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THE FUTURE
OF PHARMACY** 2022

PITTSBURGH, PA | NOVEMBER 2-5, 2022



Pharmacy-Driven Strategies to Improve Medication Safety in the Perioperative and Procedural Settings

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2022-2023 ISMP Safe Medication Management Fellow

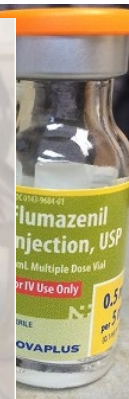
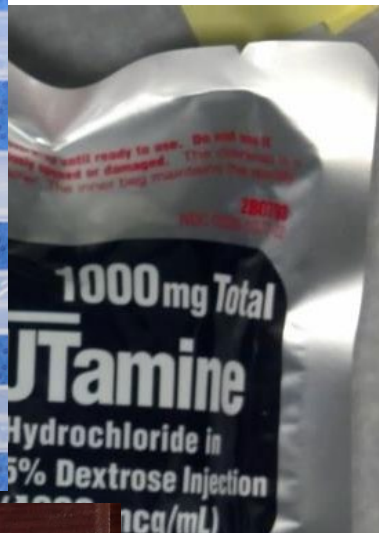
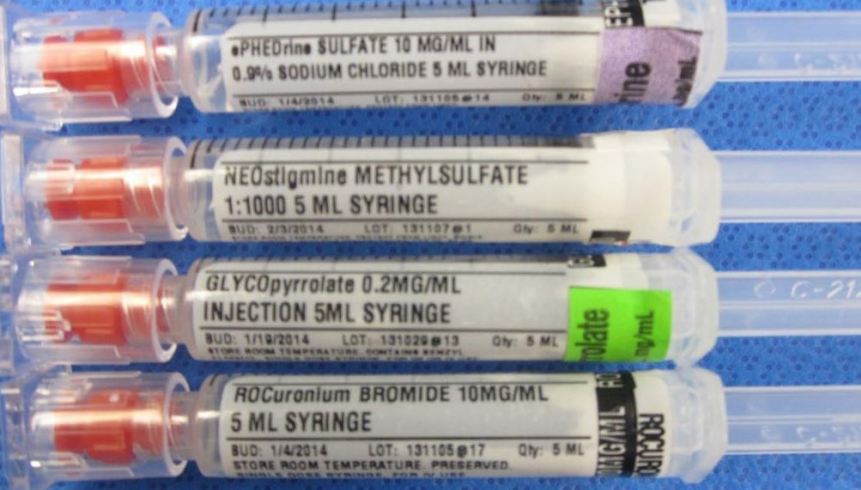
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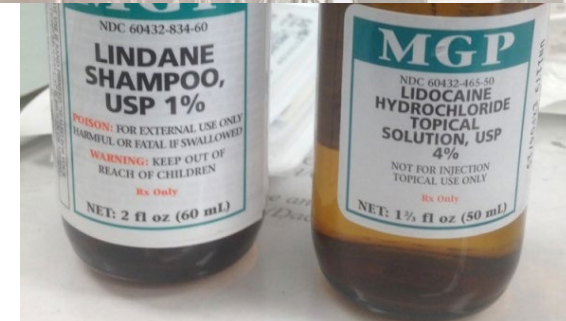
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Learning Objectives

1. Describe the prevalence of medication errors in the perioperative setting.
2. Identify resources to assess the current state of perioperative medication safety systems and practices in your institution.
3. Discuss three best practice recommendations that are designed to improve medication safety in the perioperative setting.
4. Recognize the importance of barcode scanning for real-time drug identification and electronic record documentation throughout perioperative care.



NDC 17478-713-10	NDC 17478-714-10
Ofloxacin Ophthalmic Solution, USP	Ciprofloxacin Ophthalmic Solution, USP
0.3%	0.3%
Sterile Ophthalmic Solution	(Ciprofloxacin HCl) 0.3% as Base Sterile Ophthalmic Solution
5 mL	5 mL
Sterile	Sterile
Rx only AKORN	Rx only AKORN



Why Focus on Perioperative Services?

- High-risk setting; fast-paced, involving multiple individuals and handoffs
 - Preoperative locations
 - Intraoperative locations
 - Postoperative locations

Why Focus on Perioperative Services?

- Medication-related events occur in all phases of the perioperative process
 - 1 observed medication error in half of all surgical procedures⁵
 - 1 self-reported event in every 1,285 procedures⁶
 - 1 event in every 20 medication administrations; more than one-third led to patient harm⁵
 - Occurs in at least 1 of every 133 doses administered during anesthesia^{7,8}
- Continued public health issue²⁻⁴
- Hear from providers that the safety rules are different than in the rest of the organization; this area is under-represented in event reporting

Case #1

- Technician was preparing phenylephrine infusions.
- Pharmacist noticed vials of neostigmine upon inspection.
- Several vials of neostigmine were stored with the phenylephrine supply in error.



Case #2

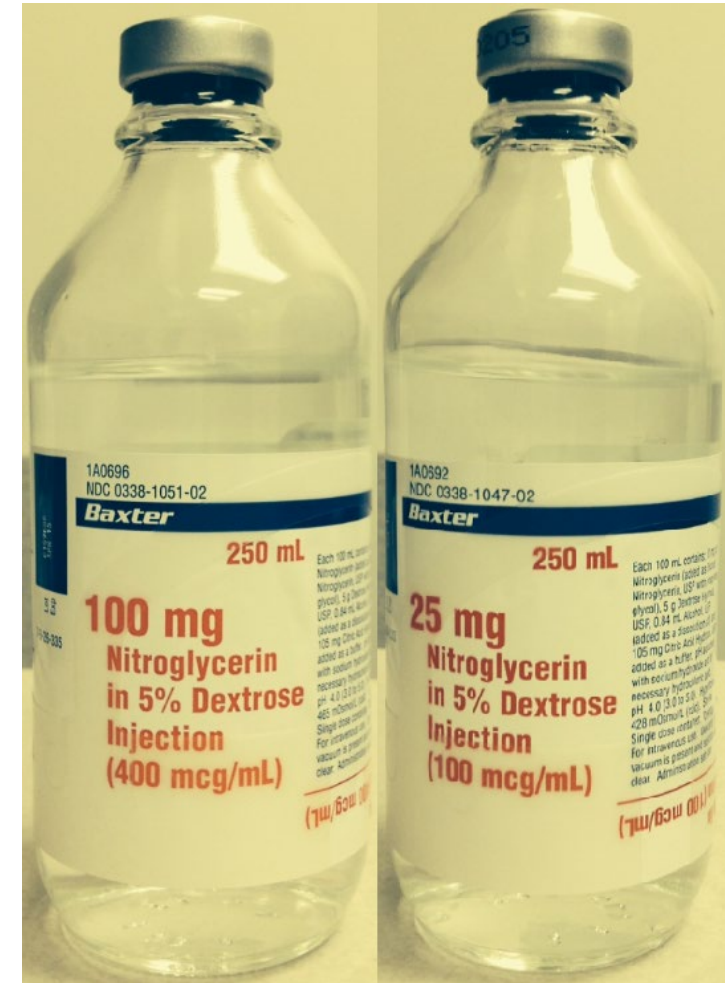
- 34-year-old patient was taken to the OR for exploratory laparotomy following GSW.
- Provider meant to give entire syringe of calcium chloride, but instead gave epinephrine.
- Patient became hypertensive which resulted in increased bleeding.



Case #3

Cardiac Cath Lab

- Concentrated nitroglycerin shortage forced hospital to use alternative concentrations (100 mcg/mL & 400 mcg/mL) to compound various nitroglycerin syringes.
- Compounding worksheets were adapted on-the-fly.
- Technician grabbed the wrong bottle to compound a nitroglycerin 100 mcg/mL syringes for the cardiac cath lab.
- Batch of medication went out with a **four-fold overdose**.



Case #4

Ambulatory Surgery Center

- Nurse inadvertently gave meperidine 50 mg IV to a patient who had morphine IV ordered.
- Stated that the meperidine and morphine were “transposed” in the cabinet and she grabbed what was in the morphine 4 mg spot.
- Did not check the name on the cartridge prior to administration.
- Patient suffered a respiratory arrest requiring naloxone and physical rescue breathing.
- Patient sent to closest hospital for monitoring.



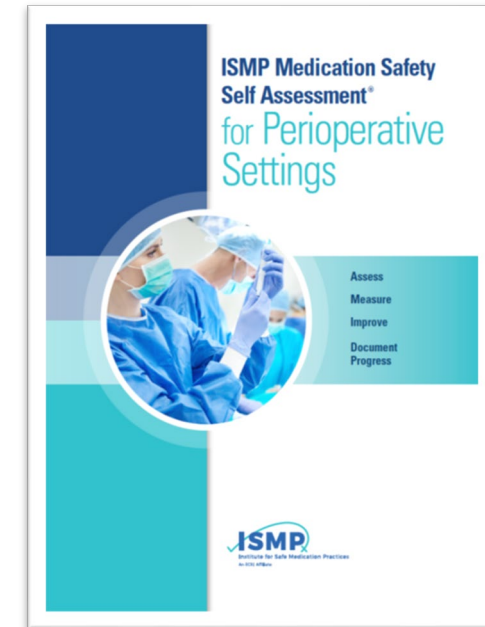
Case #5

- Pharmacy technician restocking OR Anesthesia ADC with metoprolol vials.
- Medication was placed in the incorrect matrix pocket.
- Anesthesiologist attempted to administer rocuronium to a patient but did not observe expected response.
- Anesthesiologist administered another vial.
- Patient's heart rate decreased.
- The patient developed bradycardia and hypotension that required EPHEDrine and glycopyrrolate.



ISMP Medication Safety Self Assessment® for Perioperative Settings

- Established to:
 - Provide a standard way to assess perioperative and procedural medication use
 - Create a baseline of national practices and effort
 - Support organization-specific, safety focused, quality efforts
- National data collection: May 2021-February 2022; extended due to COVID-19 pandemic
- Grant includes the development of *Guidelines for Safe Medication Use in Perioperative and Procedural Settings* published in August 2022



Scoring Key

Self-Assessment Items

A	There has been no activity to implement this item.
B	This item has been formally discussed and considered, but it has not been implemented.
C	This item has been partially implemented for some or all patients, orders, drugs, or staff.
D	This item is fully implemented for some patients, orders, drugs, or staff.
E	This item is fully implemented for all patients, orders, drugs, or staff.

Key Element I: Patient Information

		A	B	C	D	E
Core Characteristic # 1 <i>Essential patient information is obtained, readily available in useful form, and considered when prescribing, dispensing, and administering perioperative medications, and when monitoring the effects of these medications.</i>						
1	A computer-generated identification bracelet is verified for correctness using two unique patient identifiers and placed on the patient prior to medication administration and/or the medical and/or surgical procedure.					
	A complete (home) medication list, including each prescription and over-the-					

Scoring Guidelines

Demonstration of adoption of safe practices

None

- A. No activity to implement
- B. Discussed, but not implemented

Partial

- C. Partially implemented for some or all patients, orders, drugs, staff
- D. Fully implemented for some patients, orders, drugs, staff

Full

- E. Fully implemented for all patients, orders, drugs, staff

Items Weighted Based on Impact on Safety

Power (Leverage)

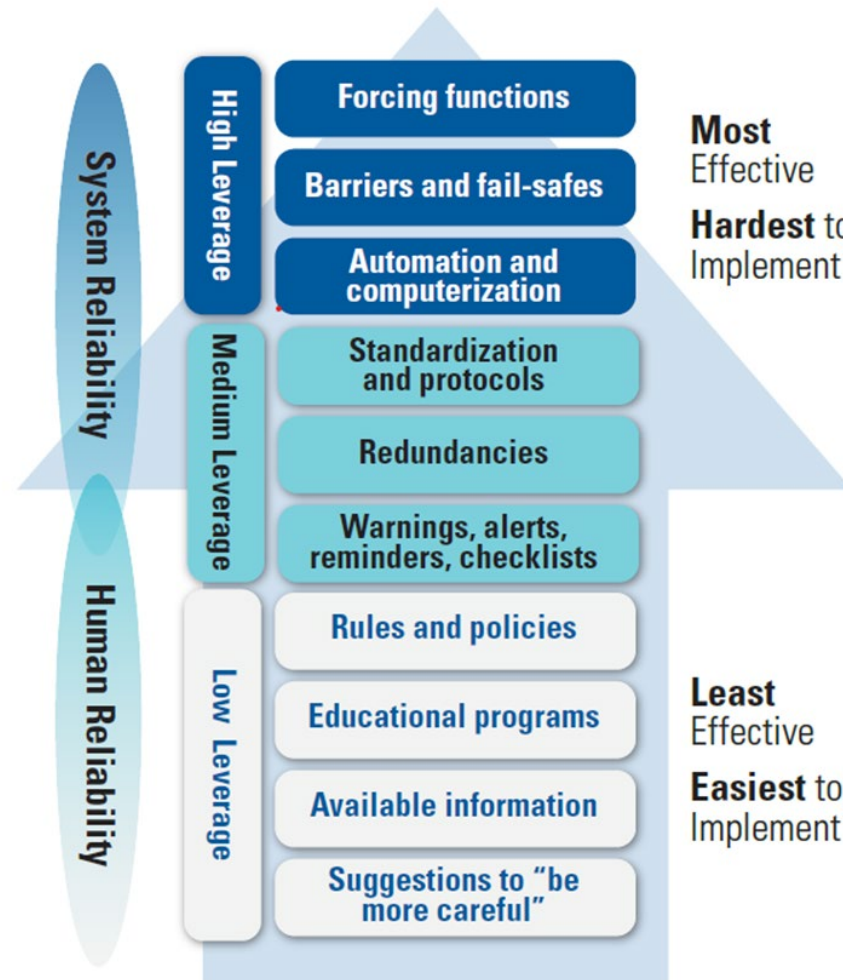
High
Max: 16



Medium
Max: 10



Low
Max: 6



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ISMP's *Key Elements of the Medication Use System*™

2

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(1 Core Characteristic, 21 assessment items)	
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(2 Core Characteristics, 22 assessment items)	
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- I. Patient Information
- II. Drug Information
- III. Communication of Drug Orders and Other Drug Information
- IV. Drug Labeling, Packaging, and Nomenclature**
- V. Drug Standardization, Storage, and Distribution**
- VI. Medication Delivery Device Acquisition, Use, and Monitoring
- VII. Environmental Factors, Workflow, and Staffing Patterns
- VIII. Staff Competency and Education
- IX. Patient Education
- X. Quality Processes and Risk Management**

Key Element IV: Drug Labeling, Packaging, & Nomenclature

2 Core Characteristics: 22 items (Cores #4-5)

Topics addressed include:

- similar labels, packaging, drug names (differentiate/separate)
- medication storage in trays, kits, carts, ADCs (label facing up)
- storage of irrigation solutions, tranexamic acid, NMBs, lubricants
- labeling used on medication storage bins, trays, kits, drawers
- use of preprinted labels
- labeling of containers on/off the sterile field

Example item:

- **Item #71:** Vials of tranexamic acid stocked in ADCs and anesthesia trays, kits, carts, drawers, or other anesthesia storage areas are sequestered or separated from look-alike vials used for regional anesthesia (e.g., bupivacaine, ropivacaine).

45

A There has been no activity to implement this item.

B This item has been formally discussed and considered, but it has not been implemented.

C This item has been partially implemented for some or all patients, orders, drugs, or staff.

D This item is fully implemented for some patients, orders, drugs, or staff.

E This item is fully implemented for all patients, orders, drugs, or staff.

Key Element IV: Drug Labeling, Packaging, and Nomenclature

		A	B	C	D	E
Core Characteristic # 4						
Strategies are undertaken to minimize the possibility of perioperative errors with pharmacy-prepared, COMMERCIAL MANUFACTURED, and/or COMMERCIAL PREPARED drug products that have similar or confusing labeling/packaging and/or drug names that look and/or sound alike.						
FAQ 65	An interdisciplinary group of perioperative practitioners examines the labeling and packaging of medications (pharmacy-prepared, COMMERCIAL MANUFACTURED, COMMERCIAL PREPARED) being considered for use in the perioperative setting to identify error potential before use.					
66	Medications that have similar labels, packaging, and/or drug names are stored in individual compartments away from each other in trays, kits, or carts, and/or stored in locked, lidded compartments in ADCs.					
67	To minimize errors with perioperative medications that have similar or confusing labeling, packaging, or drug names, warnings and/or other enhancements (e.g., TAU , MAN LETTERING to accentuate differences in look-alike drug name pairs) are used on/in computer order entry systems, order sets, protocols, guidelines, MARs, ADC screens, infusion pump screens, drug storage compartments, and pharmacy labels.					
68	EPINEPH rine-containing local anesthetics (e.g., lidocaine 1% with EPINEPH rine 1:100,000) are stored separately from plain local anesthetic formulations (e.g., lidocaine 1%) in all perioperative storage areas, including trays, kits, carts, and/or ADCs.					
69	Irrigation solutions are not placed on the same pole as an <i>N</i> infusion; and a warning label stating, " For Irrigation Use Only ," is included on the irrigation solution container.					
70	Medication storage in medication trays, kits, carts, and/or ADCs in the perioperative setting is configured to allow practitioners to immediately view the label while selecting medications (i.e., label is facing up), instead of a "cap up" storage configuration which has only the top of the vial facing up.					
71	Vials of tranexamic acid stocked in ADCs and anesthesia trays, kits, carts, drawers, or other anesthesia storage areas are sequestered or separated from look-alike vials used for REGIONAL ANESTHESIA (e.g., bupivacaine, ropivacaine). Scoring guideline: Choose <i>Not Applicable</i> only if vials of medications used for REGIONAL ANESTHESIA (e.g., bupivacaine, ropivacaine) and/or vials of tranexamic acid are never stocked in your facility or have been fully replaced by COMMERCIAL MANUFACTURED, COMMERCIAL PREPARED, and/or pharmacy-prepared infusion bags.					NOT APPLICABLE

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Key Element V: Drug Standardization, Storage, & Distribution

4 Core Characteristics: 47 items (Cores #6-9)

Topics addressed include:

- standard mixtures/concentrations
- use of commercially manufactured/prepared, pharmacy-prepared
- standard storage configurations; separate storage
- availability of antidotes, reversal/rescue agents
- access to certain medications/how medications are stocked
- safe preparation and wasting procedures
- hazardous drugs

Example item:

- **Item #126:** Fenta**NYL** transdermal patches are not stocked in perioperative unit stock, including ADCs, **and** are not used to treat acute or postoperative pain.

49

A There has been no activity to implement this item.
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E This item is fully implemented for all patients, orders, drugs, or staff.

Key Element V: Drug Standardization, Storage, and Distribution

		A	B	C	D	E
Core Characteristic # 6	IV and REGIONAL ANESTHESIA solutions, drug concentrations, doses, and administration times are standardized whenever possible.					
87	The facility has established standard concentrations for adult and/or neonatal/pediatric perioperative IV infusions of high-alert medications such as opioids, heparin, insulin, vasopressors, and neuromuscular blocking agents, which are used for 90% of adult and/or neonatal/pediatric patients.					
88	The facility has established standard mixtures and concentrations for adult and/or neonatal/pediatric NEURAXIAL ANESTHESIA, which are used for 90% of adult and/or neonatal/pediatric patients. <i>Scoring guideline: Choose Not Applicable only if patients never receive NEURAXIAL ANESTHESIA in your facility.</i>					NOT APPLICABLE
89	The facility has established standard mixtures and concentrations for adult and/or neonatal/pediatric peripheral nerve blocks, which are used for 90% of adult and/or neonatal/pediatric patients. <i>Scoring guideline: Choose Not Applicable only if your facility never administers peripheral nerve blocks.</i>					NOT APPLICABLE
90	The facility has established standard drug concentrations and dosing units between the OPERATING ROOM/PROCEDURE ROOM and inpatient critical care unit(s) within the same health system for infusions started in the OPERATING ROOM/PROCEDURE ROOM that are likely to continue in critical care units. <i>Scoring guideline: Choose Not Applicable only if your facility never transfers patients who have undergone a medical and/or surgical procedure to an inpatient critical care unit within the same health system.</i>					NOT APPLICABLE
91	Standardized COMMERCIALLY MANUFACTURED solutions are used in the perioperative setting for all adult and/or neonatal/pediatric IV hydrating solutions. <i>Exception: Pharmacy-prepared or COMMERCIALLY PREPARED neonatal/pediatric IV hydrating solutions can be used if they are clinically needed and different than available COMMERCIALLY MANUFACTURED solutions.</i>					
FAQ 92	Standardized COMMERCIALLY MANUFACTURED, COMMERCIALLY PREPARED, and/or pharmacy-prepared (not perioperative PRACTITIONER-PREPARED) solutions are used in the perioperative setting, unless they are needed in emergent situations, for the following:					Score Each Item Individually
a	IV medication infusions					
b	REGIONAL ANESTHESIA infusions (excluding BOLUS DOSES) <i>Scoring guideline: Choose Not Applicable only if patients never receive REGIONAL ANESTHESIA infusions in your facility.</i>					NOT APPLICABLE

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Key Element X: Quality Processes & Risk Management

4 Core Characteristics: 42 items (Cores #16-19)

Topics addressed include:

- Just Culture; WalkRounds, safety huddles
- error reporting, including close calls and hazards
- use of external safety alerts/recommendations to address risks
- review of data/reports to identify problems/risks
- implementation of high-leverage strategies
- use of checklists/time-out process; **barcoding**; double checks
- infection control practices

Example item:

- **Item #220:** A bag or bottle of an IV solution or medication infusion (e.g., phenylephrine, insulin) is never prepared and/or used outside the pharmacy as a source of flushes, diluents, or bolus doses for single or multiple patients.

67

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 D This item is fully implemented for some patients, orders, drugs, or staff.
 E This item is fully implemented for all patients, orders, drugs, or staff.

Key Element X: Quality Processes and Risk Management

		A	B	C	D	E
Core Characteristic # 16	<i>A safety-supportive Just Culture and model of shared accountability for safe system design/redesign and making safe behavioral choices is in place and supported by perioperative leaders, managers, and the associated Board of Trustees/Directors.</i>					
180	Patient safety is a fundamental core-value in the organization, which is reflected in the organization's mission, vision, and value statements.					
181	The perioperative setting is governed by a formal policy(ies) that outlines the organization's commitment to a fair and Just Culture, defines individual and leadership/management accountabilities associated with behavioral choices and system design/redesign, and provides an overview of the organization's just response to HUMAN ERROR (CONCOUNSEL), AT-RISK BEHAVIOR (COACHING), and RECKLESS BEHAVIOR (REMEDIATION/DISCIPLINARY SANCTIONS).					
182	Perioperative leaders and managers have been educated about establishing and/or maintaining a fair and Just Culture of safety.					
183	Key accountabilities and outcome measures (e.g., culture survey results) for establishing and/or maintaining a Just Culture are included in perioperative leaders' and managers' job descriptions (or position statements or medical staff bylaws, if applicable) and performance appraisals.					
184	Perioperative leaders and managers hold all practitioners equally accountable for the quality of their behavioral choices, regardless of their professional discipline, rank or position in the organization, experience, and/or financial importance.					
FAQ 185	Perioperative leaders and managers do not react to a harmful event by automatically punishing the person/people involved, nor do they ignore the same behavior when the outcome is good; and leaders and managers do not wait until harm occurs to redesign error-prone systems.					
186	Perioperative leaders and managers anticipate that practitioners will occasionally engage in AT-RISK BEHAVIORS and observe work daily for signs of this behavioral drift; and they manage AT-RISK BEHAVIORS through investigation, SYSTEM REDESIGN, changes in the rewards that entice the behavior, and COACHING (not DISCIPLINARY SANCTIONS) of individuals to see the risk associated with behaviors that work around the problems they encounter.					
FAQ 187	DISCIPLINARY SANCTIONS are not taken against a practitioner for making a HUMAN ERROR.					
188	Perioperative practitioners have been educated about their important role in the following key accountabilities; and these key accountabilities are included in their job descriptions (or position statements or medical staff bylaws, if applicable) and performance appraisals:					Score Each Item Individually
a	Making safe behavioral choices rather than being perfect and never making HUMAN ERRORS (which are not behavioral choices)					

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Self Assessment Results (Demographics)

• Hospital Participants (N = 326)

Bed Size	
Under 100 beds	20%
100-299 beds	34%
300-499 beds	21%
500 beds and over	25%

Number of ORs	
Under 10	30%
10-39	57%
40-79	10%
80 or more	3%

• Ambulatory Participants (n = 60)

Monthly Visits	
Less than 100	20%
100-499	48%
500-999	20%
1000 and over	12%

Number of ORs	
None	17%
1-3	43%
4-9	37%
10 or more	3%

Self Assessment Results (Demographics)

- Hospital Participants (N = 326)

Patients Served	
Only Pediatrics	5%
Only Adults	18%
Combination	77%

Number of OR Procedures/Year	
Less than 5,000	33%
5,000-9,999	20%
10,000-19,999	25%
20,000 or more	22%

- Ambulatory Participants (n = 60)

Patients Served	
Only Pediatrics	2%
Only Adults	47%
Combination	52%

Number of Procedures/Year	
Fewer than 1000	19%
1,000-4,999	47%
5,000-9,999	22%
10,000 or more	12%

Self Assessment Results (Demographics)

• Hospital Participants (N = 326)

Barcode Scanning	
Holding area	86%
OR	32%
Procedure room	41%
Recovery	88%

Smart Infusion Pumps/DERS	
Holding area	92%
OR	89%
Procedure room	88%
Recovery	94%

• Ambulatory Participants (n = 60)

Barcode Scanning	
Yes	27%
No	73%

Smart Infusion Pumps/DERS	
Yes	47%
No	53%

Key Elements – Mean Percent Scores

#	Key Element	Mean % Score (Hospitals)	Mean % Score (ASCs)
I	Patient Information	78%	79%
II	Drug Information	72%	60%
III	Communication of Drug Orders and Other Drug Information	83%	87%
IV	Drug Labeling, Packaging, and Nomenclature	80%	82%
V	Drug Standardization, Storage, and Distribution	83%	83%
VI	Medication Device Acquisition, Use, and Monitoring	75%	59%
VII	Environmental Factors, Workflow, and Staffing Patterns	76%	73%
VIII	Staff Competency and Education	82%	85%
IX	Patient Education	86%	94%
X	Quality Processes and Risk Management	78%	77%

Core Characteristics – Mean Percent Scores

Key #	Core #	Core Characteristic	Mean % Score (Hospitals)	Mean % Score (ASCs)
I	1	Essential patient information is obtained, readily available, considered	78%	79%
II	2	Essential drug information is readily available and considered	72%	60%
III	3	Communication is streamlined, standardized, and automated	83%	87%
IV	4	Strategies are implemented for look- and/or sound-alike names/labels	78%	78%
	5	Readable labels are on all containers, and drugs remain labeled	82%	85%
V	6	IV/regional anesthesia concentrations/doses/admin. times are standardized	87%	87%
	7	Medications are provided in a safe/secure manner and timeframe to meet needs	78%	82%
	8	Access to perioperative medications is restricted and controlled	80%	76%
	9	Hazardous drugs/chemicals/flammable products are safely prepared/stored/used	89%	91%
VI	10	Careful procurement, maintenance, use, and standardization of devices	75%	59%

Core Characteristics – Mean Percent Scores

Key #	Core #	Core Characteristic	Mean % Score (Hospitals)	Mean % Score (ASCs)
VII	11	Efficient and safe workflow; environment offers adequate space and lighting	85%	84%
	12	Complement of qualified, well-rested practitioners matches the clinical workload	69%	65%
VIII	13	Practitioners receive orientation, undergo baseline/annual competency evaluation	88%	90%
	14	Practitioners receive ongoing education about error prevention, safe use of drugs	75%	78%
IX	15	Patients are included as partners and are educated about ways to avert errors	86%	94%
X	16	A Just Culture is in place and supported by leaders	87%	92%
	17	Practitioners detect/report adverse events/errors/hazards, teams analyze data	78%	86%
	18	Redundancies are used to detect and correct errors before they reach patients	66%	47%
	19	Proven infection control practices are followed	84%	90%
Entire Assessment			79%	77%

The Future of Perioperative Medication Safety: Charting our Path Forward

- ISMP National Summit held November 10-11, 2021
- More than 80 key stakeholders representing interests of perioperative settings
- Focus on consensus-based best practices for medication use
- Guideline development and release in August, 2022



Key Element IV: Drug Labeling, Packaging, and Nomenclature

Mean % Score = 80%

Low-Scoring Assessment Items for Core Characteristic

#	Core Characteristics and Low-Scoring Assessment Items	Mean Percent Score		
		All N=386	Hospitals N=326	ASCs N=60
4. Strategies Are Implemented for Look-Alike Labeling and Look- and Sound-Alike Names				
70	Medication storage in trays, kits, carts, and ADCs is configured to allow practitioners to immediately view the label while selecting medications (i.e., label is facing up), instead of “cap up” storage configuration.	55	55	60
73	Storage bins and/or ADC pockets, drawers, kits, and/or trays containing neuromuscular blocking agents include an auxiliary label to clearly communicate respiratory paralysis will occur and ventilation is required.	74	76	61
5. Readable Labels Are on Drug Containers				
76	Medication storage bins, trays, kits, drawers, shelves, and compartments in the perioperative setting are labeled using electronically generated labels that include, at a minimum, the generic medication name (using TALL MAN LETTERING, as appropriate) and concentration; handwritten labels are not used.	72	72	72

Key Element IV: Drug Labeling, Packaging, and Nomenclature

Recommendations

- 4.1. Strive to configure medication vial storage in medication trays, kits, carts, and/or automated dispensing cabinets (ADCs) to allow practitioners to immediately view the vial label (i.e., label is facing up) while selecting medications, instead of a “cap up” storage configuration in which only the top of the vial is facing up.
- 4.3. Eliminate the use of handwritten labels in perioperative/procedural areas by 2025.



Labeled Solution Areas in Prototype Medication Trays



The Joint Commission Journal of Quality and Patient Safety. 2016;42(10)473-477.

Key Element IV: Drug Labeling, Packaging, and Nomenclature

Recommendations

- 4.2. Clearly label storage bins and/or ADC pockets, drawers, kits, and/or trays containing NMBs to clearly communicate that respiratory paralysis will occur and ventilation is required (e.g., “Warning: Paralyzing Agent—Causes Respiratory Arrest;” “Warning: Causes Respiratory Paralysis—Patient Must Be Ventilated”). In addition to the manufacturer’s warning on the caps and ferrules, an auxiliary label may be affixed directly on each vial.



Key Element V: Drug Standardization, Storage, and Distribution

Mean % Score = 83%

Low-Scoring Assessment Items for Core Characteristic

#	Core Characteristics and Low-Scoring Assessment Items	Mean Percent Score		
		All N=386	Hospitals N=326	ASCs N=60
6. IV/Regional Anesthesia Concentrations, Doses, and Administration Times Are Standardized				
93	For adults, commercially manufactured, commercially prepared, and/or pharmacy-prepared prefilled syringes of medications are used (including by anesthesia providers) for at least 80% of all medication doses administered from a syringe; practitioner-prepared syringes are avoided whenever possible.	61	62	57
94	For neonates/pediatric patients, commercially manufactured, commercially prepared, and/or pharmacy-prepared prefilled syringes of medications are used (including by anesthesia providers) for at least 80% of all medication doses administered from a syringe; practitioner-prepared syringes are avoided whenever possible.	66	64	74

Key Element V: Drug Standardization, Storage, and Distribution

Recommendations

- 5.2. Maximize the use of manufacturer-prepared, pharmacy-prepared, or commercially prepared (e.g., from a compounding pharmacy or outsourcing facility) syringes in the perioperative setting for adult, pediatric, and neonatal medication doses.
- 5.3. When no compounding technology is available, or when no pharmacy or pharmacist is available (e.g., ambulatory settings), the following recommendations should be considered to safely use compounded sterile preparations:
 - Maximize the use of manufacturer-prepared products
 - Purchase products in patient-specific doses that are ready to administer
 - If manufacturer-prepared products are not available, investigate the use of commercially prepared products (e.g., from a compounding pharmacy or outsourcing facility).

Low-Scoring Assessment Items for Core Characteristic

#	Core Characteristics and Low-Scoring Assessment Items	Mean Percent Score		
		All N=386	Hospitals N=326	ASCs N=60
8. Access to Medications is Restricted and Controlled				
115	In the holding area and the recovery area, interactive ADC alerts require users to enter or select clinically relevant information (e.g., purpose for drug removal, verification that the patient is ventilated [for neuromuscular blocking agents]) prior to removal of certain medications.	38	43	13
113 a,b,c	Profiled ADCs are used and require a pharmacist to review orders before pre- and postoperative medications are removed; OR autoverification procedures are in place for removal of certain medications, and a pharmacist retrospectively reviews medication orders; OR non-profiled ADCs are used, and a pharmacist retrospectively reviews medication orders.	48	55	12

Key Element V: Drug Standardization, Storage, and Distribution

Recommendations

- 5.9. Prioritize the use of PROFILED ADCs in preoperative/preprocedural and postoperative/postprocedural settings to allow for medication selection after orders have been reviewed and verified by a pharmacist.
 - Note: Removal of medications via the OVERRIDE function should be reserved for urgent or lifesaving situations in which a delay would harm the patient.
 - Note: Anesthesia workstations located in intraoperative or facility-defined procedural areas are commonly NOT PROFILED and are excluded from OVERRIDE functionality.
- 5.10. Require a medication order (e.g., electronic, verbal/telephone) or have an approved protocol in effect prior to removing any medication from storage or from ADCs (if available), even if they are removed using the OVERRIDE function.
 - Exception: This statement excludes medications administered by ANESTHESIA PROVIDERS as part of their anesthetic management of the patient.

Key Element X: Quality Processes and Risk Management

Mean % Score = 78%

Low-Scoring Assessment Items for Core Characteristic

#	Core Characteristics and Low-Scoring Assessment Items	Mean Percent Score		
		All N=386	Hospitals N=326	ASCs N=60
18. Independent Double Checks/Automation Are Used for Vulnerable Processes				
203 b,c	Barcode scanning is used in operating and procedure rooms by anesthesia providers, non-anesthesiologist sedation practitioners, surgeons, nurses, and others to verify medications/solutions prior to administration.	36	36	36
204	Barcode scanning is employed, a team reviews data from the system, including scanning compliance rates and bypassed or acknowledged alerts; and any barriers with using the technology are addressed.	60	67	25

Key Element X: Quality Processes and Risk Management

Recommendations

- 10.11. Use machine-readable coding (e.g., BARCODE SCANNING, RFID) in preoperative/preprocedural and postoperative / postprocedural settings to verify patients and medications / solutions prior to administration.
- 10.12. Take steps to implement machine-readable coding (e.g., BARCODE SCANNING, RFID) in intraoperative/ intraprocedural workflows to confirm medication/solution selection prior to administration.

Successes Implementing Barcode Scanning

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FEATURED ARTICLES

An Interview: Success with Barcode Scanning to Enhance Perioperative Medication Safety

August 11, 2022



A few months ago, ISMP interviewed Dustin Carneal, PharmD, from the Crystal Clinic Orthopaedic Center in Akron, Ohio, about the implementation of barcode scanning technology in their perioperative and procedural settings. The Crystal Clinic Orthopaedic Center is a physician-owned hospital system that has 22 operating rooms in two locations, which accommodate a volume of approximately 17,000 medical and/or surgical procedures each year. Total knee, hip, and shoulder replacements, as well as spinal fusions, are some of the more frequent procedures performed there. In 2021, the health system



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Successes Implementing Barcode Scanning

Message in our Mailbox



Barcode scanning by anesthesia providers in the OR. In our August 11, 2022 newsletter (www.ismp.org/node/33905), we published an interview with a pharmacist who successfully implemented barcode scanning technology in their perioperative and procedural settings. ISMP recommended barcode scanning technology in perioperative and procedural areas in our recently released *ISMP Guidelines for Safe Medication Use in Perioperative and Procedural Settings* (www.ismp.org/node/31601) and in our *Targeted Medication Safety Best Practices for Hospitals* (www.ismp.org/node/160). Since publishing our August newsletter article, ISMP received an email message from **Ludwik Fedorko, MD, DPhil, FRCPC**, from the University Health Network (UHN) Toronto General Hospital. Dr. Fedorko wanted to share important and timely information about how anesthesia providers can adopt barcode scanning technology in the operating room (OR) in almost any hospital in the United States and Canada that has

“During practice, anesthesia providers often administer multiple medications and multiple doses of the same medication during various stages of anesthesia care. But nobody has time to go back to the computer to chart one medication dose at a time.”



Conclusion

Questions?

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Slide Citations

1. World Health Organization. WHO launches global effort to halve medication-related errors in 5 years. www.ismp.org/ext/279. Published 2017. Accessed July 30, 2018.
2. Beyea SC, Hicks RW, Becker SC. Medication errors in the OR--a secondary analysis of Medmarx. *AORN J*. 2003;77(1):122,125-9,132-4.
3. Boytim J, Ulrich B. Factors contributing to perioperative medication errors: a systematic literature review. *AORN J*. 2018;107(1):91-107.
4. Cooper JB, Newbower RS, Long CD, McPeckB. Preventable anesthesia mishaps: a study of human factors. 1978. *Qual Saf Health Care*. 2002;11(3):277-82.
5. Nanji KC, Patel A, Shaikh S, Seger DL, Bates DW. Evaluation of perioperative medication errors and adverse drug events. *Anesthesiology*. 2016;124(1):25-34.
6. Sakaguchi Y, Tokuda K, Yamaguchi K, Irita K. Incidence of anesthesia-related medication errors over a 15-year period in a university hospital. *Fukuoka Igaku Zasshi*. 2008;99(3):58-66.
7. Gariel C, Cogniat B, Desgranges FP, Chassard D, Bouvet L. Incidence, characteristics, and predictive factors for medication errors in paediatric anaesthesia: a prospective incident monitoring study. *Br J Anaesth*. 2018;120(3):563-70.
8. Webster CS, Merry AF, Larsson L, McGrath KA, Weller J. The frequency and nature of drug administration error during anaesthesia. *Anaesth Intensive Care*. 2001;29(5):494-500.