scrub then 10% iodine paint and then 75% isopropyl alcohol	Rate of surgical site infection; blistering of skin	Significant reduction in SSI rate with reapplication of skin prep after draping and before application of adhesive incise drape. Skin blistering was lower in intervention group (3.5% vs. 6.5%).	IA
302	Hazard Communication: Toxic and Hazardous Substances, 29 CFR §1910.1200 (2012). http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10099 . Accessed July 31, 2020.	Regulatory	n/a	n/a	n/a	n/a	OSHA regulations must be followed when handling antiseptic chemicals.	n/a
302	Rees A, Sherrod Q, Young L. Chemical burn from povidone-iodine: case and review.. <i>Journal of Drugs in Dermatology: JDD.</i> 2011;10(4): 414-417.	Case Report	n/a	n/a	n/a	n/a	8 year old male experienced chemical burns after antisepsis with PI. Preventative measures, including preventing dripping and pooling, should be taken.	IVB
304	Song, J. E., Kwak, Y. G., Um, T. H., et al. Outbreak of Burkholderia cepacia pseudobacteraemia caused by intrinsically contaminated commercial 0.5% chlorhexidine solution in neonatal intensive care units. 2018	Case Report	n/a	n/a	n/a	n/a	Contaminated 0.5% CHG used for skin antiseptic was source of increased <i>B cepacia</i> positive blood cultures.	VA

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305	Ko, Suhuia, An, Hyesuna, Bang, Ji H. and Park, SangWona,b. An outbreak of <i>Burkholderia cepacia</i> complex pseudobacteremia associated with intrinsically contaminated commercial 0.5% chlorhexidine solution 2015	Case Report	n/a	n/a	n/a	n/a	Outbreak due to contamination of 0.5% chlorhexidine from single company.	VB
306	O'Rourke E, Runyan D, O'Leary J, Stern J. Contaminated iodophor in the operating room. <i>Am J Infect Control.</i> 2003;31(4): 255-256. doi:S0196655302482132 [pii].	Case Report	n/a	n/a	n/a	n/a	<i>Agrobacterium radiobacter</i> found in 4 surgical specimens. One <i>Pseudomonas stutzeri</i> and one <i>Chryseobacterium indologene</i> s. Aerobic gram-negative rods, uncommon isolates. Iodophor used to scrub skin poured from gallon jugs and may have sat for days. The containers grew <i>S aureus</i> when cultured. Not intrinsic contamination, rather prolonged use and jugs causing contamination of Pl. Recommend single use containers.	VA
307	Weber DJ, Rutala WA, Sickbert-Bennett EE. Outbreaks associated with contaminated antiseptics and disinfectants. <i>Antimicrob Agents Chemother.</i> 2007;51(12):4217-4224. doi:10.1128/AAC.00138-07	Literature Review	n/a	n/a	n/a	n/a	Review of over 40 nosocomial outbreaks associated with contaminated antiseptics and disinfectants.	VA
308	Kim JM, Ahn Y, LiPuma JJ, Hussong D, Cerniglia CE. Survival and susceptibility of <i>Burkholderia cepacia</i> complex in chlorhexidine gluconate and benzalkonium chloride. <i>J Ind Microbiol Biotechnol.</i> 2015;42(6):905-913. doi:10.1007/s10295-015-1605-x	Quasi-experimental	<i>Burkholderia cepacia</i> complex strains	Chlorhexidine gluconate	Benzalkonium	Minimum inhibitory concentrations (MICs)	<i>Burkholderia cepacia</i> in water remains viable with low susceptibility to antiseptic for 14 days.	IIB
309	Gottardi W. The influence of the chemical behaviour of iodine on the germicidal action of disinfectant solutions containing iodine. <i>J Hosp Infect.</i> 1985;6(Suppl A):1-11	Expert Opinion	n/a	n/a	n/a	n/a	Scientific paper on the properties of iodine. Heating iodine alters the chemical structure.	VA
310	Wistrand, Camilla, SÅnderquist, Bo and Nilsson, Ulrica. Positive impact on heat loss and patient experience of preheated skin disinfection: a randomised controlled trial 2016	RCT	Patients undergoing implantation of pacemaker, cardioverter-defibrillator or resynchronization device, university hospital, Sweden	Preheated (36C) CHG with alcohol	Room temperature (20C) CHG with alcohol	Skin temperature; patient experience	Preheated disinfectant may prevent heat loss and contribute to more pleasant patient experience.	IB
311	Summary of the resource conservation and recovery act. Laws & Regulations Web Site. US Environmental Protection Agency. https://www.epa.gov/laws-regulations/summary-resource-conservation-and-recovery-act	Regulatory	n/a	n/a	n/a	n/a	Designates EPA as having the authority to control hazardous waste from cradle to grave.	
312	Lavallee Jf, Gray Ta, Dumville J, Russel W, Cullum N. The effects of care bundles on patient outcomes: a systematic review and meta-analysis. <i>Implement Sci</i> 2017;12:142	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Care bundles may reduce negative outcomes when compared to no bundles, but evidence is very low quality.	IIA
313	Carter, E. B., Temming, L. A., Fowler, S., et al. Evidence-based Bundles and Cesarean Delivery Surgical Site Infections: A Systematic Review and Meta-Analysis 2018. <i>Obstetric Anesthesia Digest</i> ; Volume 38, Number 1, March 2018	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Surgical bundles that included at least 3 of interventions reduced risk of SSI by 67%. An even greater reduction (81%) was noted in superficial or deep SSIs.	IIIA

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314	Chen, Huang-Chung, Chen, Mien-Cheng, Chen, Yung-Lung, et al. Bundled preparation of skin antisepsis decreases the risk of cardiac implantable electronic device-related infection 2016	Quasi-experimental	Patients undergoing cardiac implantable electronic device (CEID) procedures, university hospital, Taiwan	75% alcohol covered with guaze night before, Povidone iodine prep three times before standard skin prep	Standard skin prep	CEID infection rate	Significantly lower CEID infection rate in bundled skin prep group.	IIA
315	Chien, Chen-Yen, Lin, Cheng-Hsin and Hsu, Ron-Bin. Care bundle to prevent methicillin-resistant Staphylococcus aureus sternal wound infection after off-pump coronary artery bypass 2014	Quasi-experimental	Patients undergoing off-pump coronary artery bypass procedures, university hospital, Taiwan	Bundle that included preoperative CHG shower with verification of coverage through application of povidone iodine paint prior to performing shower, antibiotic prophylaxis, and skin preparation with povidone iodine	No bundle	Sternal wound infection (SWI)	Significant decrease in SWI, along with MRSA infection occurred after bundle implementation.	IIB
316	Frenette, Charles, Sperlea, David, Tesolin, Joey, Patterson, Connie and Thirion, Daniel J. G. Influence of a 5-year serial infection control and antibiotic stewardship intervention on cardiac surgical site infections 2016	Quasi-experimental	Patients undergoing coronary artery bypass graft (CABG), valve replacement or both, university hospital, Canada	Additional preoperative, intraoperative and postoperative interventions	Standard practice interventions	Overall surgical site infection (SSI) rates	Long-term standardized infection control and antibiotic stewardship interventions decreased SSIs.	IIA
317	Izquierdo-Blasco, Jaume, Marta-, Magda, Soler-Palafa-n, Pere, et al. Impact of the implementation of an interdisciplinary infection control program to prevent surgical wound infection in pediatric heart surgery 2015	Quasi-experimental	Children undergoing heart surgery with cardiopulmonary bypass via sternotomy, university hospital, Spain	Preop, intraop and postoperative non-pharmacologic interventions	No intervention	Incidence of SSI per NHSN definitions	An 82% reduction in SSI incidence was associated with new intervention program.	IIB
318	Yang, Chunyan, Chen, Aihuan, Wang, Yinghuan, Fang, Xiaoqun, Ye, Ronghua and Lin, Jingyi. Prevention and control of perioperative incision infection in patients undergoing day cataract surgery. 2014	Quasi-experimental	Patients undergoing phacoemulsification with intraocular lens implantation, eye center, China	Perioperative infection prevention measures and healthcare instruction	None	Incidence of incision infection	Infection prevention measures and education resulted in no incidence of infection at incision site.	IIA
319	Kwok, Rachel P. W., Yip, Wilson W. K., Jhanji, Vishal, Chan, Vesta C. K. and Young, Alvin L. The Incidence of Postoperative Endophthalmitis Before and After a Revised Preoperative Surgical Site Preparation Protocol. 2016	Quasi-experimental	Patients undergoing primary cataract surgery, university hospital, Hong Kong	0.3% topical tobramycin drops preoperatively and skin prep with 10% PI for all eye surfaces except for ocular in which 5% PI was used	5% PI for all eye surfaces, including ocular	Incidence of postoperative endophthalmitis	Antibiotic eye drops before surgery and skin prep with 10% PI resulted in significant reduction of postoperative endophthalmitis.	IIA

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320	Gorgun, Emre M. D., Rencuzogullari, Ahmet M. D., F.T.B.S., et al. An Effective Bundled Approach Reduces Surgical Site Infections in a High-Outlier Colorectal Unit 2018	Quasi-experimental	Patients undergoing colorectal surgery, university hospital, United States	14 preoperative, intraoperative, and postoperative measures	Pre-bundle implementation	SSI within 30 days of operation	The SSI rate decreased from 11.8% to 6.6%, with a significant reduction in organ-space SSIs.	IIA
321	Keenan, Jeffrey E., Speicher, Paul J., Thacker, Julie K. M., Walter, Monica, Kuchibhatla, Maragatha and Mantyh, Christopher R. The Preventive Surgical Site Infection Bundle in Colorectal Surgery: An Effective Approach to Surgical Site Infection Reduction and Health Care Cost Savings 2014	Quasi-experimental	Patients undergoing elective colorectal surgery, academic hospital, United States	Preop, intraop and postoperative bundle interventions	No bundle	SSI rates; cost	Bundle resulted in significant reduction of superficial incisional SSIs. The cost associated with one SSI justified bundle as an effective approach to reducing healthcare costs.	IIB
322	Weiser, M. R., Gonen, M., Usiak, S., et al. Effectiveness of a multidisciplinary patient care bundle for reducing surgical-site infections 2018	Quasi-experimental	Patients undergoing colorectal procedures, cancer center, United States	13 component bundle	No bundle	SSI rate	Hospital-wide implementation of bundle reduced and maintained reduction of SSI rates.	IIA
323	Albert, Heather, Bataller, Will, Masroor, Nadia, et al. Infection prevention and enhanced recovery after surgery: A partnership for implementation of an evidence-based bundle to reduce colorectal surgical site infections 2019	Quasi-experimental	Patients undergoing colorectal surgery, university hospital, United States	Evidence-based bundle	Pre-bundle implementation	Incidence of NHSN defined SSIs.	Significantly lower SSI rate compared to pre-bundle cases.	IIB
324	Schiavone M.B., Moukarzel L., Leong K., et al. Surgical site infection reduction bundle in patients with gynecologic cancer undergoing colon surgery. 2017	Quasi-experimental	Patients diagnosed with gynecologic malignancy undergoing colorectal procedure, cancer center, United States	Preoperative, intraoperative and postoperative SSI prevention control bundle	No bundle implementation	Incidence of SSI per CDC criteria within 30 days of surgery	Significant reduction in 30 day SSI rates with bundle.	IIB
325	Davidson, Christina, Enns, Jordan, Dempster, Carrie, Lundeen, Suzanne and Eppes, Catherine. Impact of a surgical site infection bundle on cesarean delivery infection rates. <i>AJIC</i> . 2019.	Quasi-experimental	Patients undergoing cesarean delivery, academic hospital, United States	SSI care bundle	No bundle	SSI rate; SSI classification	Standardizing practices with use of bundles significantly reduced both overall and superficial SSI rates.	IIA
326	Temming, Lorene A. M. S. C. I., Raghuraman, Nandini, Carter, Ebony B., et al. Impact of evidence-based interventions on wound complications after cesarean delivery 2017	Nonexperimental	Women undergoing scheduled or nonscheduled cesarean delivery, university hospital, United States		Secondary analysis of data from RCT	Wound complication (SSI, cellulitis, seroma, hematoma, seperation) within 30 days	Risk for wound complications was significantly lower for patients receiving evidence-based measures.	IIIA
327	Johnson, M. P., Kim, S. J., Langstraat, C. L., et al. Using Bundled Interventions to Reduce Surgical Site Infection After Major Gynecologic Cancer Surgery 2016	Quasi-experimental	Women undergoing high risk gynecological cancer procedures, Mayo Clinic, United States	Evidence-based bundle		30-day SSI rate using NHSN criteria	Evidence-based bundle implementation was associated with significant reduction in SSIs.	IIB
328	Lippitt, Melissa H., Fairbairn, Melissa G. P. A. C., Matsuno, Rayna, et al. Outcomes Associated With a Five-Point Surgical Site Infection Prevention Bundle in Women Undergoing Surgery for Ovarian Cancer 2017	Quasi-experimental	Patients with ovarian cancer undergoing cytoreductive surgery, university hospital, United States	5-point evidence-based SSI reduction bundle	No bundle implementation	Incidence of SSIs per National Health Service Network definitions	The 5-point SSI reduction bundle was associated with significantly lower SSI and hospital readmission rates.	IIB

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329	Harold R.E., Butler B.A., Lamplot J., Luu H.H., Lawton C.D. and Manning, D. Multifaceted aseptic protocol decreases surgical site infections following hip arthroplasty. 2018	Quasi-experimental	Patients undergoing hip arthroplasty, university hospital, United States	2% mupirocin 5 days, CHG wipes twice, modified instrument care, vancomycin and cefazolin, 3 skin preps (CHG, IPA, PI)	No standardized or similar measures	Hospital SSI rate; Published SSI rate	Defined protocol decreased SSI rate in population undergoing hip arthroplasty with high MRSA prevalence.	IIA
330	Mok, Wen Q., Ullal, Mallya J., Su, Su, et al. An integrative care bundle to prevent surgical site infections among surgical hip patients: A retrospective cohort study 2019	Quasi-experimental	Patients undergoing hip surgery, acute hip unit, Singapore	Preoperative, intraoperative and postoperative SSI prevention control bundle.	None	Surgical site infection incidence	The care bundle promoted shared responsibility, reduced SSI rate, length of stay and readmission in patients having hip surgery.	IIA
331	Vij, Sarah C., Kartha, Ganesh, Krishnamurthi, Venkatesh, Ponziano, Michelle and Goldman, Howard B. Simple Operating Room Bundle Reduces Superficial Surgical Site Infections After Major Urologic Surgery 2018	Quasi-experimental	Patients undergoing major open and laparoscopic urologic surgery, tertiary hospital, United States	5 element bundle	No bundle	SSI rate	Significant reduction in SSI rate was noted with bundle that included alcohol based prep.	IIB
332	Fernandez-Prada, Maria, Martinez-Ortega, Carmen, Revuelta-Marino, Livia, Menendez-Herrero, Angeles and Navarro-Gracia, Juan F. Evaluation of the Bundle "Zero Surgical Site Infection" to Prevent Surgical Site Infection in Vascular Surgery. 2017	Quasi-experimental	Patients undergoing elective vascular surgery (clean) and elective lower limb amputation (contaminated), university hospital, Spain	Preoperative, intraoperative and postoperative bundle	No bundle	Incidence of surgical site infection (SSI)	A significant difference in SSI incidence was found for clean vascular surgery and reduced significantly for lower limb amputation.	IIB
333	Koek, Mayke B. G., Hopmans, Titia E. M., Soetens, Loes C., et al. Adhering to a national surgical care bundle reduces the risk of surgical site infections 2017	Quasi-experimental	Patients undergoing 13 indexed procedures, Dutch hospitals, the Netherlands	Bundle with 4 elements	No comparison group	Level of bundle compliance on SSI risk	Adherence to bundle resulted in significant reduction of SSI risk.	IIA
334	Hodge, Ashley B. C. P., F.P.P., Thornton, Brandis A. R. D., Gajarski, Robert, et al. Quality Improvement Project in Congenital Cardiothoracic Surgery Patients: Reducing Surgical Site Infections 2019	Organizational Experience	Pediatric patients undergoing cardiothoracic surgery, The Heart Center at Nationwide Children's Hospital, United States	n/a	n/a	n/a	Bundle resulted in significant reduction of cardiothoracic surgery SSIs.	VA
335	Deery, Sarah E., Cavallaro, Paul M., McWalters, Sean T. C. P. H. Q., et al. Colorectal Surgical Site Infection Prevention Kits Prior to Elective Colectomy Improve Outcomes. Ann Surg 2019, 1-6.	Organizational Experience	Patients undergoing elective colectomy, general hospital, United States	n/a	n/a	n/a	Providing free SSI prevention kit led to significantly lower rates of surgical site infection, shorter hospital stays and readmission.	VA
336	DeHaas D., Aufderheide S., Gano J., Weigandt J., Ries J. and Faust, B. Colorectal surgical site infection reduction strategies. 2016	Organizational Experience	Patients undergoing colorectal surgery, medical center, United States	n/a	n/a	n/a	A bundle resulted in reduction of colorectal surgery SSI rates (17.58% to 5.11%).	VA
337	Holland, Cindra, Foster, Peggy, Ulrich, Deborah and Adkins, Kathryn. A Practice Improvement Project to Reduce Cesarean Surgical Site Infection Rates 2016	Organizational Experience	Patients undergoing cesarean birth, community hospital, United States	n/a	n/a	n/a	Reduction in C-section rates and improved patient satisfaction after implementation of bundle.	VA

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338	Money, Laura, Eyer, Milea and Duncan, Kensi. Creating a Surgical Site Infection Prevention Bundle for Patients Undergoing Cesarean Delivery 2018	Organizational Experience	Patients undergoing cesarean delivery, tertiary teaching hospital, United States	n/a	n/a	n/a	Obstetric SSI prevention bundle provided each member of team a defined strategy which led to improved patient outcomes, limited readmissions, and reduced additional costs.	VA
339	Schaffzin, Joshua K., Simon, Katherine, Connelly, Beverly and Mangano, Francesco T. Standardizing preoperative preparation to reduce surgical site infections among pediatric neurosurgical patients. 2017	Organizational Experience	Patients undergoing elective neurosurgery, children's hospital, United States	n/a	n/a	n/a	Standardization of preoperative protocol led significant reduction in SSI rates (2.9 to 0.62).	VA
340	Gallagher B.J., McMahon S.E., Henderson K., Zachariah S., Wilson D.S. and Gallagher, B. Reducing deep joint infection in hip hemiarthroplasty-A quality improvement project. 2018	Organizational Experience	Patients undergoing hip arthroplasty, hospital, Ireland	n/a	n/a	n/a	After implementation of interventions, the rate of deep SSIs were significantly reduced.	VA
341	Morris A.J., Roberts S.A., Grae N., Hamblin R., Shuker C. and Merry, A. F. The New Zealand surgical site infection improvement (SSII) programme: A national quality improvement programme reducing orthopaedic surgical site infections. 2018	Organizational Experience	Patients undergoing hip and knee arthroplasties, publicly funded hospitals, New Zealand	n/a	n/a	n/a	Surveillance, reporting of SSIs and interventions of antibiotic prophylaxis, clipping and alcohol-based skin preparation led to a significant reduction and sustainment of hip and knee arthroplasty infection.	VA
342	Fornwalt, Lori, Ennis, David and Stibich, Mark. Influence of a total joint infection control bundle on surgical site infection rates 2016	Organizational Experience	Patients undergoing total joint procedures, medical center, United States	n/a	n/a	n/a	After 12 months, the number of knee SSI was significantly reduced (4 to 0) and hip SSIs were reduced from 3 to 0.	VB
343	Morris A.J., Jackways T.M., Morgan A., Robertson R. and McIntyre, M. Reduction in surgical site infections in the southern cross hospitals network, 2004-2015: Successful outcome of a long-term surveillance and quality improvement project. 2018	Organizational Experience	Patients undergoing surgery, ten hospitals, New Zealand	n/a	n/a	n/a	Surveillance, reporting of SSIs, antibiotic prophylaxis, and alcohol-based skin preparation contributed significantly to reduction of SSIs.	VA
344	Rozario, Duncan. Can surgical site infections be reduced with the adoption of a bundle of simultaneous initiatives? The use of NSQIP incidence data to follow multiple quality improvement interventions. 2018	Organizational Experience	Patients undergoing general and orthopedic surgery, community hospital, United States	n/a	n/a	n/a	Significant reduction in overall SSI rate after implementation of bundle.	VB
345	Toltzis P., O'Riordan M., Cunningham D.J., et al. A statewide collaborative to reduce pediatric surgical site infections. 2014	Organizational Experience	Cardiopulmonary bypass, spine and CSF shunt procedures, 8 Children's Hospitals, United States	n/a	n/a	n/a	SSI rate decreased from 4.48% to 1.89%.	VA
346	Gomez-Romero, Francisco J., Fernandez-Prada, Maria and Navarro-Gracia, Juan F. Prevention of Surgical Site Infection: Analysis and Narrative Review of Clinical Practice Guidelines 2017	Literature Review	n/a	n/a	n/a	n/a	Hair removal, antibiotic prophylaxis, surgical site preparation, and normothermia were the 4 recommended measures with similar high grade evidence.	VA

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347	Tanner, J., Kiernan, M., Hilliam, R., et al. Effectiveness of a care bundle to reduce surgical site infections in patients having open colorectal surgery 2016	Quasi-experimental	Patients undergoing open colorectal surgery, 2 academic hospitals, England	Bundle of 9 interventions	No bundle	SSI incidence within 6 months per Public Health England definition; bundle compliance	The care bundle did not reduce SSI incidence. Increasing staff education and engagement may have provided different results.	IIB
348	Davis C.H., Kao L.S., Fleming J.B., et al. Multi-Institution Analysis of Infection Control Practices Identifies the Subset Associated with Best Surgical Site Infection Performance: A Texas Alliance for Surgical Quality Collaborative Project. 2017	Qualitative	Surveys at 20 ACS NSQIP hospitals, United States	n/a	n/a	Surgery, anesthesia and nursing adherence to 38 infection control practices; general surgery SSI odds ratio	Infection control practices focusing on patient skin and wound hygiene and SSI data transparency was significantly correlated with lower SSI odds ratios.	IIIB
349	Kampf, G. Acquired resistance to chlorhexidine - is it time to establish an 'antiseptic stewardship' initiative?. 2016	Literature Review	n/a	n/a	n/a	n/a	Restricting use of chlorhexidine for those patients in which there are clear benefits can assist in reducing resistance to noscomial pathogens.	VB
350	George, Jaiben, Klika, Alison K. and Higuera, Carlos A. Use of Chlorhexidine Preparations in Total Joint Arthroplasty 2017	Literature Review	n/a	n/a	n/a	n/a	CHG preparations with alcohol is effective for skin preparation, but superiority over PI is not fully conclusive. More high quality trials are needed.	VA