Supplementary Material

Supplementary File 1. Search Strategy

Databases:

- PubMed
- Cochrane Library

Limits:

- 2011 – May 2023
- English

Results:

- # of results post-dup for review: **701**

Table S-4. PubMed search strategy

Set #	Search	# of Results
1	"cross infection*"[ti] OR "cross transmission*"[ti] OR "health care associated infection*"[ti] OR "healthcare associated infection*"[ti] OR "nosocomial infection*"[ti] OR "healthcare acquired infection*" OR "health care acquired infection*"[ti] OR "hospital acquired infection*"[ti] OR "hospital associated infection*"[ti] OR "hospital onset infection*"[ti] OR "vancomycin resistan*"[ti] OR "methicillin resistan*"[ti] OR "MRSA"[ti] OR "VRE"[ti] OR "antibiotic resistant bacter*"[tiab] OR "Cross Infection"[Mesh] OR "Gram-Positive Bacterial Infections"[MAJR] OR "Methicillin-Resistant Staphylococcus aureus"[MAJR] OR "Vancomycin-Resistant Enterococci" OR "Vancomycin Resistance"[Mesh] OR "Disease Transmission, Infectious"[MAJR] OR "healthcare infection"[ti:~3]	514,538
2	"contact precaution*"[ti] OR "isolation precaution*" OR "patient isolat*"[ti] OR "infection control*"[ti] OR "infection prevent*"[ti] OR "universal precaution*"[ti] OR "transmission precaution*"[ti] OR "transmission prevent*"[ti] OR "transmission reduction*"[ti] OR "preventative measure*"[ti] OR "Infection Control"[MAJR] OR "Patient Isolation"[MAJR] OR "Universal Precautions"[MAJR] OR "infection prevention"[ti:~2] OR "infection prevention control"[ti:~3]	48,891
3	inpatient*[tiab] OR hospital*[tiab] OR "healthcare facilit*"[tiab] OR Inpatients[Mesh] OR Hospitalization[Mesh] OR Hospitals[MAJR] OR "Health Facilities"[Mesh:NoExp]	1,810,459
4	Austria* OR Australia* OR Belgium OR Canada* OR Denmark OR Finland OR France OR French OR German* OR Ireland OR Irish OR Italy OR Italian OR Netherlands OR Norway OR Portugal OR Spain OR Spanish OR Sweden OR "New Zealand" OR "United Kingdom" OR "United States" OR "UK" OR "USA" OR England OR Scotland OR Wales	
5	#1 AND #2 AND #3 AND #4	6,042
6	#5 AND (2011/01/01:2023/12/31[Date - Publication] AND "english"[Language]) AND ("systematic review"[ti] OR "randomized controlled"[ti] OR evidence[ti] OR "meta analysis"[ti] OR comparativestudy[Filter] OR evaluationstudy[Filter] OR guideline[Filter] OR meta-analysis[Filter] OR multicenterstudy[Filter] OR practiceguideline[Filter] OR preprint[Filter] OR randomizedcontrolledtrial[Filter] OR review[Filter] OR systematicreview[Filter] OR validationstudy[Filter])	**698**

Table S-5. Cochrane Library search strategy

Set #	Search	# of Results
1	("cross" NEXT infection*):ti,ab,kw OR ("cross" NEXT transmission*):ti,ab,kw OR ("health care associated" NEXT infection*):ti,ab,kw OR ("healthcare associated" NEXT infection*):ti,ab,kw OR ("nosocomial" NEXT infection*):ti,ab,kw OR ("healthcare acquired" NEXT infection*):ti,ab,kw OR ("health care acquired" NEXT infection*):ti,ab,kw OR ("hospital acquired" NEXT infection*):ti,ab,kw OR ("hospital associated" NEXT infection*):ti,ab,kw OR ("hospital onset" NEXT infection*):ti,ab,kw OR (healthcare NEAR infection*):ti,ab,kw OR ("vancomycin" NEXT resistan*):ti,ab,kw OR ("methicillin" NEXT resistan*):ti,ab,kw OR MRSA:ti OR VRE:ti,ab,kw OR ("antibiotic resistant" NEXT bacter*):ti,ab,kw OR ("gram-positive bacteria" NEAR infection*):ti,ab,kw OR "methicillin-resistant staphylococcus aureus":ti,ab,kw OR ("infectious disease" NEAR transmission*):ti,ab,kw	5,487
2	("contact" NEXT precaution*):ti,ab,kw OR ("isolation" NEXT precaution*) OR ("patient" NEXT isolat*):ti,ab,kw OR ("infection" NEXT control*):ti,ab,kw OR ("infection" NEXT prevent*):ti,ab,kw OR ("universal" NEXT precaution*):ti,ab,kw OR ("transmission" NEXT precaution*):ti,ab,kw OR ("transmission" NEXT prevent*):ti,ab,kw OR ("transmission" NEXT reduction*):ti,ab,kw OR ("preventative" NEXT measure*):ti,ab,kw OR ("prevention" NEAR measure*):ti,ab,kw OR (safety NEAR precaution*):ti,ab,kw OR (safety NEAR measure*):ti,ab,kw	15,142
3	inpatient*:ti,ab,kw OR hospital*:ti,ab,kw OR ("healthcare" NEXT facilit*):ti,ab,kw OR ("health care" NEXT facility*):ti,ab,kw OR ("health" NEXT facilit*):ti,ab,kw OR hospitaliz*:ti,ab,kw	241,220
4	Austria*:ti,ab,kw OR Australia*:ti,ab,kw OR Belgium:ti,ab,kw OR Canada:ti,ab,kw OR Canadian*:ti,ab,kw OR Denmark:ti,ab,kw OR Finland:ti,ab,kw OR France:ti,ab,kw OR French:ti,ab,kw OR German*:ti,ab,kw OR Ireland:ti,ab,kw OR Irish:ti,ab,kw OR Italy:ti,ab,kw OR Italian:ti,ab,kw OR Netherlands:ti,ab,kw OR Norway:ti,ab,kw OR Portugal:ti,ab,kw OR Spain:ti,ab,kw OR Spanish:ti,ab,kw OR Sweden:ti,ab,kw OR "New Zealand":ti,ab,kw OR "United Kingdom":ti,ab,kw OR "United States":ti,ab,kw OR "UK":ti,ab,kw OR "USA":ti,ab,kw OR England:ti,ab,kw OR Scotland:ti,ab,kw OR Wales:ti,ab,kw	196,416
5	#1 AND #2 AND #3 AND #4	189
6	#5 Limits: 2011 – 2023	**4**

Supplementary File 2. Risk of Bias of Included Studies

Table S-1. Cochrane risk of bias for randomized-controlled trials.

Author, year	Random	Allocation Concealment	Blinding Participants	Blinding Outcome Assessment	Selective Reporting	Attrition
Amirov 2017 [1]	Unclear risk	Unclear risk	High risk	Low risk	Low risk	Unclear risk
Camus 2011 [2]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk
Huang, 2019 [3]	Low risk	Unclear risk	High risk	Low risk	Low risk	Unclear risk
Kluytmans 2019 [4]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk
Maechler 2020 [5]	Low risk	Unclear risk	High risk	Low risk	Low risk	Low risk
McConeghy, 2017 [6]	Unclear risk	Low risk	High risk	Low risk	Low risk	Unclear risk
Miller, 2023 [7]	Low risk	Unclear risk	High risk	Low risk	Low risk	Low risk
Mitchell, 2019 [8]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk
Ray, 2017 [9]	Unclear risk	Low risk	High risk	Low risk	High risk	Unclear risk
Salgado, 2013 [10]	Low risk	Unclear risk	Low risk	Low risk	Low risk	Unclear risk

Table S-2. ROBINS-I risk of bias assessment for non-randomized studies

Author, year	Confounding	Selection bias	Bias in measurement classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported result
Bessesen, 2013 [11]	High	High	Low	Unclear	Unclear	Low	Low
Biehl, 2019 [12]	Unclear	Low	Low	Unclear	Low	Low	Low
Biehl, 2022 [13]	Unclear	Low	Low	Unclear	Low	Low	Low
Evans, 2023 [14]	Unclear	Low	Low	High	Low	Low	Low
Martin, 2018 [15]	Unclear	Low	Low	Unclear	Unclear	Low	Low
Mehta, 2013 [16]	High	High	Low	Unclear	Unclear	Low	Low
Popiel, 2014 [17]	Unclear	Low	Low	Unclear	Low	Low	Low

Table S-3. SOE table for systematic reviews of selected transmission-based precaution interventions effectiveness

Author, Year	Type of Evidence	Number of Included Studies	Heterogeneity (either quantitative estimate or narrative from the authors)	Limitations Reported by Authors	Authors' Conclusions	Assigned Strength of Evidence
Abad, 2020 [18]	Narrative	All observational	Heterogeneity	"…studies were too heterogenous…"	"cohorting may be reasonable....in outbreaks" "whether effective in endemics is unknown"	Low for outbreaks, Very Low for endemics
Afonso, 2013 [19]	Narrative	15 studies, 9 RCTs	Heterogeneity	"…studies were included regardless of the research methodology utilized…a more severe approach would have increased statistical integrity and homogeneity…"	"use of chlorhexidine wipes prevent the spread of pathogens, including multidrug resistant strains"	Low
Chang, 2019 [20]	Meta-analytic	4 RCTs 4 higher quality observational studies	Heterogeneity I2 = 60%.	"..only 8 publications met inclusion criteria, and they were heterogeneous." "The included studies were of moderate quality" "Only 3 studies reported hand hygiene and gloving compliance…"	"Universal gloving may be associated with a small protective effect…" (result was nonsignificant when only RCTs were assessed)	Low
Dancer, 2021 [21]	Narrative	43 studies 3 reports from 1 RCT	Heterogeneity	None mentioned	"clear benefits in vitro…insufficient objective assessment of patient outcome…"	Low

Author, Year	Type of Evidence	Number of Included Studies	Heterogeneity (either quantitative estimate or narrative from the authors)	Limitations Reported by Authors	Authors' Conclusions	Assigned Strength of Evidence
Huang, 2016 [22]	Meta-analytic	15 studies included (1 RCT)	Minimal I2 = 12%	"only 3 eligible RCTs were included…" "..overall quality of the included studies was low." "studies did not adequately evaluate the long-term effects…"	"suggests intervention reduces HAI"	Low
Kleyman, 2021 [23]	Meta-analytic	12 studies included (all observational)	Minimal I2 = 0% no effect of stopping	"we note the inherent biases attributed to the nonrandomized nature of studies…"	No significant differences after stopping contact precautions	Low
O'Horo. 2012 [24]	Meta-analytic	12 studies 1 RCT	Heterogeneity I2 = 53% and 64% in two pooled analyses	"Only a single randomized controlled trial met our inclusion criteria…" "…variability in the choice of study outcome…"" variability in implementation of the interventions…" "…evidence of publication bias…"	"Among ICU patients, daily chlorhexidine bathing reduces the risk of health-case associated blood stream infections"	Low
Purssell, 2020 [25]	Meta-analytic	26 studies All observational	Heterogeneity	"Because this evidence is comprised of cohort and case-control studies, a claim for a casual	Data "suggest that isolation.….has a number of negative" effects on patients	Very Low

Author, Year	Type of Evidence	Number of Included Studies	Heterogeneity (either quantitative estimate or narrative from the authors)	Limitations Reported by Authors	Authors' Conclusions	Assigned Strength of Evidence
				relationship cannot be made…"		
Wong, 2022 [26]	Meta-analytic	11 studies included in the quantitative analysis 5 RCTs	Varies I2 between 0% and 77% depending on analysis	"very few data on adherence reported…" "…multiplicity of outcome measures could limit the potential to synthesize results…" "…low quality of the study affects the internal validity of our review…"	Results "did not show any beneficial effect of IPC interventions on MRSA reductions."	Low

Abbreviations: *C. difficile* = Clostridioides difficile; HAI = Healthcare-associated Infections; ICU = Intensive care unit; IPC = Infection prevention and control; MRSA = Methicillin-resistant Staphylococcus aureus; RCT(s) = Randomized controlled trial(s); VRE = Vancomycin-resistant enterococcus

Supplementary File 3. List of Excluded Studies Upon Full-Text Review

Excluded Studies

The reason for exclusion is noted at the end of the citation.

1. Abubakar S, Boehnke JR, Burnett E, et al. Examining instruments used to measure knowledge of catheter-associated urinary tract infection prevention in health care workers: A systematic review. Am J Infect Control. 2021 Feb;49(2):255-64. doi: 10.1016/j.ajic.2020.07.025. PMID: 32707131. *Intervention*

2. Adams C, Peterson SR, Hall AJ, et al. Associations of infection control measures and norovirus outbreak outcomes in healthcare settings: a systematic review and meta-analysis. Expert Rev Anti Infect Ther. 2022 Feb;20(2):279-90. doi: 10.1080/14787210.2021.1949985. PMID: 34225537. *Intervention*

3. Almeida D, Cristovam E, Caldeira D, et al. Are there effective interventions to prevent hospital-acquired Legionnaires' disease or to reduce environmental reservoirs of Legionella in hospitals? A systematic review. Am J Infect Control. 2016 Nov 1;44(11):e183-e8. doi: 10.1016/j.ajic.2016.06.018. PMID: 27524259. *Intervention*

4. Andalib E, Faghani M, Zia Ziabari SM, et al. The Effectiveness of the Anteroom (Vestibule) Area on Hospital Infection Control and Health Staff Safety: A Systematic Review. Front Public Health. 2022;10:828845. doi: 10.3389/fpubh.2022.828845. PMID: 35558527. *Intervention*

5. Anderson DJ, Chen LF, Weber DJ, et al. Enhanced terminal room disinfection and acquisition and infection caused by multidrug-resistant organisms and Clostridium difficile (the Benefits of Enhanced Terminal Room Disinfection study): a cluster-randomised, multicentre, crossover study. Lancet. 2017 Feb 25;389(10071):805-14. doi: 10.1016/s0140-6736(16)31588-4. PMID: 28104287. *Assessed in MHS II or III*

6. Backman C, Taylor G, Sales A, et al. An integrative review of infection prevention and control programs for multidrug-resistant organisms in acute care hospitals: a socio-ecological perspective. Am J Infect Control. 2011 Jun;39(5):368-78. doi: 10.1016/j.ajic.2010.07.017. PMID: 21429622. *Assessed in MHS II or III*

7. Barker AK, Krasity B, Musuuza J, et al. Screening for Asymptomatic Clostridium difficile Among Bone Marrow Transplant Patients: A Mixed-Methods Study of Intervention Effectiveness and Feasibility. Infect Control Hosp Epidemiol. 2018 Feb;39(2):177-85. doi: 10.1017/ice.2017.286. PMID: 29366434. *Not a study question of interest*

8. Bénet T, Girard R, Gerbier-Colomban S, et al. Determinants of Implementation of Isolation Precautions Against Infections by Multidrug-Resistant Microorganisms: A Hospital-Based, Multicenter, Observational Study. Infect Control Hosp Epidemiol. 2017 Oct;38(10):1188-95. doi: 10.1017/ice.2017.153. PMID: 28758615. *Intervention*

9. Birgand G, Moore LSP, Bourigault C, et al. Measures to eradicate multidrug-resistant organism outbreaks: how much do they cost? Clin Microbiol Infect. 2016 Feb;22(2):162.e1-.e9. doi: 10.1016/j.cmi.2015.10.001. PMID: 26482264. *Study design, systematic review of costs*

10. Bishop J, Parry MF, Hall T. Decreasing Clostridium difficile infections in surgery: impact of a practice bundle incorporating a resident rounding protocol. Conn Med. 2013 Feb;77(2):69-75. PMID: 23513633. *Study design, pre-post study*

11. Calfee DP, Salgado CD, Milstone AM, et al. Strategies to prevent methicillin-resistant Staphylococcus aureus transmission and infection in acute care hospitals: 2014 update. Infect Control Hosp Epidemiol. 2014 Jul;35(7):772-96. doi: 10.1086/676534. PMID: 24915205. *Timing*

12. Cheon S, Kim MJ, Yun SJ, et al. Controlling endemic multidrug-resistant Acinetobacter baumannii in Intensive Care Units using antimicrobial stewardship and infection control. Korean J Intern Med. 2016 Mar;31(2):367-74. doi: 10.3904/kjim.2015.178. PMID: 26874513. *Study design*

13. Ciobotaro P, Oved M, Nadir E, et al. An effective intervention to limit the spread of an epidemic carbapenem-resistant Klebsiella pneumoniae strain in an acute care setting: from theory to practice. Am J Infect Control. 2011 Oct;39(8):671-7. doi: 10.1016/j.ajic.2011.05.004. PMID: 21864942. *Assessed in MHS II or III*

14. Daeschlein G, von Podewils S, Bloom T, et al. Active surveillance for methicillin-resistant Staphylococcus aureus including polymerase chain reaction-based screening prevents transmission in a dermatology ward. Infect Control Hosp Epidemiol. 2012 Sep;33(9):957-9. doi: 10.1086/667372. PMID: 22869274. *Timing*

15. de França SR, Sant'Ana EA, Nunes Mafra ACC, et al. The Impact of Isolation Precautions on Hand Hygiene Frequency by Healthcare Workers. Infect Control Hosp Epidemiol. 2018 Feb;39(2):245-7. doi: 10.1017/ice.2017.275. PMID: 29345607. *Population*

16. Doebbeling BN, Flanagan ME, Nall G, et al. Multihospital infection prevention collaborative: informatics challenges and strategies to prevent MRSA. AMIA Annu Symp Proc. 2013;2013:317-25. PMID: 24551340. *Not a study question of interest*

17. Dubberke ER, Rohde JM, Saint S, et al. Quantitative Results of a National Intervention to Prevent Clostridioides difficile Infection: A Pre-Post Observational Study. Ann Intern Med. 2019 Oct 1;171(7_Suppl):S52-s8. doi: 10.7326/m18-3545. PMID: 31569233. *Study design*

18. Falagas ME, Thomaidis PC, Kotsantis IK, et al. Airborne hydrogen peroxide for disinfection of the hospital environment and infection control: a systematic review. J Hosp Infect. 2011 Jul;78(3):171-7. doi: 10.1016/j.jhin.2010.12.006. PMID: 21392848. *Outcome*

19. Farbman L, Avni T, Rubinovitch B, et al. Cost-benefit of infection control interventions targeting methicillin-resistant Staphylococcus aureus in hospitals: systematic review. Clin Microbiol Infect. 2013 Dec;19(12):E582-93. doi: 10.1111/1469-0691.12280. PMID: 23991635. *Outcome*

20. French CE, Coope C, Conway L, et al. Control of carbapenemase-producing Enterobacteriaceae outbreaks in acute settings: an evidence review. J Hosp Infect. 2017 Jan;95(1):3-45. doi: 10.1016/j.jhin.2016.10.006. PMID: 27890334. *Assessed in MHS II or III*

21. Friedman ND, Walton AL, Boyd S, et al. The effectiveness of a single-stage versus traditional three-staged protocol of hospital disinfection at eradicating vancomycin-resistant Enterococci from frequently touched surfaces. Am J Infect Control. 2013 Mar;41(3):227-31. doi: 10.1016/j.ajic.2012.03.021. PMID: 22981721. *Study Design*

22. Granzotto EM, Gouveia AM, Gasparetto J, et al. Depression and anxiety in hospitalized patients on contact precautions for multidrug-resistant microorganisms. Infect Dis Health. 2020 Aug;25(3):133-9. doi: 10.1016/j.idh.2020.01.002. PMID: 32005585. *Study Design*

23. Greig JD, Lee MB. A review of nosocomial norovirus outbreaks: infection control interventions found effective. Epidemiol Infect. 2012 Jul;140(7):1151-60. doi: 10.1017/s0950268811002731. PMID: 22217255. *Intervention*

24. Halpin HA, McMenamin SB, Simon LP, et al. Impact of participation in the California Healthcare-Associated Infection Prevention Initiative on adoption and implementation of evidence-based practices for patient safety and health care-associated infection rates in a cohort of acute care general hospitals. Am J Infect Control. 2013 Apr;41(4):307-11. doi: 10.1016/j.ajic.2012.04.322. PMID: 22921825. *Not a study question of interest*

25. Hammoud S, Amer F, Lohner S, et al. Patient education on infection control: A systematic review. Am J Infect Control. 2020 Dec;48(12):1506-15. doi: 10.1016/j.ajic.2020.05.039. PMID: 32512081. *Outcome*

26. Hessels AJ, Larson EL. Relationship between patient safety climate and standard precaution adherence: a systematic review of the literature. J Hosp Infect. 2016 Apr;92(4):349-62. doi: 10.1016/j.jhin.2015.08.023. PMID: 26549480. *Not a study question of interest*

27. Houghton C, Meskell P, Delaney H, et al. Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis. Cochrane Database Syst Rev. 2020 Apr 21;4(4):Cd013582. doi: 10.1002/14651858.Cd013582. PMID: 32315451. *Population*

28. Hsu YJ, Zhou Z, Nosakhare E, et al. Impact of certified infection preventionists in acute care settings: A systematic review. Am J Infect Control. 2023 Mar;51(3):334-9. doi: 10.1016/j.ajic.2022.06.020. PMID: 35764180. *Study design, cross sectional*

29. Huang SS, Septimus E, Kleinman K, et al. Targeted versus universal decolonization to prevent ICU infection. N Engl J Med. 2013 Jun 13;368(24):2255-65. doi: 10.1056/NEJMoa1207290. PMID: 23718152. *Assessed in MHS II or III*

30. Jokinen E, Laine J, Huttunen R, et al. Combined interventions are effective in MRSA control. Infect Dis (Lond). 2015;47(11):801-7. doi: 10.3109/23744235.2015.1063158. PMID: 26135710. *Intervention*

31. Khanafer N, Voirin N, Barbut F, et al. Hospital management of Clostridium difficile infection: a review of the literature. J Hosp Infect. 2015 Jun;90(2):91-101. doi: 10.1016/j.jhin.2015.02.015. PMID: 25913648. *Assessed in MHS II or III*

32. Korbkitjaroen M, Vaithayapichet S, Kachintorn K, et al. Effectiveness of comprehensive implementation of individualized bundling infection control measures for prevention of health care-associated infections in general medical wards. Am J Infect Control. 2011 Aug;39(6):471-6. doi: 10.1016/j.ajic.2010.09.017. PMID: 21565423. *Setting*

33. Lee MB, Greig JD. A review of nosocomial Salmonella outbreaks: infection control interventions found effective. Public Health. 2013 Mar;127(3):199-206. doi: 10.1016/j.puhe.2012.12.013. PMID: 23433804. *Population*

34. Lee MH, Lee GA, Lee SH, et al. Effectiveness and core components of infection prevention and control programmes in long-term care facilities: a systematic review. J Hosp Infect. 2019 Aug;102(4):377-93. doi: 10.1016/j.jhin.2019.02.008. PMID: 30794854. *Assessed in MHS II or III*

35. Leekha S, O'Hara LM, Sbarra A, et al. Comparison of surveillance and clinical cultures to measure the impact of infection control interventions on the incidence of methicillin-resistant Staphylococcus aureus and vancomycin-resistant Enterococcus in the hospital. Infect Control Hosp Epidemiol. 2020 Feb;41(2):161-5. doi: 10.1017/ice.2019.322. PMID: 31896372. *Intervention*

36. Leonhardt KK, Yakusheva O, Phelan D, et al. Clinical effectiveness and cost benefit of universal versus targeted methicillin-resistant Staphylococcus aureus screening upon admission in hospitals. Infect Control Hosp Epidemiol. 2011 Aug;32(8):797-803. doi: 10.1086/660875. PMID: 21768764. *Intervention*

37. Lewis SR, Schofield-Robinson OJ, Rhodes S, et al. Chlorhexidine bathing of the critically ill for the prevention of hospital-acquired infection. Cochrane Database Syst Rev. 2019 Aug 30;8(8):CD012248. doi: 10.1002/14651858.CD012248.pub2. PMID: 31476022. *Outcome*

38. Longtin Y, Paquet-Bolduc B, Gilca R, et al. Effect of Detecting and Isolating Clostridium difficile Carriers at Hospital Admission on the Incidence of C difficile Infections: A Quasi-Experimental Controlled Study. JAMA Intern Med. 2016 Jun 1;176(6):796-804. doi: 10.1001/jamainternmed.2016.0177. PMID: 27111806. *Assessed in MHS II or III*

39. Lord AS, Nicholson J, Lewis A. Infection Prevention in the Neurointensive Care Unit: A Systematic Review. Neurocrit Care. 2019 Aug;31(1):196-210. doi: 10.1007/s12028-018-0568-y. PMID: 29998427. *Outcome*

40. Louh IK, Greendyke WG, Hermann EA, et al. Clostridium Difficile Infection in Acute Care Hospitals: Systematic Review and Best Practices for Prevention. Infect Control Hosp Epidemiol. 2017 Apr;38(4):476-82. doi: 10.1017/ice.2016.324. PMID: 28300019. *Assessed in MHS II or III*

41. MacDougall C, Johnstone J, Prematunge C, et al. Economic evaluation of vancomycin-resistant enterococci (VRE) control practices: a systematic review. J Hosp Infect. 2020 May;105(1):53-63. doi: 10.1016/j.jhin.2019.12.007. PMID: 31857122. *Outcome*

42. Marche B, Neuwirth M, Kugler C, et al. Implementation methods of infection prevention measures in orthopedics and traumatology - a systematic review. Eur J Trauma Emerg Surg. 2021 Aug;47(4):1003-13. doi: 10.1007/s00068-020-01477-z. PMID: 32914198. *Population*

43. Marcus EL, Yosef H, Borkow G, et al. Reduction of health care-associated infection indicators by copper oxide-impregnated textiles: Crossover, double-blind controlled study in chronic ventilator-dependent patients. Am J Infect Control. 2017 Apr 1;45(4):401-3. doi: 10.1016/j.ajic.2016.11.022. PMID: 28034536. *Population*

44. Marshall C, Richards M, McBryde E. Do active surveillance and contact precautions reduce MRSA acquisition? A prospective interrupted time series. PLoS One. 2013;8(3):e58112. doi: 10.1371/journal.pone.0058112. PMID: 23555568. *Intervention*

45. Martin EK, Salsgiver EL, Bernstein DA, et al. Sustained improvement in hospital cleaning associated with a novel education and culture change program for environmental services

workers. Infect Control Hosp Epidemiol. 2019 Sep;40(9):1024-9. doi: 10.1017/ice.2019.183. PMID: 31256766. *Intervention*

46. Mauger B, Marbella A, Pines E, et al. Implementing quality improvement strategies to reduce healthcare-associated infections: A systematic review. Am J Infect Control. 2014 Oct;42(10 Suppl):S274-83. doi: 10.1016/j.ajic.2014.05.031. PMID: 25239722. *Not a study question of interest*

47. Maziade PJ, Andriessen JA, Pereira P, et al. Impact of adding prophylactic probiotics to a bundle of standard preventative measures for Clostridium difficile infections: enhanced and sustained decrease in the incidence and severity of infection at a community hospital. Curr Med Res Opin. 2013 Oct;29(10):1341-7. doi: 10.1185/03007995.2013.833501. PMID: 23931498. *Intervention*

48. Michels HT, Keevil CW, Salgado CD, et al. From Laboratory Research to a Clinical Trial: Copper Alloy Surfaces Kill Bacteria and Reduce Hospital-Acquired Infections. Herd. 2015 Fall;9(1):64-79. doi: 10.1177/1937586715592650. PMID: 26163568. *Study design, non systematic review*

49. Mitchell BG, Russo PL, Cheng AC, et al. Strategies to reduce non-ventilator-associated hospital-acquired pneumonia: A systematic review. Infect Dis Health. 2019 Nov;24(4):229-39. doi: 10.1016/j.idh.2019.06.002. PMID: 31279704. *Intervention*

50. Moralejo D, El Dib R, Prata RA, et al. Improving adherence to Standard Precautions for the control of health care-associated infections. Cochrane Database Syst Rev. 2018 Feb 26;2(2):Cd010768. doi: 10.1002/14651858.CD010768.pub2. PMID: 29481693. *Not a study question of interest*

51. Morgan DJ, Pineles L, Shardell M, et al. The effect of contact precautions on healthcare worker activity in acute care hospitals. Infect Control Hosp Epidemiol. 2013 Jan;34(1):69-73. doi: 10.1086/668775. PMID: 23221195. *Outcome*

52. Pallotto C, Fiorio M, De Angelis V, et al. Daily bathing with 4% chlorhexidine gluconate in intensive care settings: a randomized controlled trial. Clin Microbiol Infect. 2019 Jun;25(6):705-10. doi: 10.1016/j.cmi.2018.09.012. PMID: 30267930. *Outcome*

53. Peter D, Meng M, Kugler C, et al. Strategies to promote infection prevention and control in acute care hospitals with the help of infection control link nurses: A systematic literature review. Am J Infect Control. 2018 Feb;46(2):207-16. doi: 10.1016/j.ajic.2017.07.031. PMID: 29413157. *Not a study question of interest*

54. Plantinga NL, de Smet A, Oostdijk EAN, et al. Selective digestive and oropharyngeal decontamination in medical and surgical ICU patients: individual patient data meta-analysis. Clin Microbiol Infect. 2018 May;24(5):505-13. doi: 10.1016/j.cmi.2017.08.019. PMID: 28870727. *Intervention*

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Supplementary File 4. Infection prevention and control practices in Nursing Home settings

Our literature search identified one newer systematic review of infection control approaches for MDRO in long term care facilities [26]. This review, which we judged to be of good quality, searched through 2020 and focused on MRSA, VRE, multidrug resistant gram negative bacteria including ESBL *Enterobacterales* and CRE, and *C. difficile*. The search identified 19 studies meeting their inclusion criteria of which 11 contributed data to their main analysis: five were randomized trials, one was a controlled before-and-after study, and five were uncontrolled before-and-after studies. Interventions were classified into 8 categories and then whether they were horizontal or vertical, with horizontal interventions being administrative engagement, education, environmental cleaning, hand hygiene, performance improvement, and source control. Decolonization of colonized subjects was classified as a vertical intervention. The authors pooled analysis of data from 11 studies reporting on MRSA infections showed no statistically significant effect of infection prevention and control practice. Subgroup and sensitivity analyses in general also showed no statistically significant effect, one exception being active surveillance and decolonization in one subgroup of studies (pooled random effects RR = 0.34, 95% confidence interval 0.22, 0.53). We assessed the certainty of evidence for their conclusion about infection control practices and MRSA rates as Low.

Our search identified one new original research article addressing prevention and control of MDROs in long-term care facilities [6]. We discussed a separate randomized controlled trial of patient decolonization in nursing homes, in the main text.

McConeghy and colleagues performed a randomized pair-matched controlled trial in 10 nursing homes comparing usual care to implementation of a multimodal bundle of infection prevention and control interventions, including staff education, provision of handwashing and cleaning

products, and auditing and feedback using a dashboard reporting clinical infection rates as well as surveillance cultures from high-touch surfaces. Primary outcomes were related to staff satisfaction and hand hygiene compliance which are not relevant to our review, but relevant secondary outcomes included any infection, lower respiratory infection, antibiotic starts, and hospitalization. The authors report reductions in absolute rates of total infections that did not reach significance in difference-in-difference analysis. Overall, we conclude that infection prevention and control practices in long term care facilities have at most a small effect on rates of MDRO infections in the endemic setting, but certainty of evidence was Low.

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