FSHP 60th Annual Meeting

Sparkle Shine Celebrate!

Facets of Medication Safety: Reflecting on Lessons and Shaping a Safer Future

Heather Stanley, PharmD

Medication Safety Manager | AdventHealth Central Florida Division

Robyn Yarsley, PharmD, BCPS

Assistant Professor of Pharmacy Practice | Palm Beach Atlantic University, Gregory School of Pharmacy

Disclosure

Neither presenter has a vested interest in or affiliation with any corporate organization offering financial support or grant monies for this continuing education activity, or any affiliation with an organization whose philosophy could potentially bias their presentation (within the last 12 months).

Pharmacist and Pharmacy Technician Presentation Objectives

1. Define medication errors and key terms associated with patient safety in healthcare

2. Identify key performance indicators used for error reduction and prevention

3. Demonstrate an understanding of how to apply root cause analysis to a medication event

4. Discuss patient safety stories and strategies used to prevent medication errors and improve patient safety

Key Medication Safety Terms

Key performance indicator (KPI)	Medication Error	Medication Event	Adverse drug reaction (ADR)
Adverse drug event (ADE)	Near miss / good catch	Medication Use Process (or medication use system)	Just Culture
Sentinel Event	Root Cause Analysis (RCA)	Failure Mode Effects Analysis (FMEA)	Continuous Quality Improvement (CQI)

The Medication Use Process

Medication Safety… How are we doing?

- Medication safety is multifaceted
- Flaws in the diamond vs. medication use
- How do we identify flaws?
- **Key Performance Indicators (KPIs):** measures or values that organizations can track to assess how an organization's medication use system is performing
  - Track/trend
  - Assess/Evaluate effectiveness of the system/process
  - Identify areas that need further review and investigation
- Root cause analysis (retrospective)
- Failure Mode Effects Analysis (prospective/concurrent)

Healthcare Consultants International. (n.d.). *Practical guidance for selecting key performance indicators in healthcare.* HCI. https://hci.care/practical-guidance-for-selecting-key-performance-indicators-in-healthcare/

KEY PERFORMANCE INDICATORS

KPI Key Terms Defined Throughout

Computer Provider Order Entry (CPOE)

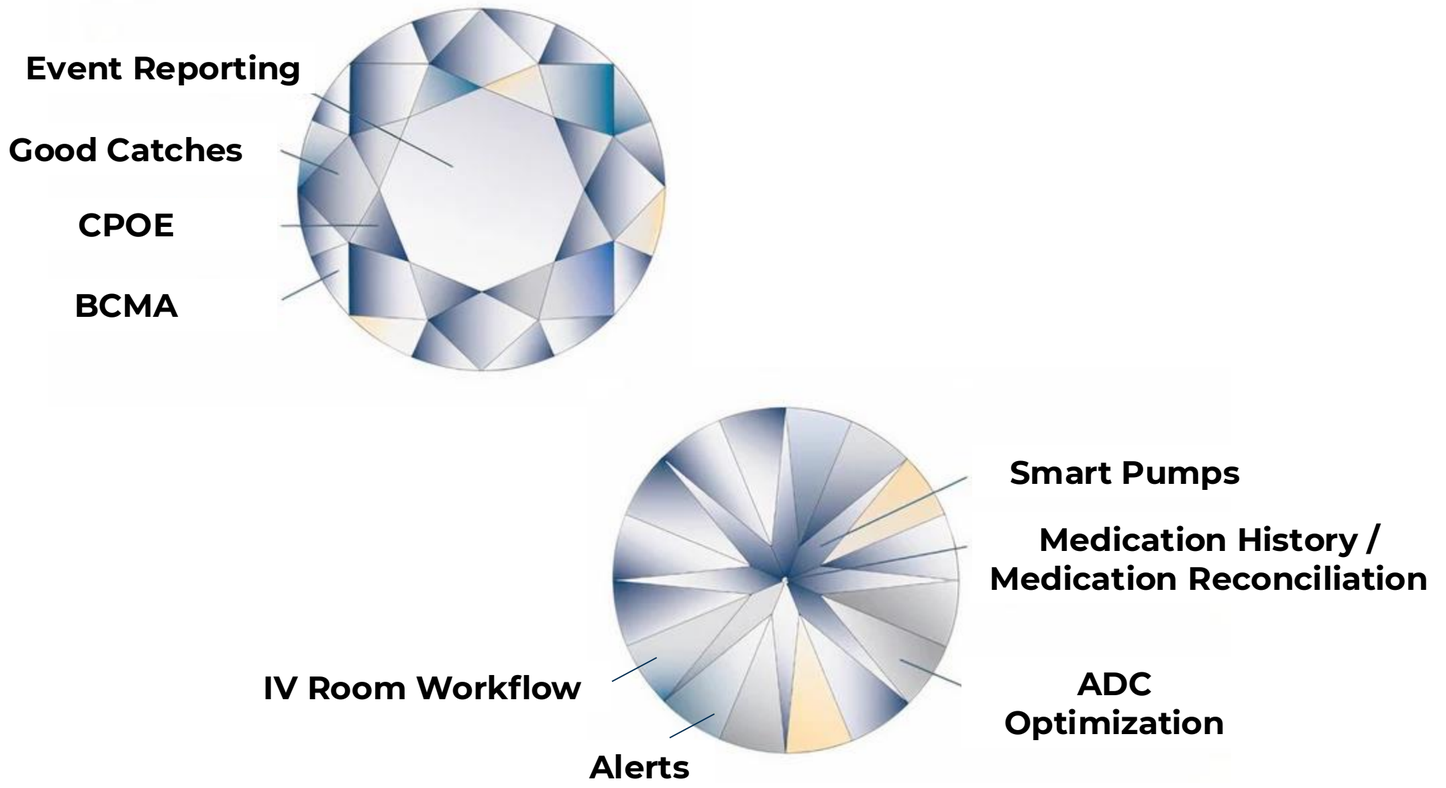
Barcode Medication Administration (BCMA)

Automated Dispensing Cabinet (ADC)

Clinical Decision Support or Alerts (CDS)

KPIs – Facets of Error Reduction

- Medication Safety Event Reporting
- Good Catches/Near Misses
- CPOE
- BCMA
- Smart Pump Technology
- Medication History / Medication Reconciliation
- ADC Optimization
- IV Room Workflow
- Clinical Decision Alerts



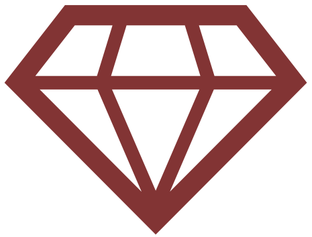
The Anatomy of Diamonds: How Cut Shapes Beauty | Brilyo Jewelry

Where do KPIs show up the Medication Use Process?

KPIs in the Medication Use Process

Storage

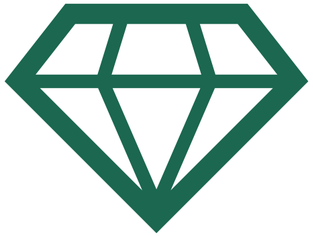
IV Room Workflow



Event Reporting
Good Catches

Prescribing/ Transcribing

ADC Optimization
Medication History / Medication Reconciliation
Alerts CPOE



Event Reporting
Good Catches

Preparation

IV Room Workflow
Alerts

Event Reporting
Good Catches

Dispensing

IV Room Workflow
Alerts
ADC Optimization

Event Reporting
Good Catches

Administration

Alerts
Smart Pumps
BCMA

Event Reporting
Good Catches

Monitoring

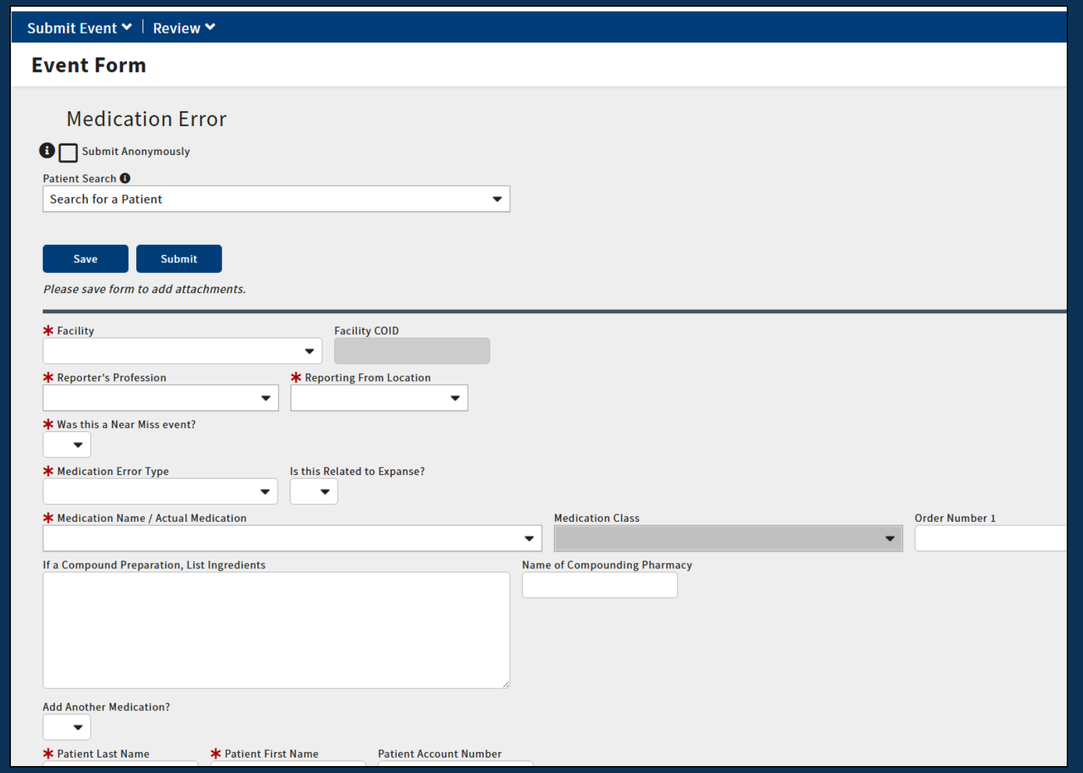
Medication History / Medication Reconciliation

Event Reporting
Good Catches

FSHP 60th Annual Meeting

Sparkle Shine Celebrate!

MEDICATION SAFETY EVENT REPORTING



Defining A Few Medication Safety Terms

Medication Error

- Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer

Near Miss (Good Catch or Close Call) Medication Event

- A mistake in prescribing, dispensing, or planned medication administration that is detected and corrected through intervention (by another healthcare provider or patient) before actual medication administration

Adverse Drug Reaction (ADR)

- An unwanted or harmful side effect experienced following the administration of a drug or combination of drugs and is suspected to be related to the drug at normal doses

Adverse Drug Event (ADE)

- Harm experienced by a patient as a result of exposure to a medication
- Does not necessarily have a causal relationship with this treatment
- **Preventable ADE:** medication-related harm due to error

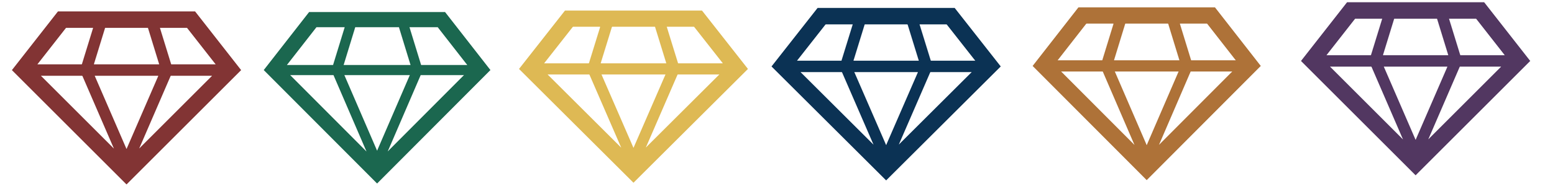
Medication Errors and Adverse Drug Events. PSNet. Agency for Healthcare Research and Quality. https://psnet.ahrq.gov/primer/medication-errors-and-adverse-drug-events
Am J Health-Syst Pharm. 2018; 75:1493–1517
Am J Health-Syst Pharm. 1995; 52:417-9..

KPI Metric: Medication Event Reporting

- Medication error
  - Event occurred:
    - Could have resulted in harm
    - Adverse drug event: occurred → harm
  - Near miss: did not reach the patient
- Adverse drug reactions (ADRs)
- Medication event tracking
- Collecting data from “incident reports”
- Voluntary patient safety event reporting systems
- Passive surveillance for near misses or unsafe conditions
- Could also include trigger tools such as antidote monitoring

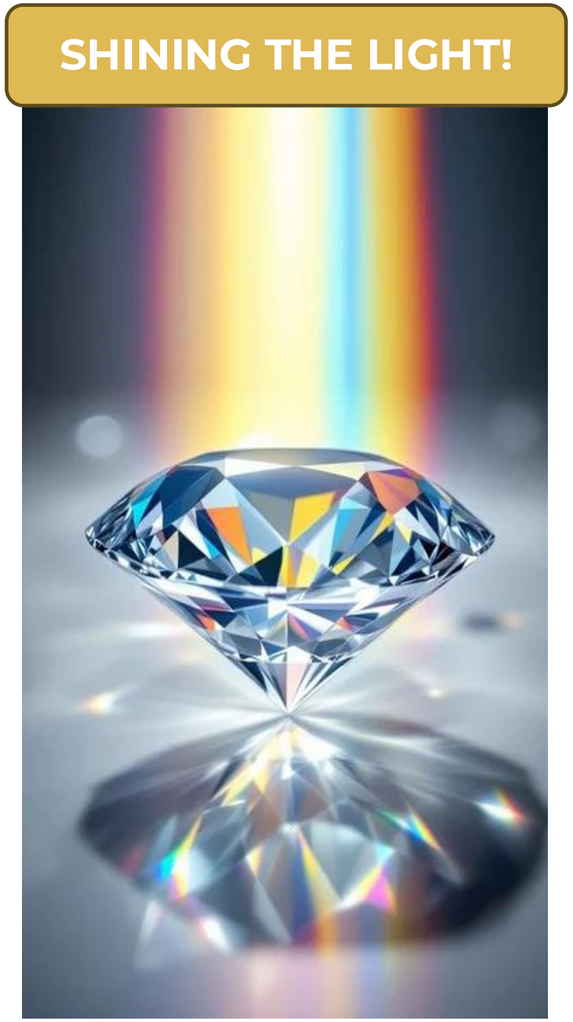
Who Interacts with Medication Event Reporting?

Everyone involved with the medication use process



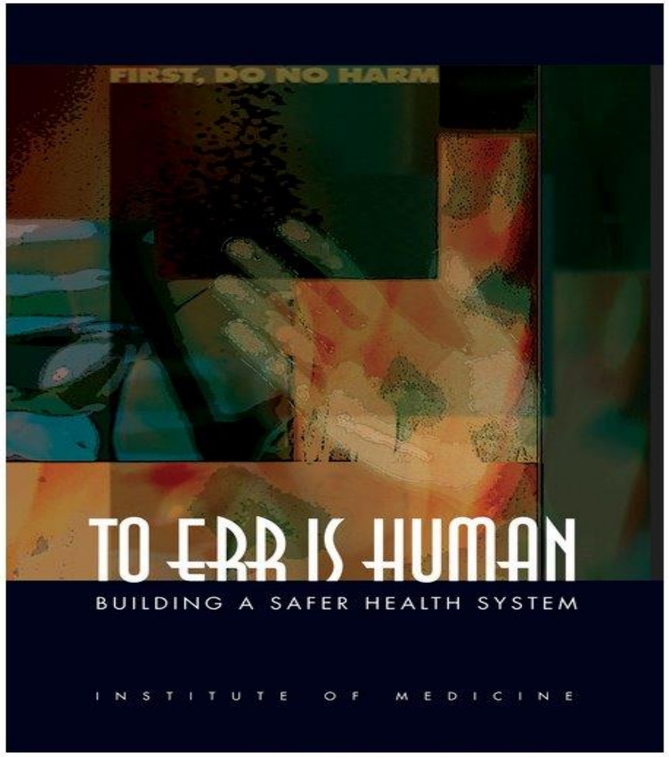
Benefits of Medication Event Reporting

- Data used for:
  - Learning
  - Process improvements
    - Redesign
    - Technology optimization
    - Policy or protocol changes
- **Promotes safe/just culture**
- Measure effectiveness of changes
- Track and trend
- Supports regulatory compliance
- Engages the team!



https://stockcake.com/s/flawless-diamond

Defining Medication Safety Terms



Just Culture

- Agency for Healthcare Research and Quality (AHRQ), defines:
- “focuses on identifying and addressing systems issues that lead individuals to engage in unsafe behaviors, while maintaining individual accountability by establishing zero tolerance for reckless behavior.
- Distinguishes between human error (e.g., slips), at-risk behavior (e.g., taking shortcuts), and reckless behavior (e.g., ignoring required safety steps), in contrast to an overarching “no-blame” approach still favored by some.
- The response to an error or near miss is predicated on the type of behavior associated with the error, and not the severity of the event.”

https://psnet.ahrq.gov/primer/culture-safety

Medication Event Reporting: What is the Goal?

- What should be the goal?
  - Provide information that allows an organization to identify weaknesses in its medication use system and to apply lessons learned to improve the system
  - Quality over quantity
- Good catches: goal is to increase #
- Actual events:
  - More good catches and less errors
  - Not necessarily wanting to see less events
  - Trending reporting
    - Select process or medication-related events
    - Harm-reduction

- National Coordinating Council for Medication Error Reporting and Prevention:
  - No acceptable incidence rate
  - Track and trend own data

National Coordinating Council for Medication Error Reporting and Prevention: Statement on Medication Error Rates; Available at: https://www.nccmerp.org/statement-medication-error-rates

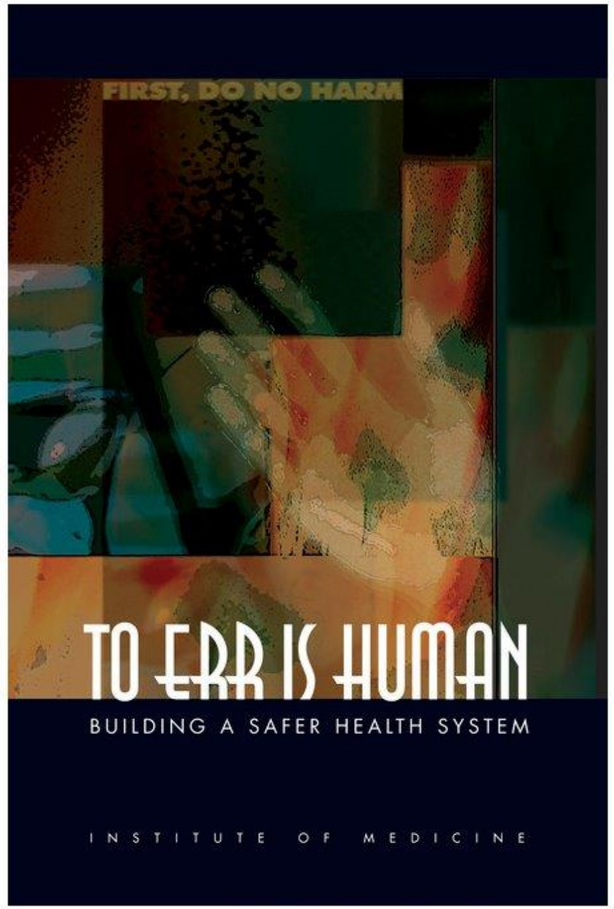
Who is Managing/Reviewing Medication Events?

- Medication safety officer, manager, coordinator
- Director of Pharmacy
- Clinical Coordinator/Manager
- Pharmacy Operations Supervisor/Manager
- Patient Safety Officer/Risk/Quality Manager
- Corporate/Division

Magnific AI. *Yellow hard hat mining helmet with flashlight* [vector image]. Magnific. Accessed May 24, 2026. https://www.magnific.com/premium-vector/yellow-hard-hat-mining-helmet-with-flashlight_40827885.htm

According to AHRQ: Best Practice for Incident Reporting Systems

- **A supportive environment for event reporting**
  - Protects reporting staff privacy/confidentiality
- Reports are received from a broad range of personnel in the process
- Event reporting summaries are disseminated in a timely fashion
- Structured mechanism in place for report review and action plan development



AHRQ = Agency for Healthcare Research and Quality

Kohn LT, Corrigan JM, Donaldson MS, eds. To err is human: building a safer health system. Washington, DC: National Academy Press; 1999.

Medication Event Reporting Best Practices/Resources

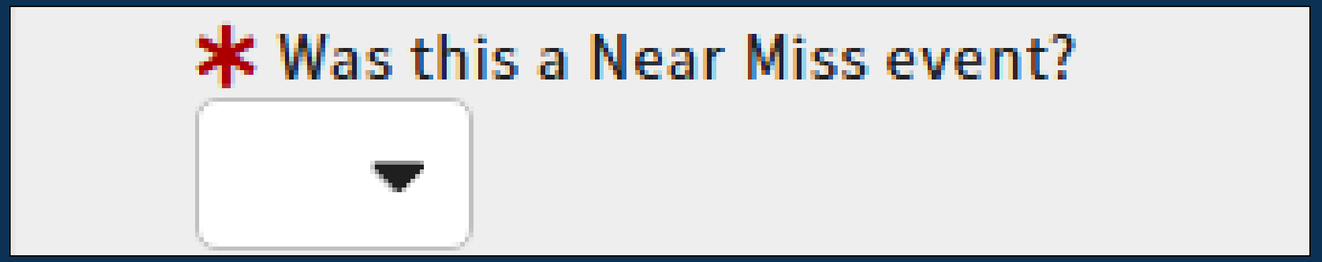
Best Practices:

- **Increase reporting of good catches/near misses**
- **Promote Just Culture**
- Prospective hazard detection tool: FMEA
- Direct observation of medication use processes
- Retrospective chart reviews
- Retrospective hazard detection tool: RCA
- Trigger assessments: i.e. antidote/reversal agent reports
- Rule-based reports
- Focus groups
- Review of technology

- **Resources:**
  - FSHP Medication Safety Resource Document
  - ASHP and ISMP Tools on Just Culture
  - ISMP Best Practices for Hospitals
  - NCCMERP: National Coordinating Council for Medication Error Reporting and Prevention | NCC MERP

National Coordinating Council for Medication Error Reporting and Prevention: Statement on Medication Error Rates; Available at: https://www.nccmerp.org/statement-medication-error-rates

GOOD CATCHES / NEAR MISSES



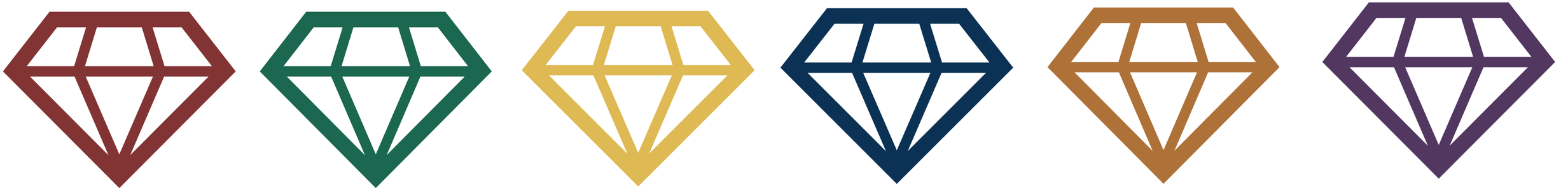
KPI Metric: Good Catches

- Patient is exposed to a **hazardous situation** but does not experience harm either through luck or early detection
- Subset of reported medication events
- AKA “Good Catch”, “Near Miss”, “Close Call”
- An unsafe situation that occurs due to error or failure to apply acceptable prevention strategies

Adverse Events, Near Misses, and Errors. PSNet. Agency for Healthcare Research and Quality. September 7, 2019. https://psnet.ahrq.gov/primer/adverse-events-near-misses-and-errors;
Medication Errors and Adverse Drug Events. PSNet. Agency for Healthcare Research and Quality. https://psnet.ahrq.gov/primer/medication-errors-and-adverse-drug-events
https://inspiresafety.com/products/the-near-miss-poster-6

Who Interacts with Good Catch Reporting?

other



Storage | Prescribing/ Transcribing | Preparation | Dispensing | Administration | Monitoring

pharmacy technician | provider | pharmacist | nurse | leaders

Good Catch Reporting: What is the Goal/Best Practice?

Goal

- **Increase number of near miss events reported**

Best Practices

- **Share information changed**
  - Increases awareness of medication safety program
- **Promote culture of safety:**
  - Acknowledge team efforts and feedback/celebration per quarter with award
- **Track by drug to impact change**
- Track dept level before leave dept, or way to track prescribing errors caught before verification
- Use Microsoft form/survey to track outside or in addition of event tracking

Who is Managing Good Catch Reporting?

- Medication safety officer, manager, coordinator
- Facility pharmacy management
  - Director of Pharmacy
  - Clinical Coordinator/Manager
  - Pharmacy Operations Supervisor/Manager
- Patient Safety Officer/Risk/Quality Manager
- Corporate/Division
- Chief officer/VP overseeing pharmacy department (i.e CNO, COO, CFO)

Frankel A, Haraden C, Federico F, Lenoci-Edwards J. *A Framework for Safe, Reliable, and Effective Care*. White Paper. Cambridge, MA: Institute for Healthcare Improvement and Safe & Reliable Healthcare; 2017. (Available at ihi.org)

Good Catches Best Practices/Resources

Best Practices:

- **Increase team effort acknowledgements**
  - Through daily huddles so real time efforts are seen and rewarded
- **Increase Just Culture (JC)/ Psychological Safety (PS)**
  - Leadership modeling and framing
  - Present the algorithm along with the Swiss Cheese Model
  - Create safe spaces for dialogue i.e. huddles
- **Decrease Adverse Drug Events (ADE)**
  - Team to inform leaders through SBARs by structured governance meetings, CQI's, or staff huddles of occurrences on the nursing units
- **Introduce technology into workflow**
  - i.e. IV workflow allows users and leadership to see in real time along with system changes/process improvement

Resources:

- ASHP Guidelines on Preventing Medication Errors in Hospitals. Am J Health-Syst Pharm. 2018; 75:1493–1517
- ASHP Guidelines on Adverse Drug Reaction Monitoring and Reporting. Am J Health-Syst Pharm. 2022;79:e83-89
- Frankel A, Haraden C, Federico F, Lenoci-Edwards J. A Framework for Safe, Reliable, and Effective Care. White Paper. Cambridge, MA: Institute for Healthcare Improvement and Safe & Reliable Healthcare; 2017.
- IHI: A Framework for Safe, Reliable, and Effective Care. Available at: https://www.ihi.org/library/white-papers/framework-safe-reliable-and-effective-care
- ISMP Targeted Medication Safety Best Practices for Hospitals 2026-2027. ECRI.

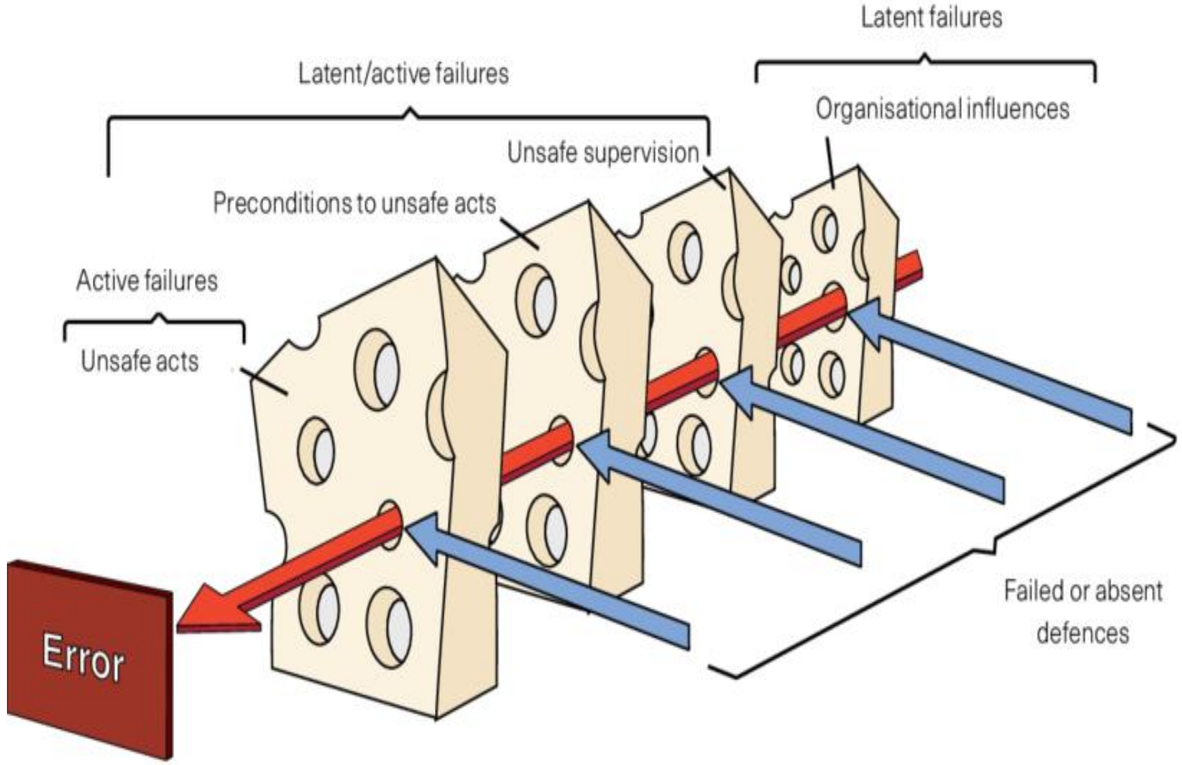
National Coordinating Council for Medication Error Reporting and Prevention: Statement on Medication Error Rates; Available at: https://www.nccmerp.org/statement-medication-error-rates

How and Why to increase Good Catches/Near Misses
Increase medication safety event reporting each year

Metric	Definition	How to improve metric?	Tools used for this metric/ Data Sources	Possible Barriers	References
To increase team Effort Acknowledgements	Acknowledging near misses during staff huddles and governance meetings	Acknowledgements through daily huddles of near misses and great catches, so real time efforts are seen and rewarded	Staff communications, i.e emails, written announcements, verbal announcements	Lack of psychological safety, lack of implementation of a “speak up” culture in the pharmacy	IHI: A Framework for Safe, Reliable, and Effective Care, 2017
To increase Just Culture(JC)/ Psychological Safety(PS)	JS - A culture where safety is valued, where there is reporting without penalization. PS – A culture where members feel safe to report issues and events to leadership	Leadership modeling and framing. Present the algorithm along with the Swiss Cheese Model. Create safe spaces for dialogue i.e. huddles	Front line staff surveys on how safe individuals are to report out events.	Lack of training from leadership on just culture, lack of implementation of just culture and psychological safety	ASHP guidelines on preventing medication errors in hospitals. Am J Health-Syst Pharm. 2018; 75:1493–1517.
To decrease Adverse Drug Events (ADE)	ADE: Preventable harm from a medication. Goal is to decrease ADE by increasing reporting	Team to inform leader through SBARs by structured governance meetings, CQI’s, or staff huddles of occurrences on the nursing units	Excel, Word, other resources used to measure NCC MERP categories A & B. Program used by the Risk/Quality department	Unawareness, lack of education on concept or system, lack of a methodology to tra ck issues	Am J Health-Syst Pharm. 2022;79:e83-89
To introduce technology into workflow	Technologies and operational procedures that favor system reliability support a high moral workflow.	Technology in workflow i.e IV workflow allows users and leadership to see real time what the near misses/good catches are to implement system changes/ process improvement	Electronic IV workflow, BCMA, Electronic Health Record Documentation, ADC	Lack of adoption of optimal technologies for safe and reliable patient care	IHI: A Framework for Safe, Reliable, and Effective Care, 2017

Theory of Human Error: Swiss Cheese Model

- When humans work in a system there is always a risk for error and mistakes
- **Human error is defined as "the failure of planned actions to achieve their desired ends – without the intervention of some unforeseeable event"**
- Slips: attention failures (i.e. stress, distraction)
- Lapses: forgetting to carry out an action step completely
- Mistakes: incorrectly assessing problems or next proper steps



Bulletin of the Royal College of Surg of Eng. 2019;101:8.

Theory of Human Error

- Two broad strategies for preventing and mitigating errors:
  - Prevent the **initial source of the error**
  - **Find and fix the system problems**
- **Systems thinking** requires the evaluation of the whole process rather than focusing on just one step or person
- System design

Journal of Patient Safety. 2022;18(2):119-123.

Sentinel Events

- A patient safety event (not primarily related to a patient's illness or underlying condition) that reaches a patient and results in death, severe or permanent harm
- Can be considered sentinel even if the outcome was not death, permanent harm, severe harm but life-sustaining treatment was required
- Signals the need for immediate investigation and response
- Organizations benefit from self-reporting to The Joint Commission
  - Now renamed Serious Reportable Events

Sentinel Event Policy and Procedures. Available at: https://www.jointcommission.org/en-us/knowledge-library/support-center/standards-interpretation/sentinel-event-policy-and-procedurest Commission

COMPUTERIZED PROVIDER ORDER ENTRY (CPOE)

Definition

- **Computerized Provider Order Entry (CPOE)**
  - Application that allows providers to use information and communication technology to directly enter medical orders, e.g., medication, laboratory, or radiology orders, electronically, in either inpatient or ambulatory settings

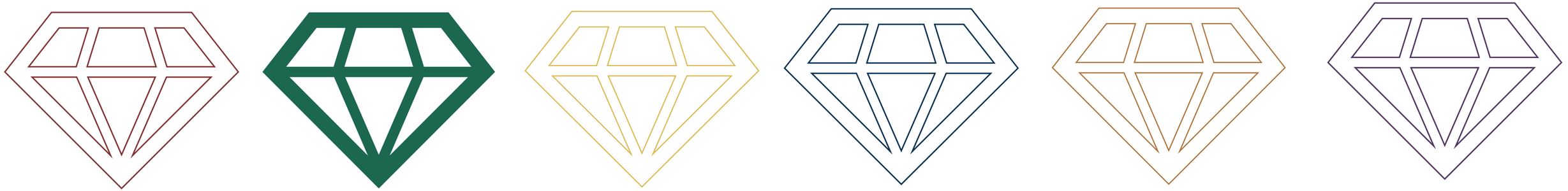
https://digital.ahrq.gov/sites/default/files/docs/page/percentage-of-orders-entered-using-cpoe-quick-reference-guide.pdf

KPI Metric: CPOE Utilization

- **Reported: % CPOE medications entered by provider**
  - # of orders entered by provider via CPOE/ Total # of verbal, telephone, written orders
- **Implementation wide-spread following the HITECH Act → "Meaningful Use"**
  - CMS threshold for CPOE of medication orders ≥ 60%
  - No longer part of CMS measures
  - Now set by Leapfrog Survey

https://digital.ahrq.gov/sites/default/files/docs/page/percentage-of-orders-entered-using-cpoe-quick-reference-guide.pdf

Who Interacts with CPOE Utilization?



Storage | Prescribing/ Transcribing | Preparation | Dispensing | Administration | Monitoring

Benefits of CPOE Utilization

- Proposed to improve patient safety around prescribing
- Reduced prescribing errors compared to paper orders
- Avoids problems with:
  - Interpreting handwritten provider orders
  - Error-prone drug names and high alert medications
  - Drug interactions
- Allows for evidence-based prescribing
  - Order sets and protocol
  - Clinical decision support (CDS)
- Reduced time to transmission to pharmacy and other departments

CPOE Utilization: What is the Goal?

- Goal is > 85% of inpatient medication orders entered via CPOE
  - Metric set by Leapfrog Survey
- **Limit use of telephone and verbal orders**
- **Limit use of hand-written orders**
- **Prevent prescribing errors**

- **Prevent prescribing errors**
  - Examples:
    - Wrong medication ordered
    - Wrong dose ordered
    - Wrong route ordered

- **Prevent patient harm**

prescribing / transcribing

https://www.leapfroggroup.org/survey-materials/survey-and-cpoe-materials

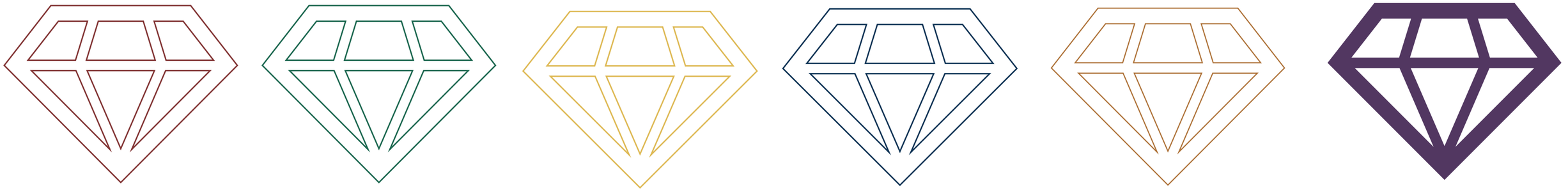
What types of errors can still occur in CPOE?

- Example:
  - Wrong drug ordered
  - Wrong patient
  - Wrong dose ordered
  - Wrong route ordered
  - Wrong frequency ordered

Solution:

- Limit formulary options
- Renaming or strategies to move drugs that look-alike or sound alike to not fall together in CPOE dictionary
  - Tall-man lettering
- Limit dose options
- Limit route options
- Use of standardized/evidence-based order sets and protocols
  - High alert medications

Who is Managing/Reviewing CPOE Utilization?



Storage | Prescribing/ Transcribing | Preparation | Dispensing | Administration | Monitoring

leaders

CPOE Utilization KPI Takeaways

- While monitoring is required for Leapfrog.....
- CPOE platform is only as good as it is designed
- Can lead to more errors if not built correctly
- Monitoring percent compliance vs. monitoring of CDS alerts

CPOE Best Practices/Resources

- Leapfrog Section 2A: Computerized Physician Order Entry (CPOE), 2026
- Guidance for the 2026 Leapfrog CPOE Evaluation Tool
- ASHP Guidelines on Pharmacy Planning for Implementation of Computerized Provider-Order-Entry Systems in Hospitals and Health Systems, 2011

ASHP Guidelines on Pharmacy Planning for Implementation of Computerized Provider-Order-Entry Systems in Hospitals and Health Systems, *American Journal of Health-System Pharmacy*, Volume 68, Issue 6, 15 March 2011, Pages e9–e31, https://doi.org/10.2146/sp100011e
J Am Med Info Asso. 2013;20(3):470-476.

BARCODE MEDICATION ADMINISTRATION (BCMA)

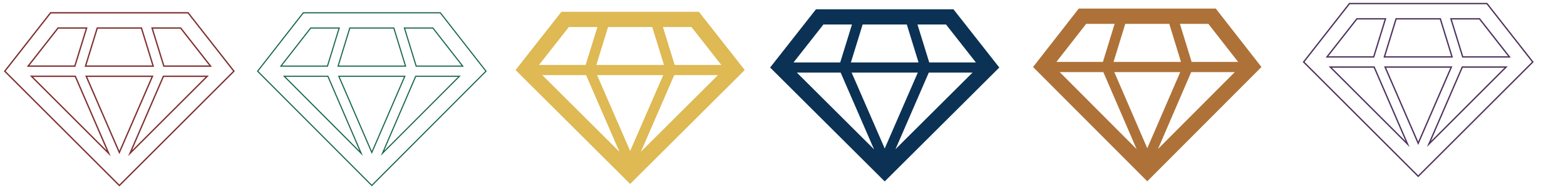
KPI Metric: BCMA

- BarCode Medication Administration = BCMA
- Scanning the medication barcode and patient armband barcode *prior* to administration

- Goal is ≥ 95% per Leapfrog

https://www.ucsf.edu/sites/default/files/legacy_files/headline-images/5-600-06252012.jpg

Who Interacts with BCMA?



Storage → Prescribing/ Transcribing → Preparation → Dispensing → Administration → Monitoring

pharmacy technician

nurse

pharmacist

Benefits of BCMA

- Medication administration is one of the most vulnerable steps in the medication use process
  - Source of harmful medication errors
  - Step least likely to catch an error without technology

- **BCMA helps to intercept medication errors during medication administration**

- Studies have shown that BCMA can reduce medication errors by
- **65-86%**
  - Must use it **consistently** and **correctly**

Cohen M\R. Medication Errors, 2nd ed. APhA. 2007.

Errors in the Medication Use Process




	prescribing	transcribing	dispensing	administering
Errors:	39%	12%	11%	39%
Harm:	28%	11%	28%	51%
Intercepted:	48%	33%	33%	2%

Leape L. JAMA. 1995;274:35-43

BCMA Workarounds and Drifting Behavior

- Not scanning (patient or medication)
- Scan one for several
- Use of a decoy
- Scan after administration
- Ignoring alerts
- Not taking workstation to bedside

IMPACT OF SHORTAGES

Van de Veen W. J Am Med Inform Assoc. 2018;25(4):385-392.

Who is Managing BCMA?

Storage

Prescribing/ Transcribing

Preparation

Dispensing

Administration

Monitoring

leaders

BCMA KPI Takeaways

- Medication administration is one of the most vulnerable steps in the medication use process AND difficult to catch errors at this step without technology.
- BCMA helps to intercept medication errors during medication administration.
- Awareness of workarounds and drifting behavior help to monitor data and share the “why” around the use of this technology.

BCMA Best Practices/Resources

- Leapfrog: 2024 BCMA Fact Sheet.pdf
- ASHP Barcode-Enabled Technology - ASHP: Statement on Bar-Code Enabled Medication Administration Technology
- ISMP Targeted Medication Safety Best Practices for Hospitals 2026-2027. ECRI. ISMP_TargetedMedicationSafetyBestPractices_Hospitals.pdf

Nurse Gwen Cox Learns from Her Patient Safety Mistake

MEDICATION ERROR EXAMPLE

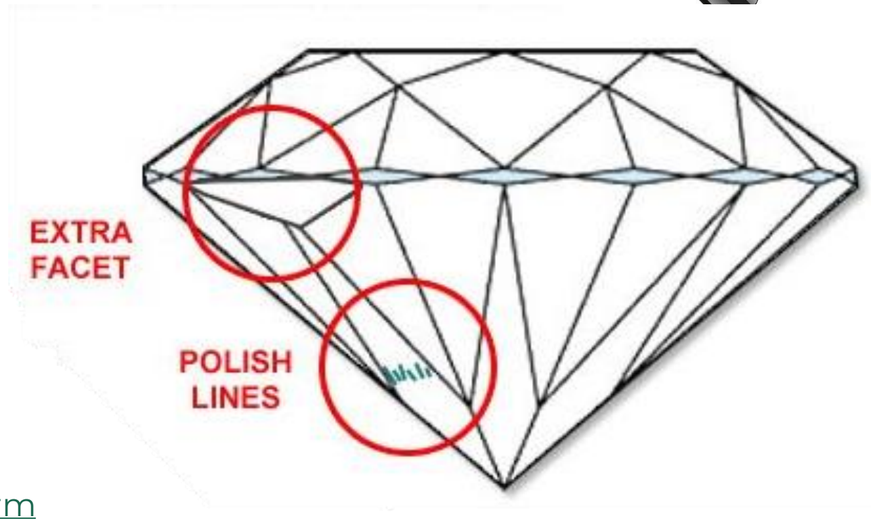
When significant event/error occurs → Root Cause Analysis (RCA)

- **RCA Definition: a systematic process to identify and address problems after they occur**
- Tool to analyze facts about events and form conclusions about why these events happened
- Team activity
- Data collection
- May use “The 5 Why’s”
- **Retrospective: After an event occurs**

https://galleryofdiamonds.com/2018/10/03/my-diamond-chipped/

Root Cause Analysis: Walk-though…Think of an Example

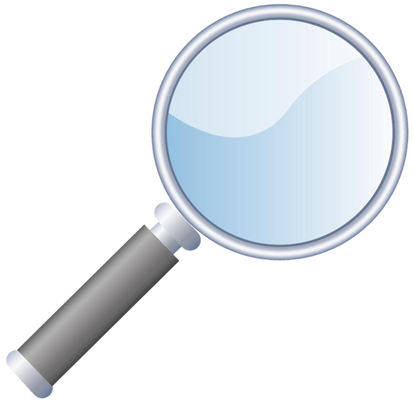
- **Gather an interprofessional team familiar with problem/event.**
- **What happened?**
- What normally happens?
- What do policies/procedures require?
- **Why did it happen? ← Ask Why 5 times**
  1. **Why was it not prevented by our processes?**
  2. **Why…..**
  3. **Why…..**
  4. **Why….**
  5. **Why….**
- **Action: What can we do to ensure it does not happen again?**



https://www.jewelry-secrets.com/Blog/hidden-diamond-flaws-and-inclusions/
https://www.ihi.org/library/tools/rca2-improving-root-cause-analyses-and-actions-prevent-harm

Failure Mode Effects Analysis (FMEA)

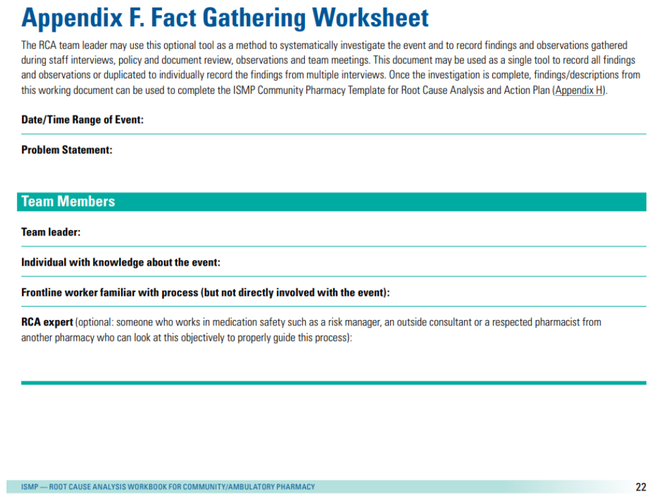
- **FMEA Definition:** as a structured way to identify and address potential problems, or failures and their resulting effects on the system or process **before** an adverse event occurs.
- Prospectively identifying and eliminating process failures for the purpose of preventing an undesirable event
- Used for new processes or existing workflows



Centers for Medicare & Medicaid Services (CMS). *Guidance for Performing Failure Mode and Effects Analysis with Performance Improvement Projects Available at:* Guidance for Performing Failure Mode and Effects Analysis with Performance Improvement Projects

Resources for Conducting FMEA and RCA

- ISMP Root Cause Analysis Workbook for Community /Ambulatory Pharmacy
- Institute for Healthcare Improvement (IHI) Patient Safety Essentials Toolkit
  - RCA2: Improving Root Cause Analyses and Actions to Prevent Harm | Institute for Healthcare Improvement
  - Patient Safety Essentials Toolkit | Institute for Healthcare Improvement



Appendix F. Fact Gathering Worksheet

The RCA team leader may use this optional tool as a method to systematically investigate the event and to record findings and observations gathered during staff interviews, policy and document review, observations and team meetings. This document may be used as a single tool to record all findings and observations or duplicated to individually record the findings from multiple interviews. Once the investigation is complete, findings/descriptions from this working document can be used to complete the ISMP Community Pharmacy Template for Root Cause Analysis and Action Plan (Appendix H).

Date/Time Range of Event:

Problem Statement:

Team Members

Team leader:

Individual with knowledge about the event:

Frontline worker familiar with process (but not directly involved with the event):

RCA expert (optional: someone who works in medication safety such as a risk manager, an outside consultant or a respected pharmacist from another pharmacy who can look at this objectively to properly guide this process):

ISMP — ROOT CAUSE ANALYSIS WORKBOOK FOR COMMUNITY/AMBULATORY PHARMACY 22

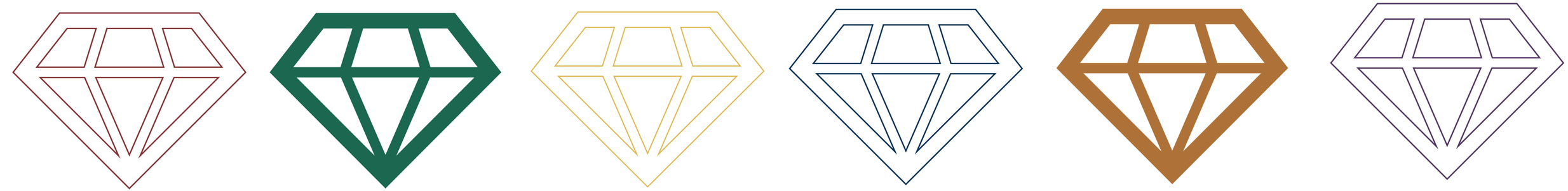
https://www.ismp.org/sites/default/files/attachments/2018-01/FINAL%20ISMP52-RCA-011414.pdf
https://online.ecri.org/hubfs/ISMP/Resources/ISMP_Community_Root_Analysis.pdf

SMART PUMP TECHNOLOGY

KPI Metric: Smart Pump Technology

- Drug Library Compliance
- **Drug Library Compliance Rate = (Drug Library Infusions ÷ Total Infusions) × 100**
- Integration
- Other monitoring:
  - Upper hard limit
  - Upper soft limits
  - Concentrations

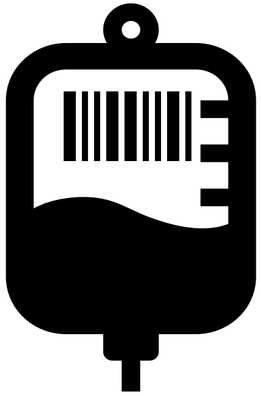
Who Interacts with Smart Pump Technology?



Storage | Prescribing/ Transcribing | Preparation | Dispensing | Administration | Monitoring

Benefits of Smart Pump Technology

- Eliminates need for math
- Can alert staff when infusion is done or near completion
- When library used: Limits set can help identify potential errors:
  - Programming errors
  - Dose errors
- Can default in hospital standards (e.g., concentration, infusion rate, duration)
- Report utilization metrics
- Report analytics



- Infusion-related medication errors expose patients to a higher risk of harm
- Helps prevent potentially harmful errors
  - Hospital-defined dosing limits and other clinical advisories in the drug library
  - Designed to prevent:
    - Miskeys/mistypes
    - Doses that could cause harm
    - Infusion parameters outside recommended drug information (i.e. over 1 hr instead of 30 min)

Smart Pump Technology: What is the Goal?

- > 95% drug library usage per ISMP
- Pump integration best practices for hospitals from ISMP state to monitor but do not state a goal
- Alerts
- **“The goal of this is to ensure the use of dose error-reduction technology to prevent infusion-related medication errors, which can cause harm to patients.”** *– ISMP Targeted Best Practices for Hospitals 2026-2027*

2020 ISMP Guidelines for Optimizing Safe Implementation and Use of Smart Infusion Pumps

ISMP Targeted Medication Safety Best Practices

Best Practice #8:

- Safely administer medication infusions
- **Administer all* medication and hydration infusions** via a programmable infusion pump utilizing dose error-reduction systems
- **Maintain a compliance rate of greater than 95% for the use of dose error-reduction systems**
  - Monthly basis
- Pump allows programming of the bolus (or loading dose) and continuous infusion rate with separate limits for each
- **Further, implement bidirectional smart infusion pump interoperability with the electronic health record and establish organizational expectations for the use of auto-programming and documentation for medication and hydration infusions**
- Allocate resources for ongoing maintenance, updating, and testing of the software, drug library
- Ensure drug library content is consistent with the drug information and nomenclature in the electronic health record

ISMP Targeted Medication Safety Best Practices for Hospitals 2026-2027. ECRI. ISMP_TargetedMedicationSafetyBestPractices_Hospitals.pdf

Smart Pump Workarounds and Drifting Behavior

- Infuse without a pump
- Programming outside of the library
- Programming a different drug
- Program without using interoperability
- Scan a decoy
- Scan an empty/completed bag

Who is Managing Smart Pump Technology?

Storage

Prescribing/ Transcribing

Preparation

Dispensing

Administration

Monitoring

leaders

Smart Pump KPI Takeaways

- Most of facilities responding to KPI survey track pump compliance
- More than half have goals (either > 95% or higher)
- Mismatch with library and EHR → pump drift
- Not using the pump, no safety measure
- Only as good as it is designed
- Future goals: integration with EHR

Smart Pump Best Practices/Resources

- ISMP Targeted Medication Safety Best Practices for Hospitals 2026-2027. ECRI. ISMP_TargetedMedicationSafetyBestPractices_Hospitals.pdf
- ISMP guideline: 2020 ISMP Guidelines for Optimizing Safe Implementation and Use of Smart Infusion Pumps
- ISMP Newsletter: Survey results: Smart pump data analytics, Pump metrics that should be monitored to improve safety. Volume 23, No. 14 July 12, 2018
- ASHP: Guidance Document for Improved Smart Pump Usage and Governance. ASHP MS SAG Smartpump Govenrnance 2021_final

MEDICATION HISTORY / MEDICATION RECONCILIATION

Medical Error NEAR MISS

MEDICATION ERROR EXAMPLE

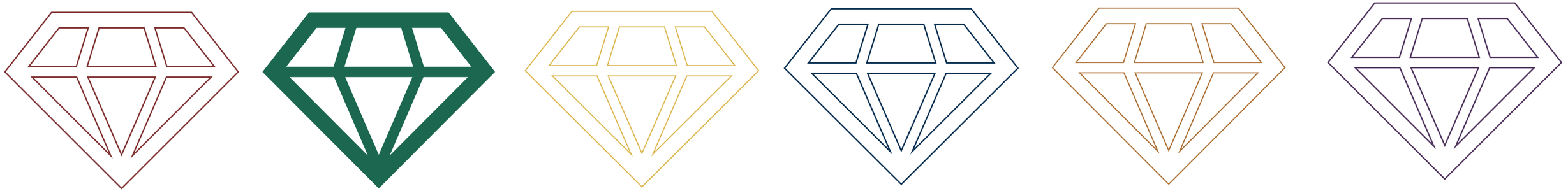
KPI Metric: Medication History / Medication Reconciliation

- Medication History
  - Complete list of all medications a patient is taking (i.e. Rx, OTC, herbals, supplements)
  - Obtained from multiple sources
  - Forms the basis for safe prescribing and transitions of care
- Medication Reconciliation
  - Process of comparing medication history with current orders
  - Identifies and resolves discrepancies

# of complete
Time to completion
Specific patient populations
Accuracy
Personnel completing

American Society of Health-System Pharmacists (ASHP). *ASHP guidelines on the pharmacist's role in medication reconciliation.* Am J Health-Syst Pharm. 2013.
The Joint Commission. *National Patient Safety Goal NPSG.03.06.01: Maintain and communicate accurate patient medication information.*

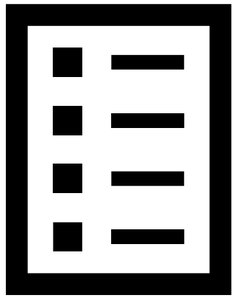
Who Interacts with Medication History / Medication Reconciliation?



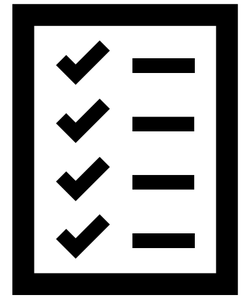
Storage | Prescribing/ Transcribing | Preparation | Dispensing | Administration | Monitoring

Benefits of Medication History / Medication Reconciliation

- **Medication History**
  - Forms the basis for safe prescribing and transitions of care



- **Medication Reconciliation**
  - Ensures the continuation of safe prescribing throughout transitions of care



Pharmacists in Transitions of Care

https://youtu.be/mnILmO7rPEM?si=mQ3KHtIj1Gwg0xCh

National Transitions of Care Coalition (NTOCC). “Partnering with Pharmacists in Transitions of Care.” Available at: https://www.ntocc.org

Who is Managing Medication History / Medication Reconciliation?

- Storage
- Prescribing/ Transcribing
- Preparation
- Dispensing
- Administration
- Monitoring

leaders

Medication History / Medication Reconciliation KPI SURVEY Key Takeaways

- Medication History
  - Percentage of patients with a complete and accurate admission medication history completed by pharmacy personnel
  - Inpatient medication history reviews as a percentage of total admissions by pharmacy staff
    - Proposed KPI > 80%
  - Timing of completion <24h

- Medication Reconciliation Accuracy
  - Discrepancies as a factor of total medications reconciled, tracked at the admission and discharge timepoints
    - Goal: < 10%
  - Consider tracking at all transition timepoints

- Best practice established by Leapfrog but expanded to include more timepoints in the medication reconciliation process

Medication History / Medication Reconciliation Best Practices/Resources

- ASHP Medication Use Benchmarking Toolkit: ASHP-SICP-Medication-Use-Benchmarking-Toolkit.pdf
- ASHP Statement on the Pharmacist's Role in Medication Reconciliation: Pharmacist's Role in Medication Reconciliation
- Pharmacy-Led Medication Reconciliation Is Best Practice
- Leapfrog standard for medication reconciliation accuracy: 2024 Medication Reconciliation Fact Sheet.pdf
- WHO: Standard Implementation Protocol for Medication Reconciliation
- AHRQ: Medications at Transitions and Clinical Handoffs (MATCH) Toolkit for Medication Reconciliation | Agency for Healthcare Research and Quality

ASHP = American Society of Health-System Pharmacists
AHRQ = Agency for Healthcare Research and Quality

AUTOMATED DISPENSING CABINET (ADC) OPTIMIZATION

KPI Metric: ADC Optimization [Overrides]

- Override = ADC functionality to obtain a medication in an urgent or emergent situation without pharmacist verification
- Override rate = # of overrides / total ADC vends

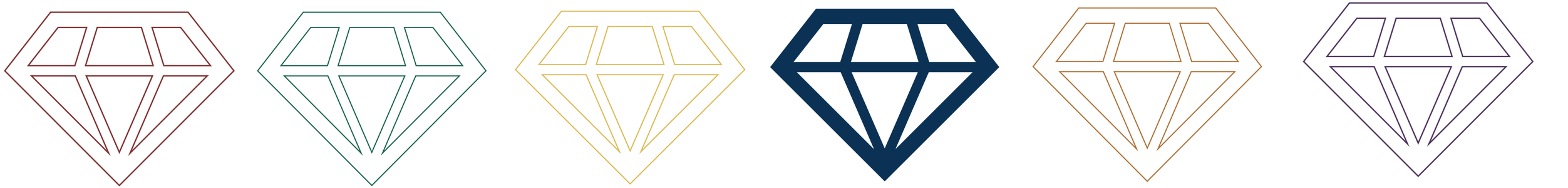
- Overrides should be reviewed to verify they can be matched to a prescriber order and documented as administered
- Overrides withOUT orders = # of overrides NOT associated with a verified medication order

Override rate by…
- Medication
- Medication class
- Nursing unit
- User
- Campus as a whole

…can identify system breakdowns

Practice Resource for Automated Dispensing Cabinet Overrides. ASHP Inpatient Care Practitioners. patient-safety-practice-resource-for-automated-dispensing-cabinet-overrides.ashx

Who Interacts with ADC Overrides



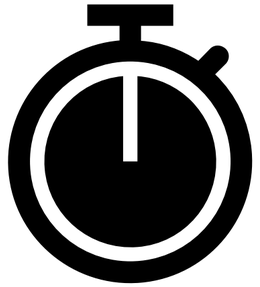
nurse

pharmacist

Benefits of ADC Override Optimization

- ADCs have many benefits
  - Reduces immediate delivery from pharmacy need
  - Reduced time for obtaining first doses
  - Return-to-stock efficiencies
  - Improved productivity
  - Controlled drug tracking and monitoring capabilities

- Benefit of an override is being able to have a medication available in an urgent or emergent situation.



ADC Overrides: What is the Goal?

- No established goal

- Hospitals should consider a baseline evaluation of their overall override rate, unit override rate, individual user override rate, and override rate by medication.
- Organizations should set goals focused on a continued downward trend of their facilities overall override percentage and identify barriers related to these overrides.

- We lose the benefits of overrides when we see this process being used inappropriately for convenience.
- This may lead to also not utilizing the MAR to review a verified medication order as the medication is already in hand.

https://www.ashp.org/-/media/assets/pharmacy-practice/resource-centers/patient-safety/patient-safety-practice-resource-for-automated-dispensing-cabinet-overrides.ashx

Who is Managing ADC Overrides?

- Storage
- Prescribing/ Transcribing
- Preparation
- Dispensing
- Administration
- Monitoring

leaders

ADC Override KPI Key Takeaways

- Medication Safety Focus
  - Overrides
  - Overrides withOUT orders

Review rates in your facility

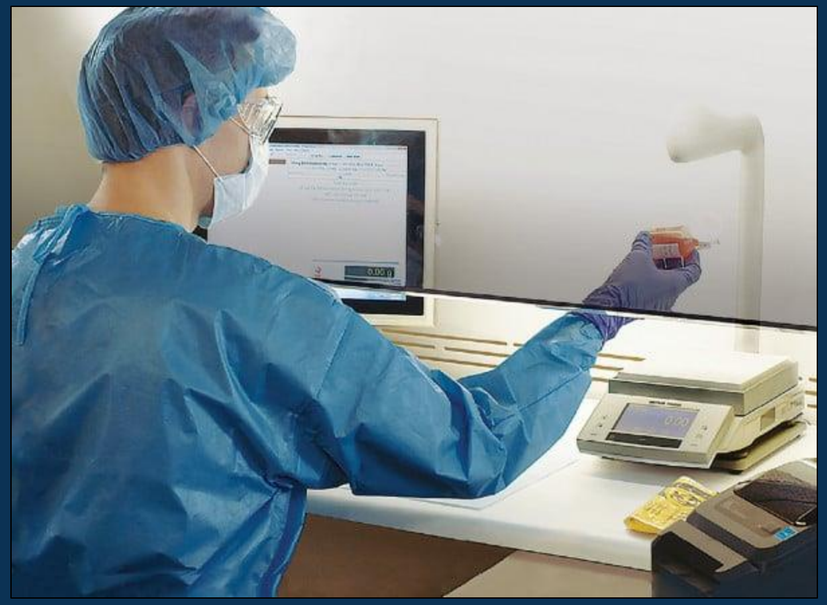
Discuss varying goals based on different care areas, as appropriate

ADC Override Optimization Best Practices/Resources

- ISMP Guidelines for the Safe Use of Automated Dispensing Cabinets
- ASHP Guidelines on the Safe Use of Automated Dispensing Devices
- Practical strategies for ensuring safety of medication overrides from automated dispensing cabinets - Journal of the American Pharmacists Association
- Practice Resource for Automated Dispensing Cabinet Overrides. ASHP Inpatient Care Practitioners.
- ISMP Targeted Medication Safety Best Practices for Hospitals 2026-2027. ECRI. ISMP_TargetedMedicationSafetyBestPractices_Hospitals.pdf

IV Room Workflow Management System (IVWMS)

IV ROOM WORKFLOW SYSTEMS



Name	Amt	Conc	Volume
penicillin G potassium			
penicillin G potassium 5 million units (Roerig/pfizer)	5,000,000 units	500,000unit/ 1mL	10 mL
0.9% sodium chloride			
sodium chloride 0.9% 100mL (Baxter Healthcare) #3	90 mL	1 mL/mL	90 mL

Assigned BUD	
03/14/2026 08:21	Based on Drug BUD Profile
	For more details mouse over on Descriptio
Dose BUD	Dose Initialization: Assigned at 03/05/20 07:20:00 Drug penicillin G potassium (204) ExpCalc: Storage Method = Refrigerated; -> Profile (26453): 216hrs and 0mins.
Dose BUD	Dose Preparation: Assigned at 03/05/20 08:21:39 Drug penicillin G potassium (204) ExpCalc: Storage Method = Refrigerated; -> Profile (26453): 216hrs and 0mins.

Product Preparation

- ✔ Enter Product Lot Number.
- ✔ Enter Mfg Exp Date
- ✔ Scan diluent for reconstitution.
- ✔ Acquire and take an image of 8.2 mL of diluent for reconstitution
- ✔ Inject Diluent into vial for reconstitution

Pharmacy Purchasing & Products Magazine accessed 4/12/2026

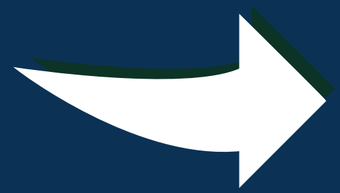
IV medication compounding workflow Utilizing an IVWMS

Dose selected from queue

Ingredients barcode scanned

Dose prepared

Dose verified

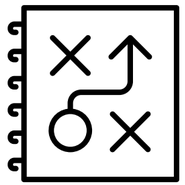


Dose delivered

KPI Metric: IV Room Workflow Systems

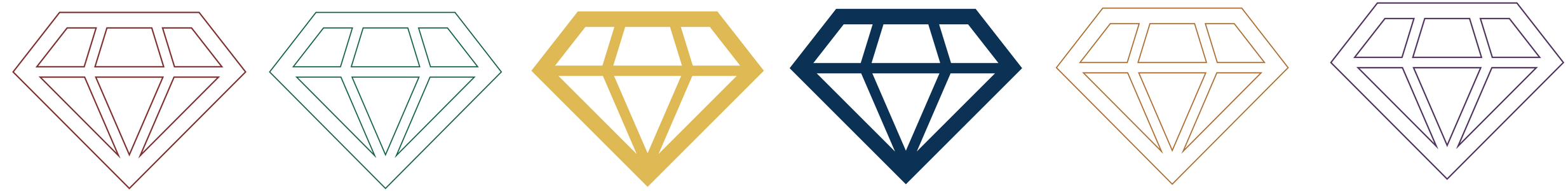
- To ensure proper use of IV workflow technologies, monitor bypass rates to determine barriers to completing barcode scanning.
  - The bypass rate can be calculated as total bypasses divided by total number doses compounded.

- Safety Gaps and IVWFS Best Practices
  - Compounds that need multiple vials or infusion bags for preparation
  - Alert overrides
  - Label swapping



2022 ISMP Guidelines for Sterile Compounding and the Safe Use of Sterile Compounding Technology

Who Interacts with IV Room Workflow Systems?



Benefits of IV Room Workflow Systems

- Detect and prevent many potentially serious medication errors that would not have been recognized with traditional verification methods.

- Examples:
  - One facility concluded that 23% of the errors detected by the system were undetectable by the pharmacy's previous verification practices.
  - Another study found nearly 9% of the intercepted errors could have resulted in patient harm.

IV Room Workflow Systems: What is the Goal?

- ISMP Best Practice 11
  - When compounding sterile preparations, perform an independent verification to ensure that the proper ingredients (medications and diluents) are added, including confirmation of the proper amount (volume) of each ingredient prior to its addition to the final container.

BEST PRACTICE 11:

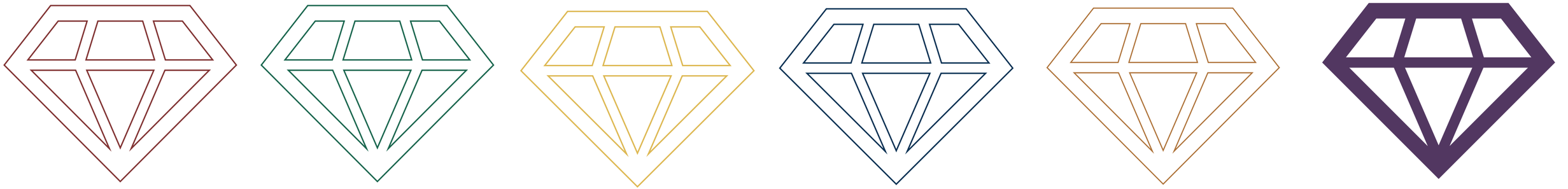
When compounding sterile preparations, utilize workflow management systems.

- Minimize sterile compounding outside a pharmacy environment.
- Follow safe pharmacy processes for use of technology.*
- Identify safety gaps specific to each technology and create an action plan to avoid errors.
- If you are not currently using workflow management systems, create an implementation plan.
- Before implementing compounding technology, perform a failure mode and effects analysis of the new system and workflow process.

* See ISMP Guidelines for Sterile Compounding and the Safe Use of Sterile Compounding Technology (2022)

ISMP best practices for hospitals 2026-2027

Who is Managing IV Room Workflow Systems?



Storage | Prescribing/ Transcribing | Preparation | Dispensing | Administration | Monitoring

IV Room Workflow Systems KPI Key Takeaways

- Organizations should invest in IV workflow technology with barcoding scanning and/or image capturing.
- To ensure proper use of IV workflow technologies, monitor bypass rates to determine barriers to completing barcode scanning.

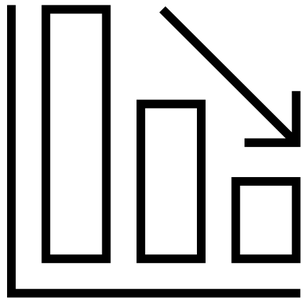
IVWFS Best Practices/Resources

- Intravenous Workflow Management Systems Implementation Checklist. ASHP Inpatient Care Practitioners Section Advisory Group. 2022.
- IV Workflow Management Systems webpage. ASHP Informatics Section Advisory Group.
- IV Workflow Management 2022. Klas Research.
- ISMP Guidelines for Sterile Compounding and the Safe Use of Sterile Compounding Technology 2022.
- The IVWMS/THRIV Bibliography of IV workflow articles/guidelines. THRIV coalition for IV accuracy.
- ISMP Targeted Medication Safety Best Practices for Hospitals 2026-2027. ECRI. ISMP_TargetedMedicationSafetyBestPractices_Hospitals.pdf.

CLINICAL DECISION SUPPORT / ALERTS (CDS)

KPI Metric: CDS [Alerts]

- Clinical decision support / alerts (CDS) provides users with knowledge and scenario specific information presented at appropriate times to enhance healthcare



Clinical Decision Support - ASHP

Who Interacts with CDS?

Storage | Prescribing/ Transcribing | Preparation | Dispensing | Administration | Monitoring

provider
nurse
pharmacist

pharmacy technician

nurse

CDS: What is the Goal?

- There is no set metric
- There is no set goal

- What should we look at…
- What should we focus on…

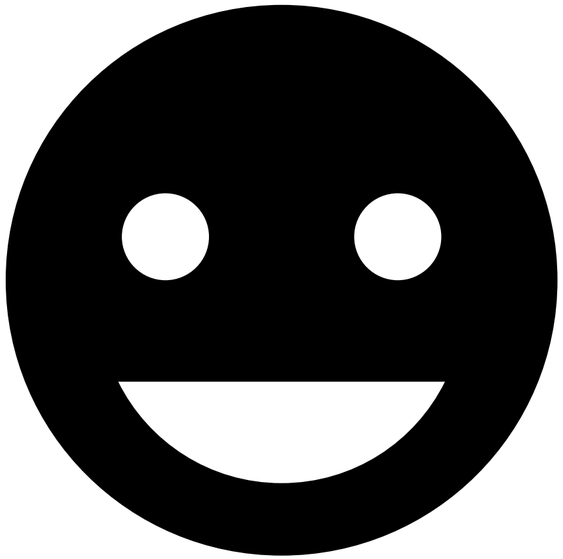
Drug–drug interactions that should be non-interruptive in order to reduce alert fatigue in electronic health records

Shobha Phansalkar,[1–3] Heleen van der Sijs,[4] Alisha D Tucker,[1] Amrita A Desai,[1] Douglas S Bell,[5,6] Jonathan M Teich,[7] Blackford Middleton,[1–3] David W Bates[1–3]

- Applying successful strategies
  - Alert logs for interruptive alerts of all severities within a 6 month period
  - Interactions with override rates greater than 90%
  - Final list of low-priority drug-drug interaction that the panel assessed as safe to suppress from interruptive alerting in electronic health record

Phansalkar *et al.*

Benefits of CDS



Alert Fatigue

- Misconception that more is better
  - "Show it all ≠ Get it all"
- Information overload and the presentation of low-quality alerts have led to alert desensitization
- Conditioned behavior to ignore the alerts (pop-up windows)

- **Alerts → ~~Attention~~ → ~~Decision~~**

Who is Managing CDS?

- Storage
- Prescribing/ Transcribing
- Preparation
- Dispensing
- Administration
- Monitoring

leaders

CDS KPI Key Takeaways

Your Approach to CDS:

Reactive

- End User Reports
- Share this information with your teams – get their feedback

Proactive

- Start conversations of what may work for your organization
- Data Driven
  - # of alerts overridden
  - # of alerts acted on

Review internal alert data to identify the most common medication warnings and their rates of override

Discuss the clinical impact of these warnings with a panel of physicians, pharmacists, and medication safety officers

Customize the problematic alerts to improve overall medication warnings' quality and relevance

CDS Best Practices/Resources

- ASHP - Clinical Decision Support
- AHRQ - Clinical Decision Support
- Patient Safety Network - Alert Fatigue
- ONC - Office of the National Coordinator for Health Information Technology - Clinical Decision Support
- Guidance for the 2026 Leapfrog CPOE Evaluation Tool (Alerts)

MEDICATION SAFETY KPI SUMMARIES

Facets of Error Reduction

KPIs

- ❖Medication Safety Event Reporting
- ❖Good Catches/Near Misses
- ❖CPOE
- ❖BCMA
- ❖Smart Pump Technology
- ❖Medication History / Medication Reconciliation
- ❖ADC Optimization
- ❖IV Room Workflow
- ❖Clinical Decision Alerts

- Metrics
- Who interacts
- Benefits
- Goals
- Who manages
- Key Takeaways
- Best Practices

Key Performance Indicators (KPIs) and Scorecards

Key Performance Indicators	Goal	Aug	Sep	Oct	Nov	Dec	YTD/Average
% Compliance with BCMA	> 95%	96.7%	95.1%	97.3%	96.4%		94.91%
% Compliance with Pump Library Use	> 95%	91.2%	92.2%	91.6%	91.9%		90.51%
% Compliance with ADC Override	< 2%	1.9%	2.2%	3.2%	3.4%		2.97%

- Pick a few key metrics to tackle in your organization
- Color coded to easily identify if the goal was met
- Can be presented to leaders monthly / quarterly
- Can show results by campus, region, whole company, etc.
- Be able to discuss how this goal can improve safe patient care

Diamond-Cut Medication Safety Summary

- **Polish the Basics:** Review common medication safety concepts that help cut down errors and strengthen prevention strategies.
- **Find the Flaw:** Recall and apply root cause analysis to a medication event to uncover the hidden facets contributing to error.
- **Share the Sparkle:** Discuss real-world patient safety stories and brilliant strategies used to prevent medication errors and improve patient safety.
- **Compare the Cuts:** Differentiate between systems used to evaluate medication events to determine which approaches provide the clearest clarity for improvement.

Shine Bright Like a Diamond!

Questions?

FSHP 60th Annual Meeting

Sparkle Shine Celebrate!

Facets of Medication Safety: Reflecting on Lessons and Shaping a Safer Future

Heather Stanley
Heather.Stanley@adventhealth.com

Robyn Yarsley
Robyn_Yarsley@pba.edu

Thank you!