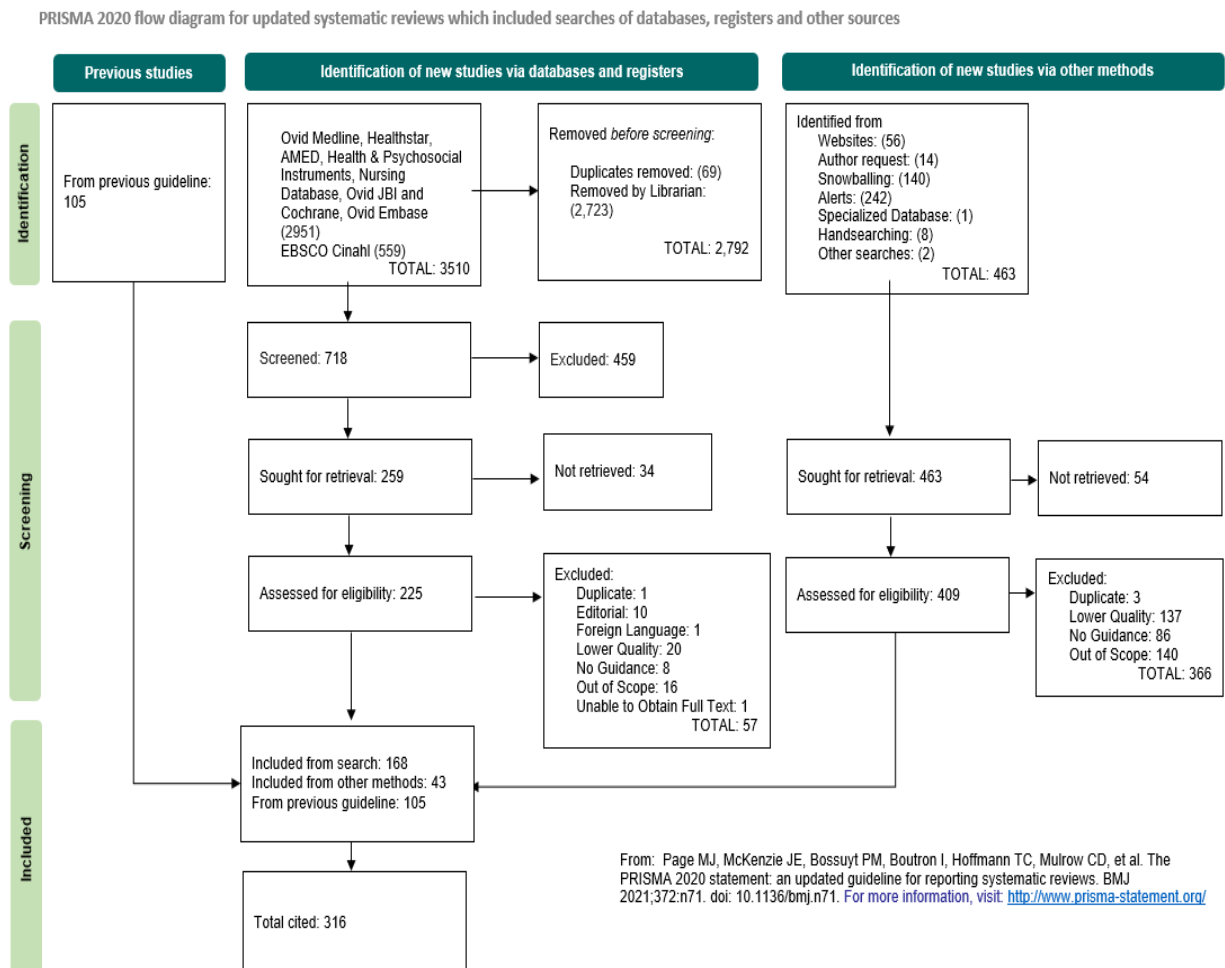


EVIDENCE REVIEW

A medical librarian with a perioperative background conducted a systematic search of the databases Ovid MEDLINE®, Ovid Embase®, EBSCO CINAHL®, and the Cochrane Database of Systematic Reviews. The search was limited to literature published in English from January, 2018 through March, 2023. At the time of the initial search, weekly alerts were created on the topics included in that search. Results from these alerts were provided to the lead author until September, 2023. The lead author requested additional articles that either did not fit the original search criteria or were discovered during the evidence appraisal process. The lead author and the medical librarian also identified relevant guidelines from government agencies, professional organizations, and standards-setting bodies.

Included were research and non-research literature in English, complete publications, and publications with dates within the time restriction when available. Historical studies were also included. Excluded were non-peer-reviewed publications and older evidence within the time restriction when more recent evidence was available. Editorials, news items, and other brief items were excluded. Low-quality evidence was excluded when higher-quality evidence was available, and literature outside the time restriction was excluded when literature within the time restriction was available. Articles identified in the search were provided to the project team for evaluation. The team consisted of the lead author and one evidence appraiser. The lead author and the evidence appraiser reviewed and critically appraised each article using the AORN Research or Non-Research Evidence Appraisal Tools as appropriate. A third appraiser was consulted if there was a disagreement between the lead author and the primary evidence appraiser. The literature was independently evaluated and appraised according to the strength and quality of the evidence. Each article was then assigned an appraisal score. The appraisal score is noted in brackets after each reference as applicable. Each recommendation rating is based on a synthesis of the collective evidence, a benefit-harm assessment, and consideration of resource use. The strength of the recommendation was determined using the AORN Evidence Rating Model and the quality and consistency of the evidence supporting a recommendation. The recommendation strength rating is noted in brackets after each recommendation. See the PRISMA 2020 flow diagram (Figure 1) below for more information about the systematic review and nature of included studies and resources.

Figure 1: PRISMA 2020 Flow Diagram



On March 8, 2023, a medical librarian with a perioperative background conducted searches for relevant publications on websites of organizations selected by the author (including government departments). Full details of these supplementary searches is included in the Supplementary Content on the aorn.org web site. These results were also screened by two screeners: the medical librarian, and then the lead author.

On March 6, 2023, a medical librarian with a perioperative background conducted a systematic search of 16 health science databases, the names and date coverage of which are given in Table 1. These results were screened by the medical librarian, and then the lead author.

Table 1: Databases searched and coverage

Database Coverage

AORN Full Text Journals@Ovid Current

Books@Ovid March 6, 2023

JBI EBP Database Current to March 1, 2023

EBM Reviews: ACP Journal Club 1991 to February 2023

EBM Reviews: Cochrane Central Register of Controlled Trials February 2023

EBM Reviews: Cochrane Database of Systematic Reviews 2005 to February 28, 2023

EBM Reviews: Cochrane Clinical Answers February 2023

EBM Reviews: Cochrane Methodology Register 3rd Quarter 2012

EBM Reviews: Database Of Abstracts Of Reviews Of Effects 1st Quarter 2016

EBM Reviews: Health Technology Assessment 4th Quarter 2016

EBM Reviews: NHS Economic Evaluation Database 1st Quartet 2016

AMED (Allied and Complementary Medicine) 1985 to February 2023

Embase 1974 to 2023 March 03

Health and Psychosocial Instruments 1985 to January 2023

Ovid Healthstar 1902 to 1998, 1999 to January 2023

Ovid MEDLINE(R) ALL 1946 to March 2023

Ovid Nursing Database 1946 to February week 4 2023

EBSCOhost CINAHL 1937 to March 2023

Search strategy development process: The medical librarian referred to a search strategy used for the previous Guideline. A draft search strategy was developed using terms listed in the previous strategy and additional search terms identified from a meeting with the lead author. Using the MeSH Subject Headings database, additional search terms were identified and added to the search strategy. The strategy was limited following the constraints in the eligibility criteria outlined by the lead author.

Editor's note: MEDLINE is a registered trademark of the US National Library of Medicine's Medical Literature Analysis and Retrieval System, Bethesda, MD. Embase is a registered trademark of Elsevier B.V., Amsterdam, The Netherlands. CINAHL, Cumulative Index to Nursing and Allied Health Literature, is a registered trademark of EBSCO Industries, Birmingham, AL.

Search Strategies

Ovid (Medline, Cochrane, and Embase)

1. "Foreign-body reaction"/et, pa or "foreign bodies"/pa, et or (fibers or fibres or lint or powder).ti,ab,kw. or ((foreign or talcum) and (particles or material)).ti,ab,kw. or gelbo.ti,ab,kw. 745757

2. ("Intraoperative Care" or "surgical procedures, operative" or "operating rooms" or "ambulatory surgical procedures" or "Cesarean Section").de,sh,hw. or "operating rooms"/st or "Infection Control"/mt or "Surgical Wound Infection"/pc, et or Asepsis/is, mt, st or ("procedure room" or "cardiac catheterization

laboratory" or "interventional radiology").ti,ab. or (("laminar flow" or restricted) and areas).ti,ab. or ((surgical or endoscopy) and suite).ti,ab. or ((surgical or operating) and theat\$).ti,ab. or (invasive and procedures).ti,ab. or ("sterile technique" or "aseptic technique" or "sterile practices" or "aseptic practices" or "sterile field").ti,ab. 511929

3. ("perioperative nursing" or "operating room nursing").sh. or ("perioperative nurse" or "operating room staff" or "surgical technologist" or "operating room personnel" or "scrubbed person" or "circulating nurse" or circulator).ti,ab. 48538

4. 2 or 3 551859

5. ("surgical wound classification" or "surgical conscience" or "break in sterile technique" or "Surgical Site Infection" or insects or vectors or "immediate action" or "clamped instruments" or "assembled instruments" or "corrective actions" or "instrument set removal" or "surgical contamination" or (("organic material" or blood or hair or tissue or bone or debris or grease) and "instrument tray") or ("human factors" adj3 (simulation or training))).ti,ab. or "Equipment Contamination"/pc 406753

6. 4 and 5 11179

7. (("leaning over" or plac\$ or open\$ or dispens\$ or deliver\$ or transfer\$ or handl\$) and ("sterile supplies" or instruments or solution)).ti,ab. or (packaging and ("surgical instruments" or filters)).de,sh,hw. or Kimguard.dm. or ("inspection of surgical supplies" or "package integrity" or "wrapped items" or "expiration date").ti,ab. or ((event or time) and "related sterility").ti,ab. or (chemical adj5 (integrator or indicator)).ti,ab. or (instrument and (inspection or wrap or trays)).ti,ab. or ("sterile field preparation" or "sterile field set up" or "non-sterile items on the sterile field").ti,ab. or ((dual or multiple) and "sterile fields").ti,ab. 375369

8. 7 and 4 4790

9. ("surgical attire" or "gloves, surgical" or "surgical drapes" or "protective clothing" or "methyl methacrylate" or "bone cements").de,sh,hw. or Maxair.dm. or ("surgical gowns" and (donning or doffing or size or fit or length or sleeve or "sterile area" or "critical zone" or strikethrough or cuffs or seams)).ti,ab. or (glove and gown and interface).ti,ab. or ((double or assisted or closed) and gloving).ti,ab. or (glove and (compromise or inspection or perforation or integrity or "fluid absorption" or "fat absorption" or "indicator systems" or "visible defect")).ti,ab. or ((sterile or "extended-cuff") and "surgical gloves").ti,ab. or ((surgical or orthop\$dic) and (helmet or hood)).ti,ab. or ("body exhaust suits" or "sterile vest").ti,ab. or "hand hygiene"/sn, mt or "Foreign-body reaction"/et, pa or "foreign bodies"/pa, et or (fibers or fibres or lint or powder).ti,ab,kw. or ((foreign or talcum) and (particles or material)).ti,ab,kw. or gelbo.ti,ab,kw. 450012

10. 4 and 9 6683

11. (((surgical or sterile or procedural) and (drapes or barrier)) or ("plastic adhesive incise" or "iodine-impregnated") adj8 drape) or ("unanticipated delay" or "unattended sterile field" or "table covering" or "non-penetrating clamps")).ti,ab. or loban.dm. or ((maintain\$ or monitor\$) and "sterile field").ti,ab. or ((waist or chang\$ or "sterile field") adj8 level).ti,ab. or (cover and (equipment or "instrument trays" or implant)).ti,ab. 256758

12. 4 and 11 2330

13. ("gastrointestinal tract" or "neoplasm metastasis" or "colorectal surgery" or "metastatic tumors" or "bowel surgery").de,sh,hw. 353864

14. ("isolation technique" or "bowel technique" or "clean closure technique" or "bowel isolation technique" or "surgical site infection bundle" or "closure technique" or "seeding of metastatic tumors" or (closing and (trays or instruments))).ti,ab,kw. 6971

15. 13 and 14 69

16. ((door and (opening\$ or closing\$ or motion\$)) or ("operating room" and traffic) or (Sneez\$ or cough\$ or "chewing gum" or talk\$ or conversation or "number of people" or "movement of personnel" or "front to front" or "back to back" or "increased activity") or ((foot or deterrent\$ or patterns) and traffic)).ti,ab,kw.592720

17. "Air microbiology"/st or "environmental microbiology"/st or bioaerosols.ti,ab,kw. 2799

18. 16 and 17 107

19. 4 and 18 8

20. ventilation/st, mt or "environment,controlled".de,sh,hw. or ((laminar or unidirectional) and (airflow or "air flow")).ti,ab,kw. or ("positive pressure" and environment).ti,ab,kw. or ("controlled environment" or

"laminar air-flow areas" or "ultraclean ventilation" or "surgical air systems" or "air velocity" or "unidirectional ultraclean air delivery system" or "temperature-controlled air flow" or TcAF or "turbulent mixed air flow" or "surgical doors shut" or "blocked vents").ti,ab,kw. 17499

21. 17 and 20 137

22. 4 and 21 41

23. 6 or 8 or 10 or 12 or 15 or 19 or 22 23750

24. limit 23 to english language 22021

25. limit 24 to human 19442

26. limit 25 to yr="2018 -Current" [Limit not valid in DARE; records were retained] 6104

27. limit 26 to humans 6104

28. limit 27 to full systematic reviews 6104

29. limit 28 to original articles 6102

30. limit 29 to primary source 6102

31. limit 30 to (editorials or letters or original articles or reports or "review articles" or nursing practice or recommended practices or systematic reviews or editorial or letters to the editor or journal article or clinical trial or practice guideline or "review" or case reports or clinical trial,all or controlled clinical trial or letter or monograph or position paper or article or article in press or clinical study or clinical trial, all or "corrected and republished article" or evaluation study or festschrift or government publication or guideline or in vitro or legal case or legislation or meta analysis or multicenter study or observational study or pragmatic clinical trial or published erratum or research support, nih, extramural or research support, nih, intramural or research support, non us gov't or research support, us gov't, non phs or research support, us gov't, phs or "systematic review" or technical report or validation study or randomized controlled trial or articles) 5769

32. limit 31 to surgical services 5769

33. remove duplicates from 32 2951

EBSCOhost (CINAHL)

S1 ((MH "Foreign-Body Reaction/ET/PA") OR (MH "Foreign Bodies/ET/PA")) OR (fibers or fibres or lint or powder) OR (((foreign or talcum) and (particles or material))) OR gelbo 48,293

S2 ((MM "Surgical Wound Infection/PC/ET") OR (MM "Surgery, Operative") OR (MM "Operating Rooms")) OR ("procedure room" or "cardiac catheterization laboratory" or "interventional radiology") OR (("laminar flow" or restricted) and areas) OR ((surgical or endoscopy) and suite) OR ((surgical or

operating) and theat*) OR ("sterile technique" or "aseptic technique" or "sterile practices" or "aseptic practices" or "sterile field") OR ((invasive and procedures)) 70,451

S3 ((MM "Perioperative Nursing") OR (MM "Operating Room Personnel")) OR ("perioperative nurse" or "operating room staff" or "surgical technologist" or "operating room nursing" or "scrubbed person" or "circulating nurse" or circulator) 19,829

S4 S2 OR S3 88,206

S5 (MH "Equipment Contamination/PC") OR ("surgical wound classification" or "surgical conscience" or "break in sterile technique" or "Surgical Site Infection" or insects or vectors or "immediate action" or "clamped instruments" or "assembled instruments" or "corrective actions" or "instrument set removal" or "surgical contamination") OR (("organic material" or blood or hair or tissue or bone or debris or grease) and "instrument tray") OR ("human factors" N3 (simulation or training)) 31,810

S6 S4 AND S5 4,623

S7 (((MH "Surgical Instruments") or filters) AND packaging) OR (("leaning over" or plac* or open* or dispens* or deliver* or transfer* or handl*) and ("sterile supplies" or instruments or solution)) OR ("inspection of surgical supplies" or "package integrity" or "wrapped items" or "expiration date") OR ((event or time) and "related sterility") OR (chemical N5 (integrator or indicator)) OR (instrument and

(inspection or wrap or trays)) OR ("sterile field preparation" or "sterile field set up" or "non-sterile items on the sterile field") OR ((dual or multiple) and "sterile fields") OR Kimguard 36,691

S8 S4 AND S7 1,010

S9 ((MH "Foreign-Body Reaction/ET/PA") OR (MH "Foreign Bodies/ET/PA") OR (MM "Surgical Draping") OR (MM "Surgical Wound Infection")) OR ("surgical attire" or "gloves, surgical" or "protective clothing" or "methyl methacrylate" or "bone cements" OR "hand hygiene") OR ("surgical gowns" and (donning or doffing or size or fit or length or sleeve or "sterile area" or "critical zone" or strikethrough or cuffs or seams)) OR (glove and gown and interface) OR ((double or assisted or closed) and gloving) OR (glove and (compromise or inspection or perforation or integrity or "fluid absorption" or "fat absorption" or "indicator systems" or "visible defect")) OR ((sterile or "extended-cuff") and "surgical gloves") OR ((surgical or orthop\$dic) and (helmet or hood)) OR ("body exhaust suits" or "sterile vest" or Maxair or fibers or fibres or lint or powder or gelbo) OR ((foreign or talcum) and (particles or material)) 70,956

S10 S4 AND S9 5,461

S11 (((surgical or sterile or procedural) and (drapes or barrier))) OR (("plastic adhesive incise" or "iodine-impregnated") N8 drape) OR ("unanticipated delay" or "unattended sterile field" or "table covering" or "non-penetrating clamps" or loban) OR ((maintain* or monitor*) and "sterile field") OR ((waist or chang* or "sterile field") N8 level) OR (cover and (equipment or "instrument trays" or implant)) 38,894

S12 S4 AND S11 929

S13 (MH "Neoplasm Metastasis") OR ("colorectal surgery" or "metastatic tumors" or "bowel surgery" or "gastrointestinal tract") 61,792

S14 ("isolation technique" or "bowel technique" or "clean closure technique" or "bowel isolation technique" or "surgical site infection bundle" or "closure technique" or "seeding of metastatic tumors") OR (closing and (trays or instruments)) 448

S15 S13 AND S14 18

S16 (door and (opening* or closing* or motion*)) OR ("operating room" and traffic) OR (Sneez* or cough* or "chewing gum" or talk* or conversation or "number of people" or "movement of personnel" or "front to front" or "back to back" or "increased activity") OR ((foot or deterrent* or patterns) and traffic) 90,492

S17 ((MH "Environmental Microbiology/ST") OR (MH "Air Microbiology/ST")) OR bioaerosols283

S18 S16 AND S17 12

S19 S4 AND S18 1

S20 (MH "Environment, Controlled") OR ((laminar or unidirectional) and (airflow or "air flow")) OR ("positive pressure" and environment) OR ("controlled environment" or "laminar air-flow areas" or "ultraclean ventilation" or "surgical air systems" or "air velocity" or "unidirectional ultraclean air delivery system" or "temperature-controlled air flow" or TcAF or "turbulent mixed air flow" or "surgical doors shut" or "blocked vents") OR ventilation 50,289

S21 S17 AND S20 40

S22 S4 AND S21 13

S23 S6 OR S8 OR S10 OR S12 OR S15 OR S19 OR S22 7,472

S24 S6 OR S8 OR S10 OR S12 OR S15 OR S19 OR S22 1,053

*Limiters - Published Date: 20180101-20230331; English Language; Peer Reviewed; Human

S25 S6 OR S8 OR S10 OR S12 OR S15 OR S19 OR S22 559

*Limiters - Published Date: 20180101-20230331; English Language; Peer Reviewed; Exclude MEDLINE records; Human

Web Searches// All searches conducted in 2023.

3/8: Used google.com to navigate to the FDA, www.fda.gov. 2] Scrolled to "Products We Regulate" heading, and chose "Medical Devices." 3] Chose "Medical Device Safety." 4] Scrolled through Safety Communications, saved for author screening. (x3)

3/8: Used google.com to navigate to the FDA, www.fda.gov. 2] Used "Search" function in upper RIGHT corner, and entered "sterile gowns." 3] Scrolled to result. 4] Saved for author screening.(x2)

3/8: Used google.com to navigate to the FDA, www.fda.gov. 2] Used "Search" function in upper RIGHT corner, and entered "sterile gowns." 3] Noticed a link for "N95 Respirators..." on the LEFT nav bar. 4] Saved for author screening.

3/8: Used google.com to navigate to the FDA, www.fda.gov. 2] Used "Search" function in upper RIGHT corner, and entered "sterile gowns." 3] Noticed a link for "Medical Gloves" on the LEFT nav bar. 4] Saved for author screening.

3/8: Used google.com to navigate to the FDA, www.fda.gov. 2] Scrolled to "Products We Regulate" heading, and chose "Medical Devices." 3] Chose "Medical Device Safety." 4] Scrolled through Recent Letters to Health Care Providers, saved for author screening. (x6)

3/8: Used google.com to navigate to the FDA, www.fda.gov. 2] Scrolled to "Products We Regulate" heading, and chose "Medical Devices." 3] Chose "Medical Device Safety." 4] Scrolled through Recent Letters to Health Care Providers, noticed a reference to a "Heater-Cooler Device" page. 5] Navigated to "What is a Heater-Cooler Device?" 6] Saved for author screening.

3/8: Used google.com to navigate to CMS, www.cms.gov. 2] Chose "Research, Statistics, Data..." from the navigation menu. 3] Chose "Medicare Geographic Variation" from Statistics, Trends & Reports heading. 4] Saved for author screening.

3/9: Used google.com to navigate to AST, https://www.ast.org. 2] Under "About" at top navigation bar, chose "Position Statements", and then "Aseptic Technique." 3] Browsed results, saved for author screening. (x7)

3/9: Used google.com to navigate to APIC, https://apic.org/. 2] Under "Professional Practice" at top navigation bar, chose "Implementation Guides." 3] Scrolled to "Hand Hygiene." 4] Browsed results, saved for author review. (x2)

3/9: Used google.com to navigate to APIC, https://apic.org/. 2] Under "Resources" at top navigation bar, chose "Topic-specific infection prevention." 3] Scrolled to "Hand Hygiene." 4] Browsed results, saved for author review.

3/9: Used google.com to navigate to HICPAC, https://www.cdc.gov/hicpac/. 2] Scrolled to "Guidance Documents" button. 3] Message at destination: "The CDC Healthcare Infection Control Guidelines have moved." 4] Clicked link: "The CDC infection control guidelines that were developed with input from HICPAC have moved to the infection control website." 5] Browsed results, saved for author review. (x5)

3/9: Used google.com to navigate to HICPAC, https://www.cdc.gov/hicpac/. 2] Scrolled to "Guidance Documents" button. 3] Message at destination: "The CDC Healthcare Infection Control Guidelines have moved." 4] Clicked link: "Go to the Guidelines." 5] Saved for author review.

3/9: Used google.com to navigate to CMS, www.cms.gov. 2] Used "Search" function in upper RIGHT corner, and entered "surgical site infection." 3] Browsed results, saved for author screening.(x2)

3/21: Used google.com to navigate to osha.gov. 2] Chose "Healthcare" under "Topics" drop-down menu ("By Sector"). 3] Chose "Infectious Diseases" from LEFT menu. 4] Scrolled to "Bloodborne Pathogens", under "Specific Diseases" heading. 5] Chose "Additional Resources." 6] Scrolled to result; saved for author screening. (x2)

3/21: Used google.com to navigate to osha.gov. 2] Chose "Healthcare" under "Topics" drop-down menu ("By Sector"). 3] Chose "Infectious Diseases" from LEFT menu. 4] Scrolled to result; saved for author screening. (x2)

3/22: Used google.com to navigate to NIOSH, www.cdc.gov/niosh/index.htm. 2] Chose "NIOSH A-Z Index." 3] Under "N" listings, chose "N95 Respirators." 4] Saved for author screening.

3/22: Used google.com to navigate to NIOSH, www.cdc.gov/niosh/index.htm. 2] Chose "NIOSH A-Z Index." 3] Under "P" listings, chose "Protective Clothing and Ensembles." 4] Chose "Respirators" from LEFT menu. 5] Expanded "Respirator Resources." 6] Browsed results, saved for author screening. (x7)

3/22: Used google.com to navigate to NIOSH, www.cdc.gov/niosh/index.htm. 2] Chose "NIOSH A-Z Index." 3] Under "P" listings, chose "Protective Clothing and Ensembles." 4] Chose "Respirators" from

LEFT menu. 5] Chose "NIOSH Certified Equipment List (CEL)." 6] Selected "Certified Equipment List", saved for author screening.

3/22: Used google.com to navigate to NIOSH, www.cdc.gov/niosh/index.htm. 2] Chose "NIOSH A-Z Index." 3] Under "P" listings, chose "Protective Clothing and Ensembles." 4] Expanded "Additional Resources." 5] Selected "New ASTM...", and searched google.com for "f3352" (mentioned in news item). 6] Saved citation for author screening.

3/22: Used google.com to navigate to NIOSH, www.cdc.gov/niosh/index.htm. 2] Chose "NIOSH A-Z Index." 3] Under "P" listings, chose "Protective Clothing and Ensembles." 4] Expanded "Journal Articles." 5] Saved for author screening. (x3)

3/22: Used google.com to navigate to NIOSH, www.cdc.gov/niosh/index.htm. 2] Chose "NIOSH A-Z Index." 3] Under "P" listings, chose "Protective Clothing and Ensembles." 4] Expanded "NIOSH Publications." 5] Saved for author screening.

3/22: Used google.com to navigate to NIOSH, www.cdc.gov/niosh/index.htm. 2] Chose "NIOSH A-Z Index." 3] Under "P" listings, chose "Protective Clothing and Ensembles." 4] Clicked on "Considerations for Selecting Protective Clothing." 5] Saved for author screening.

Handsearching

3/8 Biomedical Instrumentation & Technology, 2015 to current, handsearching (x8)

RESULTS

Studies that offer insights that can inform perioperative nursing practice in the area of sterile technique and maintaining the sterile field (ie, reducing the risk of contamination) were included in this review. Studies that appeared to meet the inclusion criteria were excluded if they were of lower quality, provided no guidance, were duplicates of already-included studies, full text was not available in English, the results were not applicable or generalizable to the perioperative practice setting, were the wrong setting, or wrong population. A synthesis of the study results informed construction of practice recommendations and this synthesis is described briefly in the corresponding rationales that follow each practice recommendation. Additional information about each included study is found in the [evidence table](#) that corresponds to the published guideline.