

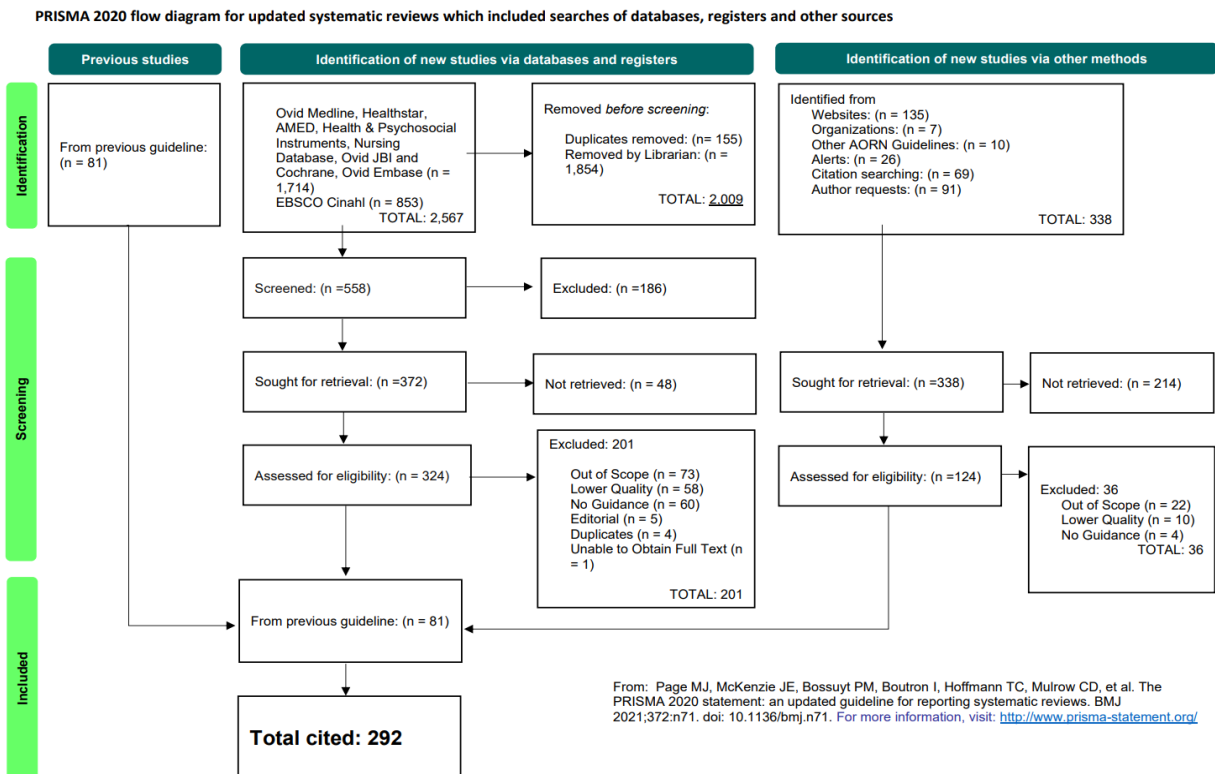


**EVIDENCE REVIEW**

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 April, 2016 through August, 2021. 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 February, 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 August 25, 2021, 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.

On September 10, 2021, 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.

**Table 1: Databases searched and coverage**

Database	Coverage
AORN Full Text Journals@Ovid	
Books@Ovid	
JBI EBP Database	Current
EBM Reviews - ACP Journal Club	1991 to Current
EBM Reviews - Cochrane Central Register of Controlled Trials	Current
EBM Reviews - Cochrane Database of Systematic Reviews	2005 to Current
EBM Reviews - Cochrane Clinical Answers	Current
AMED (Allied and Complementary Medicine)	1985 to Current
Embase	1974 to Current
Health and Psychosocial Instruments	1985 to Current
Ovid Healthstar	1999 to Current
Ovid MEDLINE(R) ALL	1946 to Current
Ovid Nursing Database	1946 to Current
EBSCOhost CINAHL	1937 to Current

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 ("operating rooms" or "ambulatory care facilities" or surgicenters).sh. or ("operating room" or "operating theater" or "operating theatre" or "operating suite" or "surgical suite").ti,ab,kw. or ((ambulatory or outpatient) adj1 surg\$).ti,ab,kw. or exp "perioperative nursing"/ or exp "surgical procedures, operative"/ or (surgery or surgical or preoperative or perioperative or intraoperative or postoperative).ti,ab,kw. 14756091
- 2 (("medication administration" or "medication management") and (error\$ or safety)).ti,ab,kw. 9084
- 3 1 and 2 993
- 4 ("drug storage".sh. or (medication adj3 storag\$).ti,ab,kw. or (drug adj3 storag\$).ti,ab,kw. or ("shelf life" or "expiration date" or "beyond use date").ti,ab,kw. or (manufacturer\$ and (instructions or guidelines or requirements or recommendation\$)).ti,ab,kw. or ("medication cart" or "medication drawer" or "medication cabinet").ti,ab,kw. or ("drug labeling".sh. or (drug adj2 label\$).ti,ab,kw. or (medication adj2 label\$).ti,ab,kw.)) and ("medication error".ti,ab,kw,sh. or "sterile field".ti,ab,kw.) 1616

- 5 1 and 4 155
- 6 ("medication error" or "medication reconciliation").ti,ab,kw,sh. or "adverse drug event".ti,ab,kw. or "safe medication practices".ti,ab,kw. 40042
- 7 1 and 6 3882
- 8 ("medication systems" and (barcod\$ or "radiofrequency identification device")).ti,ab. or ("prescription drug diversion".sh. or "drug diversion".ti,ab,kw. or "narcotic diversion".ti,ab,kw.) and prevent\$.ti,ab,kw.) 392
- 9 1 and 8 20
- 10 ((teratogens or carcinogens or noxae or genotoxins or mutagens).sh. or ("antineoplastic agent" or "cancer drugs" or carcinogen\$ or teratogen\$ or mutagen\$ or genotoxin\$ or cytotoxin\$.ti,ab,kw.) and ("pharmaceutical preparations".sh. or (medication\$ or drug\$.ti,ab,kw.) and ("occupational exposure" or "environmental contamination" or "occupational diseases").sh. or (handling or exposure or safety).ti,ab,kw.) and (exp "health personnel"/ or (nurse\$ or health care or healthcare).ti,ab,kw.) 1686
- 11 1 and 10 114
- 12 ("pharmaceutical preparations" and ("waste products" or "waste management")).sh. or ((medication\$ adj3 wast\$) or (medication adj3 disposal) or "unused medication" or (pharmaceutical\$ adj3 disposal) or (pharmaceutical adj3 waste)).ti,ab,kw. 2588
- 13 1 and 12 255
- 14 "drug compounding".sh. or ((drug\$ adj1 compounding) or "compounding practice").ti,ab,kw. 45142
- 15 1 and 14 1339
- 16 ("multidose vial" or "multi-dose vial" or "single-dose vial" or "multiple dose" or ("rubber stopper" and (medication\$ or pharmaceutical\$ or drug or drugs))).ti,ab,kw. or ("drug packaging" and rubber).sh. or (("equipment contamination" or "cross-infection") and "pharmaceutical solutions").ti,ab,kw,sh. or ("drug contamination" and "cross-infection").sh. or ("disease outbreaks" and "drug contamination").sh. or ((contaminat\$ adj3 medication\$) or (contaminat\$ adj3 drug\$)).ti,ab,kw. 26841
- 17 1 and 16 2379
- 18 (((("look alike" or "sound alike" or "name differentiation" or tallman) and (medication\$ or pharmaceutical\$ or drug or drugs)) or ("English as a second language" or "language barrier")).ti,ab,kw. or "limited English proficiency".de,sh,hw. 6339
- 19 1 and 18 595
- 20 (("standing order" or "verbal order" or "preference card") and (medication\$ or pharmaceutical\$ or drug or drugs)).ti,ab,kw. 284
- 21 1 and 20 42
- 22 "education, nursing, continuing".sh. or ((exp "inservice training"/ or "needs assessment".sh. or "clinical competence".sh.) and nurs\$.ti,ab,kw.) 151512
- 23 2 and 22 467
- 24 (documentation or "electronic health records").sh,ti,ab. and ("medication administration" or "medication management").ti,ab,kw. 2060
- 25 24 and 1 244
- 26 3 or 5 or 7 or 9 or 11 or 13 or 15 or 17 or 19 or 21 or 23 or 25 9821
- 27 limit 26 to english language 9417
- 28 limit 27 to yr="2016 -Current" 4002
- 29 remove duplicates from 28 2550

EBSCOhost (CINAHL)

S1 (MH "Surgicenters") OR (MH "Ambulatory Care Facilities") OR (MH "Operating Rooms")

S2 ("operating room" or "operating theater" or "operating theatre" or "operating suite" or "surgical suite" ) OR ( (ambulatory or outpatient) N1 surg\* ) OR ( surgery or surgical or preoperative or perioperative or intraoperative or postoperative )

S3 (MH "Surgery, Operative+") OR (MH "Perioperative Nursing")

S4 S1 OR S2 OR S3

S5 ("medication administration" or "medication management") and (error\* or safety)

S6 S4 AND S5

S7 ( (MH "Drug Storage") OR (medication N3 storag\*) ) OR (drug N3 storag\*) OR ( "shelf life" or "expiration date" or "beyond use date" ) OR ( manufacturer\* and (instructions or guidelines or requirements or recommendation\*) ) OR ( "medication cart" or "medication drawer" or "medication cabinet" ) OR ( (medication N2 label\*) and ("medication error" or "sterile field") )

S8 (MH "Drug Labeling") OR (drug N2 label\*)

S9 S7 OR S8

S10 S4 AND S9

S11 ( (MH "Medication Reconciliation") OR (MH "Medication Errors") OR ""medication error" or "medication reconciliation"" ) OR ( "adverse drug event" or "safe medication practices" )

S12 S4 AND S11

S13 ( ("prescription drug diversion" or "drug diversion" or "narcotic diversion") and prevent\* ) OR ( "medication systems" and (barcod\* or "radiofrequency identification device") )

S14 S4 AND S13

S15 (MH "Antineoplastic Agents, Alkylating") OR "( teratogens or carcinogens or noxae or genotoxins or mutagens or "antineoplastic agent" or "cancer drugs" or carcinogen\* or teratogen\* or mutagen\* or genotoxin\* or cytotoxin\* )

S16 (MH "Health Personnel") OR "( "occupational exposure" or "environmental contamination" or "occupational diseases" or handling or exposure or safety ) AND ( "health personnel" or nurse\* or "health care" or healthcare )"

S17 S15 AND S16

S18 S4 AND S17

S19 "pharmaceutical preparations" AND ( "waste products" or "waste management" or (medication\* N3 wast\*) or (medication N3 disposal) or ("unused medication" )

S20 pharmaceutical\* N3 (disposal or waste)

S21 S19 OR S20

S22 S4 AND S21

S23 (MH "Drug Compounding") OR ( (drug\* N1 compounding) or "compounding practice" )

S24 S4 AND S23

S25 ( "multidose vial" or "multi-dose vial" or "single-dose vial" or "multiple dose" ) OR ( "rubber stopper" and (medication\* or pharmaceutical\* or drug or drugs) )

S26 (MH "Drug Packaging") OR ("drug packaging" and rubber)

S27 ((MH "Cross Infection") OR (MH "Equipment Contamination")) AND "pharmaceutical solutions"

S28 (MH "Drug Contamination") AND (MH "Disease Outbreaks")

S29 (contaminat\* N3 medication\*) OR (contaminat\* N3 drug\*)

S30 S25 OR S26 OR S27 OR S28 OR S29

S31 (S4 AND S30)

S32 (MH "Limited English Proficiency")

S33 "English as a second language" or "language barrier"

S34 ( "look alike" or "sound alike" or "name differentiation" or tallman ) AND ( medication\* or pharmaceutical\* or drug or drugs )

S35 S32 OR S33 OR S34

S36 S4 AND S35

S37 ( ("standing order" or "verbal order" or "preference card") ) AND ( (medication\$ or pharmaceutical\* or drug or drugs) )

S38 S4 AND S37

S39 (MH "Education, Nursing, Continuing") OR (MH "Needs Assessment")

S40 "inservice training"

S41 S39 OR S40

S42 ( S39 OR S40 ) AND nurs\*

S43 S5 AND S42

S44 ( (MH "Electronic Health Records") or (MH "Documentation") ) AND ( ("medication administration" or "medication management") )

S45 S4 AND S44

S46 S6 OR S10 OR S12 OR S14 OR S18 OR S22 OR S24 OR S31 OR S36 OR S38 OR S43 OR S45

S47 S6 OR S10 OR S12 OR S14 OR S18 OR S22 OR S24 OR S31 OR S36 OR S38 OR S43 OR S45// Limiters - Published Date: 20160101-20210931; English Language; Peer Reviewed; Exclude MEDLINE records

Web Searches// All searches conducted in 2021.

10/4/2021: www.cms.gov> "State operations manual" in search bar> chose first result

10/4: www.cms.gov> "medication safety" in search bar> Chose second result> Scrolled down for PDF

10/5: Author request; cited in current edition of GL. www.cms.gov> "state operations manual appendix I" in search bar> chose first result, scrolled down to find PDF of current SOM Appx L

10/5: Author request; www.cms.gov> "state operations manual appendix I" in search bar> chose second result, scrolled down to find PDF of current SOM Appx A

10/8: www.cdc.gov> "A-Z Index"> "M"> Scrolled to look for Medication-related topics> Found "Medication Safety"

10/8: fda.gov> Drugs> Resources for You> Information for Consumers and Patients

10/8: fda.gov> Drug Information, Safety, and Availability> LEFT nav bar> Medication Errors Related to CDER-Regulated Drug Products

10/8: fda.gov> Drugs> Drug Information, Safety and Availability, LEFT nav bar (x3)

10/8: fda.gov> Drugs> Drug Information, Safety and Availability

10/8: fda.gov> Drugs> Drug Approvals and Databases (x5)

10/8: fda.gov> Drugs> Drug Development and Review Process> LEFT nav bar (Drug Approvals and Databases)> FDA Adverse Event Reporting System (FAERS) Public Dashboard

10/8: fda.gov> Drugs> Drug Approvals and Databases> Resources For You (x2)

10/8: fda.gov> Drugs> Drug Information, Safety, and Availability> Medication Errors Related to CDER-Regulated Drug Products> Resources For You

10/8: fda.gov> Drugs> Drug Information, Safety, and Availability> LEFT nav bar> Medication Guides> Where can I find Medication Guides?

10/8: From OSHA home page (<https://www.osha.gov/>)> From "TOPICS" drop down menu, choose "Health Care" under "By Sector" heading> Choose "Other Hazards" from LEFT nav bar> Scroll to "Hazardous Drugs" heading> Scrolled to 3rd bullet point, and navigated to URL from this text: "Hazardous Drugs Safety and Health Topics Page"

10/8: From OSHA home page (<https://www.osha.gov/>)> From "TOPICS" drop down menu, choose "Health Care" under "By Sector" heading> Choose "Other Hazards" from LEFT nav bar> Scroll to "Hazardous Drugs" heading> Clicked link embedded in OSHA's "Waste Anesthetic Gases Safety and Health Topics Page"> Choose "Possible Solutions" from LEFT nav bar> Clicked link embedded in "Controlling Occupational Exposure to Hazardous Drugs: Medical Screening and Surveillance"> Added entire resource for screening rather than just "Surveillance" portion.

10/8: From OSHA home page (<https://www.osha.gov/>)> From "TOPICS" drop down menu, choose "Health Care" under "By Sector" heading> Choose "Other Hazards" from LEFT nav bar> Scroll to "Hazardous Drugs" heading> Clicked link embedded in OSHA's "Waste Anesthetic Gases Safety and Health Topics Page"> Choose "Possible Solutions" from LEFT nav bar> Clicked link embedded in "Work Precautions for Handling Hazardous Drugs Letter."

10/8: fda.gov> Drugs> Guidance, Compliance, and Regulatory Information> LEFT nav bar

10/8: fda.gov> Guidance, Compliance, & Regulatory Information> Human Drug Compounding

10/8: From OSHA home page (<https://www.osha.gov/>)> From "STANDARDS" drop down menu, choose "Law and Regulations"> Scrolled to "Resources" heading> Clicked "Safety & Health Topics A to Z"> Found under "G", "General Duty Clause of the OSH Act"

10/11: Author request, "NIOSH"> Google search for NIOSH (<https://www.cdc.gov/niosh/index.htm>)> Scrolled to "Workplace Safety and Health Topics," chose "Hazards & Exposures"> Chose "Antineoplastic Agents"> Chose "NIOSH Publications" on LEFT nav bar> Chose this document for author screening.

10/11: From NIOSH home page (<https://www.cdc.gov/niosh/index.htm>), scrolled to "Industries & Occupations"> Chose "Healthcare Workers"> Chose "Chemical Hazards" from LEFT nav bar> Scrolled to "Hazardous Drugs" heading> Chose "Hazardous Drug Exposures in Health Care"> Chose "Closed System Drug-Transfer Device (CSTD) Research" from LEFT nav bar

10/11: From NIOSH home page (<https://www.cdc.gov/niosh/index.htm>), scrolled to "Industries & Occupations"> Chose "Healthcare Workers"> Chose "Chemical Hazards" from LEFT nav bar> Scrolled to "Hazardous Drugs" heading> Chose "Hazardous Drug Exposures in Health Care"

10/11: From NIOSH home page (<https://www.cdc.gov/niosh/index.htm>), scrolled to "Industries & Occupations"> Chose "Healthcare Workers"> Chose "Chemical Hazards" from LEFT nav bar> Scrolled to "Health and Safety Practices of Healthcare Workers" in "Spotlight" bar> Chose "Study Findings and Recommendations" from LEFT nav bar> Chose "Anesthetic gases (in medical settings)"

10/11: From NIOSH home page (<https://www.cdc.gov/niosh/index.htm>), scrolled to "Industries & Occupations"> Chose "Healthcare Workers"> Chose "Chemical Hazards" from LEFT nav bar> Scrolled to "Hazardous Drugs" heading> Chose "Hazardous Drug Exposures in Health Care"> Chose "Antineoplastic Agents" from LEFT nav bar

10/11: From NIOSH home page (<https://www.cdc.gov/niosh/index.htm>), scrolled to "Industries & Occupations"> Chose "Healthcare Workers"> Chose "Chemical Hazards" from LEFT nav bar> Scrolled to "Hazardous Drugs" heading> Chose "Hazardous Drug Exposures in Health Care"> Chose "Antineoplastic Agents" from LEFT nav bar> Opened sub-menu, chose "Recent Publications, Guidelines, Review Articles and Surveys" from LEFT nav bar> Expanded "Recent Publications"> Scrolled to article

10/11: From NIOSH home page (<https://www.cdc.gov/niosh/index.htm>), scrolled to "Industries & Occupations"> Chose "Healthcare Workers"> Chose "Chemical Hazards" from LEFT nav bar> Scrolled to "Hazardous Drugs" heading> Chose "Hazardous Drug Exposures in Health Care"> Chose "Antineoplastic Agents" from LEFT nav bar> Opened sub-menu, chose "Recent Publications, Guidelines, Review Articles and Surveys" from LEFT nav bar> Expanded "Recent Publications"> Scrolled to article

10/11: From NIOSH home page (<https://www.cdc.gov/niosh/index.htm>), scrolled to "Industries & Occupations"> Chose "Healthcare Workers"> Chose "Chemical Hazards" from LEFT nav bar> Scrolled to "Hazardous Drugs" heading> Chose "Hazardous Drug Exposures in Health Care"> Chose "Antineoplastic Agents" from LEFT nav bar> Opened sub-menu, chose "Recent Publications, Guidelines, Review Articles and Surveys" from LEFT nav bar> Expanded "Recent Publications"> Scrolled to article (x16)

10/11: From NIOSH home page (<https://www.cdc.gov/niosh/index.htm>), scrolled to "Industries & Occupations"> Chose "Healthcare Workers"> Chose "Chemical Hazards" from LEFT nav bar> Scrolled to "Hazardous Drugs" heading> Chose "Hazardous Drug Exposures in Health Care"> Chose "Antineoplastic Agents" from LEFT nav bar> Opened sub-menu, chose "Recent Publications, Guidelines, Review Articles and Surveys" from LEFT nav bar> Expanded "Guidelines, Recommendations and Regulations for Handling Antineoplastic Agents"> Scrolled to link called "Health and Safety Executive. Safe handling of cytotoxic drugs in the workplace"

10/11: From NIOSH home page (<https://www.cdc.gov/niosh/index.htm>), scrolled to "Industries & Occupations"> Chose "Healthcare Workers"> Chose "Chemical Hazards" from LEFT nav bar> Scrolled to "Hazardous Drugs" heading> Chose "Hazardous Drug Exposures in Health Care"> Chose "Antineoplastic Agents" from LEFT nav bar> Chose "Environmental Sampling, Decontamination, Protective Equipment, Closed System Transfer Devices, and Work Practice" from LEFT nav bar> Expanded "Closed System Drug-Transfer Devices (CSDTs) and Similar Devices"> Scrolled to article

10/14: From NIOSH page, <https://www.cdc.gov/niosh/index.htm>> Scrolled to "Workplace Safety and Health Topics"> Chose "Chemicals"> Scrolled to "Nitrous Oxide" (knowing that sometimes Anesthesia providers use it)> Scrolled to "Selected Publications," and chose this resource for screening.

10/14: From NIOSH page, <https://www.cdc.gov/niosh/index.htm>> Scrolled to "Workplace Safety and Health Topics"> Chose "Industries & Occupations"> Scrolled to "Healthcare Workers"> Scrolled to "Chemical Hazards"> Scrolled to "Anesthetic Gases," and chose this resource for screening.

10/14: From OSHA home page (<https://www.osha.gov/>)> From "TOPICS" drop down menu, choose "Health Care" under "By Sector" heading> Choose "Other Hazards" from LEFT nav bar> Scroll to "Hazardous Drugs" heading

10/14: From OSHA home page (<https://www.osha.gov/>)> From "TOPICS" drop down menu, choose "Health Care" under "By Sector" heading> Choose "Other Hazards" from LEFT nav bar> Scroll to "Hazardous Drugs" heading, then the "Waste Anesthetic Gases" subheading> Clicked link embedded in "Anesthetic Gases: Guidelines for Workplace Exposures."

10/14: From OSHA home page (<https://www.osha.gov/>)> From "TOPICS" drop down menu, choose "Health Care" under "By Sector" heading> Choose "Other Hazards" from LEFT nav bar> Scroll to "Hazardous Drugs" heading, then the "Waste Anesthetic Gases" subheading> Clicked link embedded in OSHA's "Waste Anesthetic Gases Safety and Health Topics Page"

10/14: From NIOSH page, <https://www.cdc.gov/niosh/index.htm>> Scrolled to "Workplace Safety and Health Topics"> Chose "Chemicals"> Scrolled to "Nitrous Oxide" (knowing that sometimes Anesthesia providers use it)> Scrolled to "Selected Publications," and chose this resource for screening.

10/14: From NIOSH page, <https://www.cdc.gov/niosh/index.htm>> Scrolled to "Workplace Safety and Health Topics"> Chose "Chemicals"> Scrolled to "Nitrous Oxide" (knowing that sometimes Anesthesia providers use it)

10/14: From OSHA home page (<https://www.osha.gov/>)> From "TOPICS" drop down menu, choose "Health Care" under "By Sector" heading> Choose "Other Hazards" from LEFT nav bar> Scroll to "Hazardous Drugs" heading, then the "Waste Anesthetic Gases" subheading> Clicked link embedded in OSHA's "Waste Anesthetic Gases Safety and Health Topics Page"> Clicked the blue "More" link in "Possible Solutions" box

10/14: Author request; cited in current edition of GL.10/14: access to 2021 edition created. (x2)

10/15: author request for "CoP requirement for history and physical examinations..."> Searched in Google (www.google.com)> search string: "Medicare and Medicaid Programs; Hospital Conditions of Participation: Requirements for History and Physical Examinations; Authentication of Verbal Orders; Securing Medications; and Postanesthesia Evaluations"> Chose second result, for a "Federal Register" document.

10/15: Author request, "CFR 29 1910.1200 Haz com"> went to "govinfo.gov"> Clicked "Citation" tab> Chose "Code of Federal Regulations" for "Collection"> Chose "Most Recent" for "Select Year"> Chose "29" for "Select Title Number"> Entered "1910" in "Part" field> Entered "1200" in both "Subpart" and "Section" fields> Clicked "Search"> Chose PDF of document

10/18: Author request, "CFR 29 1910.1030 BBP"> went to "govinfo.gov"> Clicked "Citation" tab> Chose "Code of Federal Regulations" for "Collection"> Chose "Most Recent" for "Select Year"> Chose "29" for "Select Title Number"> Entered "1910" in "Part" field> Entered "1030" in both "Subpart" and "Section" fields> Clicked "Search"> Chose PDF of document

10/18: Author request, "CFR 29 1910.134 resp protection"> went to "govinfo.gov"> Clicked "Citation" tab> Chose "Code of Federal Regulations" for "Collection"> Chose "Most Recent" for "Select Year"> Chose "29" for "Select Title Number"> Entered "1910" in "Part" field> Entered "134" in both "Subpart" and "Section" fields> Clicked "Search"> Chose PDF of document

10/18: Author request, for "DEA disposal of controlled substances"> 10/18: Google (www.google.com), searched "DEA disposal of controlled substances"> chose first result, for the DEA's "Diversion Control Division"> Scrolled to heading, "DEA Registrant Drug Disposal"> Clicked link for "Title 21 Code of Federal Regulations; Part 1317 Disposal"

10/18: Author request, for "DEA disposal of controlled substances"> Searched 10/18 in Google (www.google.com) for "DEA disposal of controlled substances"> chose first result, for the DEA's "Diversion Control Division"> Scrolled to heading, "DEA Registrant Drug Disposal"> Clicked link for "Disposal of Controlled Substances; Final Rule (PDF) (September 9, 2014)"

10/18: Author request, "EPA unused pharmaceuticals in health care"> Google search (www.google.com) "EPA unused pharmaceuticals in health care"> Chose first Web site after the ones with the "Ad" tag. (x3)

10/18: Author request, "Federal water pollution control act"> Google search> Scrolled to first relevant-sounding result ("Federal Water Pollution Control Act (Clean Water Act)")> added to search results for screening.

10/18: Author request. Went to <https://www.dnv.us/assurance/healthcare/standards/niaho-ac-dl.html>, clicked on "NIAHO Accreditation Requirements- Acute", created records for relevant chapters. (x2)

10/27: Author request ("Institute for Safe Medication Practices (ISMP), guidelines for standard order sets")> Google search for "Institute for Safe Medication Practices"> Selected first result, "Institute For Safe Medication Practices: Home" ("Guidelines" option)> Clicked on "Resource Library" button under "View all published guidelines"> Searched the page using Ctrl + F for "order," result found at bottom of page.

10/27: Author request ("National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP)")> Google search> Selected first result, "NCC MERP"

10/27: Author request ("National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP)")> Google search> Selected first result, "NCC MERP"> In "MEDICATION ERRORS" drop-down menu, chose "Report Medication Errors"

10/27: Author request ("National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP)")> Google search> Selected first result, "NCC MERP"> In "MEDICATION ERRORS" drop-down menu, chose "Adverse Drug Event Algorithm"

10/27: Author request ("National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP)")> Google search> Selected first result, "NCC MERP"> In "RECOMMENDATIONS/ STATEMENT" drop-down menu, scrolled to "ISMP Medication Errors Reporting Program (MERP)"

10/27: Author request ("National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP)")> Google search> Selected first result, "NCC MERP"> In "RECOMMENDATIONS/ STATEMENTS" drop-down menu, chose this resource for author screening. (x9)



10/27: Author request ("National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP)")> Google search> Selected first result, "NCC MERP"> Clicked "OPIOIDS RESOURCES" chose this resource for author screening.

10/27: Author request ("HICPAC")> Google search> Selected first result> Chose "Guidance Documents" box> Scrolled to this result, saved for author screening (x2)

10/27: Author request, "Pennsylvania Patient Safety Advisory"> Google search> Selected first result> Looked in "Patient Safety Topics" Drop-down> Clicked "Browse All", did not see Medication Safety topic> Searched "Medication Safety" in search box> Chose relevant citation for author screening (x6)

11/8: Navigated to ECRI web site (www.ecri.org); signed in> Chose "Browse Topics" from TOP nav bar> Scrolled to "Medication/ Drug Safety"; sorted results by "Best match"> Scrolled to result; saved for author screening.

11/8: Navigated to ECRI web site (www.ecri.org); signed in> Chose "Browse Topics" from TOP nav bar> Scrolled to "Medication/ Drug Safety"> Browsed results; saved resource for author screening. (x7)

11/8: Navigated to ECRI web site (www.ecri.org); signed in> Chose "Browse Topics" from TOP nav bar> Scrolled to "Medication/ Drug Safety"> Browsed to resource, noted that it was a discussion of an article> Downloaded primary citation for article; saved for author screening (x3)

11/9: Navigated to main WHO web site (www.who.int)> Chose "All Topics" from "Health Topics" drop-down on TOP nav bar> Scrolled down to "Medicines"> Browsed through different subsections of "Medicines"; saved resource for author screening.

11/9: Used google.com to search for ONS> Chose "Explore Resources" from TOP nav bar> From "Source" filter, chose "Clinical Practice Resources"> Browsed list of resources; registered for account to view Toolkit> Saved resource for author review.

11/9: Used google.com to search for ONS> Chose "Explore Resources" from TOP nav bar> From "Source" filter, chose "Position Statements"> Browsed list of resources> Saved resource for author review.

11/9: Used google.com to search for ONS> Chose "Explore Resources" from TOP nav bar> From "Source" filter, chose "Standards"> Browsed list of resources> Saved resource for author review.

11/9: Used google.com to search for ONS> Chose "Explore Resources" from TOP nav bar> From "Source" filter, chose "Standards"> While reviewing another Standard, browsed list of "Related Resources"> Saved resource for author review.

11/9: Used google.com to find the International Society for Fluorescence Guided Surgery (www.isfgs.org)> Scrolled to "Annals of Surgery Article"> From "Current Delphi Consensus Projects," clicked "View article" button> Saved resource for author screening.

11/9: Used google.com to find the American Society of Health-System Pharmacists (www.ashp.org)> Under "PRACTICE RESOURCES" drop down menu, chose "Drug Shortages"> Chose "Publications"> Browsed available resources; saved for author screening. (x8)

11/9: Used google.com to find the American Society of Health-System Pharmacists (www.ashp.org)> Under "PRACTICE RESOURCES" drop down menu, chose "Drug Shortages"> Chose "Publications"> Scrolled to "Current Shortages"> Browsed available resources; saved for author screening.

11/9: Used google.com to find the American Society of Health-System Pharmacists (www.ashp.org)> Under "PRACTICE RESOURCES" drop down menu, chose "Drug Shortages"> Chose "Publications"> Scrolled to "Shortage Resources"> Chose "Drug Shortages Statistics"> Browsed available resources; saved for author screening. (x2)

11/9: Used google.com to find the American Society of Health-System Pharmacists (www.ashp.org)> Under "PRACTICE RESOURCES" drop down menu, chose "Drug Shortages"> Chose "Publications"> Scrolled to "Shortage Resources"> Chose "Guidelines and Tools"> Browsed available resources; saved for author screening. (x2)

11/9: Author request, used google.com to search "Guidelines on Preventing medication errors in hospitals ASHP"> Chose news release result> Clicked link ("ASHP Guidelines on Preventing Medication Errors in Hospitals") in press release> Saved resource for author screening.

11/9: Author request, used google.com to search "Antimicrobial Prophylaxis Surgery ASHP"> Chose second result> Clicked link ("Therapeutic Guidelines- ASHP") > From there, scrolled to result; saved resource for author screening.

11/9: Used google.com to find "minimum standard for pharmacies in hospitals ASHP"> Chose second result, for "Guidelines"> Scrolled to result; saved for author screening. (x9)

11/9: Used google.com to find "physician's role in medication reconciliation ASHP" (author request)> Scrolled to result; saved for author screening.

11/10: Used google.com to search "Surgical Infection Society (SIS) Guidelines for antibiotic use"> Navigated to first result, "Guidelines - Surgical Infection Society Member Portal"> Clicked "EDUCATION & GUIDELINES" drop-down from TOP nav bar> Browsed list of GLs; saved resource for author screening.

11/10: Link provided by EK per Gayle D.

11/10: Navigated to aorn.org> From "Guidelines & Clinical Resources" drop down, chose "Position Statement" under "Clinical Resources" heading> Scrolled to resource; saved for author screening.

## RESULTS

Studies that offer insights that can inform perioperative nursing practice in the area of medication safety 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.

## REGISTRATION

PROSPERO Registration: CRD42021274097