Standardize and Safeguard Medication Administration

How To Use This Guide

This APSS provides evidence-based resources and recommendations for standardizing and safeguarding medication administration for executives, leaders, clinicians, and performance improvement specialists. This document is intended to be used as a guide for healthcare organizations to examine their own workflows, identify practice gaps, and implement improvements. In it, you will find:

Best Practice Summary: A high level summary of evidence-based, clinical best practices.

Executive Summary: Executives should understand the breadth of the problem and its clinical and financial implications.

Leadership Checklist: This section is for senior leaders to understand common patient safety problems and their implications related to standardizing and safeguarding medication administration. Most preventable medical harm occurs due to system defects rather than individual mistakes. Leaders can use this checklist to assess whether best practices are being followed and whether action is needed in their organization around standardizing and safeguarding medication administration.

Clinical Workflow: This section includes more specific information around standardizing and safeguarding medication administration across the continuum of care. Leaders should include the people doing the work in improving the work. This section outlines what should be happening on the frontline. Clinicians can use this section to inform leaders whether there are gaps and variations in current processes. This is presented as an infographic that can be used for display in a clinical area.

Education for Patients and Family Members: This section outlines what frontline healthcare professionals should be teaching patients and family members about engaging in their care. Clinicians can inform leaders whether there are gaps and variations in current educational processes.

Performance Improvement Plan: If it has been determined that there are gaps in current processes, this section can be used by organizational teams to guide them through an improvement project.

What We Know about Standardizing and Safeguarding Medication Administration: This section provides additional detailed information about standardizing and safeguarding medication administration.

Resources: This section includes helpful links to free resources from other groups working to improve patient safety.

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Endnotes: This section includes the conflict of interest statement, workgroup member list, and references.

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Best Practice Summary

Always:

☐ Confirm medication details using tools like the rights of medication administration or "read back" strategies.

☐ Use tools like Tall Man Lettering and separate out Look-Alike-Sound-Alike medications.

☐ Use standard order sets and clinical decision support tools whenever possible.

☐ Ensure emergency medications are accessible at all times.

Routine Care:

☐ Follow the organizational protocol for independent double checks and bar code scanning.

☐ Report near misses, errors, and areas for improvement.

☐ Evaluate the patient's health literacy level and communicate in ways that they can understand.

☐ Involve the patient and family members in safeguarding medication administration.

Discharge Care:

☐ Educate patients about proper medication home storage and administration.

☐ Ensure patients and family members understand the medications they are going home with, their appropriate use and administration, and when and how to call for help if needed.

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Executive Summary

The Problem

Medication errors have the potential to lead to adverse effects due to errors that are likely to continue without robust reporting and intervention processes and could eventually lead to significant harm (Elliott et al., 2020; Eldn & Ismail, 2015; Kang et al., 2017; Wolf & Hughes, 2008). It has been estimated that medication administration errors in hospitals and long term care facilities may occur in 8-25% of cases, with an even higher rate of 48-53% in cases involving intravenous medications (Keers et al., 2013). However, patients and family members are also involved in the medication administration, and it has been estimated that errors in the home occur in 2-33% of cases (Parand et al., 2016).

The Cost

Avoidable adverse drug events are estimated to cost nearly £99 million annually and require nearly 200,000 bed days (Elliott et al., 2020). Furthermore, medication errors are strongly underreported, therefore, current figures are likely to underestimate medication error rates (Morrison et al., 2018; Walsh et al., 2008).

The Solution

Improving safety of medication administration for better long-term patient outcomes and significant cost savings for healthcare organizations. This document provides a blueprint that outlines the actionable steps organizations should take to successfully improve medication administration and summarizes the available evidence-based practice protocols. This document is revised annually and is always available free of charge on our website.

Leadership Checklist

Use this checklist as a guide to determine whether current evidence-based guidelines are being followed in your organization:

Remain sensitive to reports and correct gaps as they arise.

☐ Measure and report medication error near misses and patient harm due to medication errors. Routinely reassess outcomes.

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☐ Ensure the metrics collected tell the full story of the organization's current state. For example, set up systems to collect medication administration metrics from various places (e.g., home administration, patient portal reports, frontline reports, etc).

☐ Expect that when the organization starts tracking safety events, there will be an initial increase in reported events before organizational improvement work begins to reduce error rates over time. Ensure that the frontline staff and leaders understand this so they don't become demoralized.

☐ Make sure all who can report know how to do so and give praise for all reports from both clinicians and patients.

☐ Use medication pass audits or medication safety rounds to provide 'just in time' education and understand processes that could be improved (AHRQ, 2021).

Set those administering medications up for success.

☐ Manage high alert medications by using visual indicators, separating out similar medications, etc.

☐ Ensure the list of look alike sound alike drugs are reviewed annually.

☐ Identify best areas to reduce distractions and interruptions and visually flag this area as a 'no distraction' zone.

☐ Provide Intranet-based up-to-date drug information.

☐ Improve nursing efficiency by using ether medication cards with unit doses or a locked wall-mounted cupboard in each patient room (Bennett et al., 2006).

☐ Implement barcode scanning technology.

☐ Standardize abbreviations and numerical conventions.

☐ Consider the use of pharmacy-prepared emergency kits to help standardize labeling and instructions for use during emergencies (AHRQ, 2021).

☐ Integrate smart pump-EHR interoperability.

☐ Use technology that supports the clinician in assessing how the patient is responding to the medication (e.g., patient controlled analgesia pumps can be linked with an End Tidal CO_2 monitor and can halt the administration of medications if the retention of CO_2 is detected).

☐ Use tools to measure distraction and cognitive overload in the administration workflow (AHRQ, 2021).

☐ Incorporate antidote information and training into ongoing education (IHI, 2021).

☐ Minimize the number of medications available on the unit (IHI, 2021).

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Empower those on the frontline and communicate expectations clearly.

☐ Ensure that medication administration protocols are embedded and easily accessible in clinical workflows, whether electronic or paper.

☐ Ensure adequate training and documentation of medication administration competencies and skills for all administering medications, including patients.

☐ Establish a universal checklist for all medication administration.

☐ Clearly define which medications are high risk and hazardous medications and which require an independent double check (Grant, 2015).

☐ Ensure those on the frontline understand the data that is being auto-populated into the EHR by devices and the data that requires manual entry.

Sustain efforts.

☐ Analyze and report the data routinely in debriefs and use the data to determine best next steps.

☐ Hold staff accountable for providing the standard of care and reward success.

☐ Ensure that leaders have a simple process to oversee medication administration improvement work while also considering how it aligns with other initiatives across the organization.

Clinical Workflow

1. ALWAYS

- Avoid using leading or trailing decimals (e.g., 0.2mg or 2.0 mg).

- Authenticate all orders. Double check the order from the ordering provider. Use "Triple Verification" and/or "Read Back" strategies.

- Confirm that the patient should actually receive the medication (e.g., antihypertensives should be administered after the blood pressure is confirmed).

- Avoid interrupting those administering medications (Gilmartin et al., 2017).

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2. IN THE HEALTHCARE ORGANIZATION

- When using barcoding technology, verify the scanned product matches the armband.
- Ensure all supplies and documents are available during administration.
- Adhere to the Rights of Medication Administration. See ""Detailed Rights of Medication Administration"" for questions to ask for ensuring safe administration aligned with each Right:
  - **Right patient:** Use organizationally-defined patient identifiers.
  - **Right drug:** Confirm the prescription with the medication.
  - **Right time/frequency:** Confirm the time and frequency of medication administration.
  - **Right dose:** Confirm the dose.
  - **Right route:** Confirm the route.
  - **Right preparation:** Prepare the medication correctly, taking into account the form of presentation of the medication, the solvent appropriate quantity, and infection prevention precautions.
  - **Right knowledge:** Confirm the drug to be administered, the action, its side effects, drug interactions, incompatibilities and pharmacokinetics.
  - **Right patient education:** Inform the patient on the medication to be administered, explain possible side effects, and clarify any doubts presented.
  - **Right documentation:** After administering the medication, document correctly (right patient, right drug, right dose, right time, right route, wasted medication).
- Do not pull medications to administer to multiple patients at once. Do not remove multidose vials from the automated dispensing cabinet or medication room. For many medications, such as injections or IV bags, administer and document administration separately and without overlapping steps.
- Administer medication infusions via infusion pumps with dose error-reduction technology, if available.
- When intravenous drugs are given consecutively, flush the line between each administration.

3. DISCHARGE

- Modify instructions about how to safely administer medications based on the individual's health literacy level (AHRQ, 2019).
- Confirm that the patient has the appropriate supplies for administration at home.
- Teach patients about the rights of medication administration and write down what they should be checking with each administration (IHI, 2021).
- Have the patient practice using equipment or the proper administration technique.
- Provide multi compartment medication devices for patients taking many medications.

Education For Patients And Family Members

Convey information to patients and family members in ways that they can understand. At each interaction, it is important that those on the frontline explain:

- How to prepare questions for the next provider (e.g., from discharge to primary care)
- The purpose, risks, benefits, and directions for administration/use of any new medication or change in medication
- The purpose of shared decision making
- How and where the patient will obtain the medication
- The supplies and instructions needed for safe home administration
- When the first dose of medication should be taken and the time of day each medication should be taken, if administered by the patient
- What it means when medications state "as needed"
- When to stop taking the medication
- The process for obtaining refills
- Potential interactions with other medications or supplements the patient is taking.
- The importance of maintaining a list of all medications currently taken, including drug names, doses, frequencies, and any drug allergies.
- How family members can contribute to medication safety

- Realistic expectations for the patient
- Any decision aids provided to the patient
- What to expect during the follow up visit
- Where to find the patient portal, its purpose, and how to use it
- How to prepare questions and take notes while explaining the tools available to assist (e.g., AHRQ notecard or Google Question Generator)
- What signs and symptoms may indicate an issue and exactly who to call

Make sure the patient understands the information relevant to them. See Health Literacy AEBP.

Performance Improvement Plan

Follow this checklist to improve performance and move your organization toward eliminating the harm and death associated with unplanned extubation:

☐ **Gather the right project team.** Be sure to involve the right people on the team. You'll want two teams: an oversight team that is broad in scope, has 10-15 members, and includes the executive sponsor to validate outcomes, remove barriers, and facilitate spread. The actual project team consists of 5-7 representatives who are most impacted by the process. Whether a discipline should be on the advisory team or the project team depends upon the needs of the organization. Patients and family members should be involved in all improvement projects, as there are many ways they can contribute to safer care.

Complete this Lean Improvement Activity:

Conduct a SIPOC analysis to understand the current state and scope of the problem. A SIPOC is a lean improvement tool that helps leaders to carefully consider everyone who may be touched by a process, and therefore, should have input on future process design.

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RECOMMENDED MEDICATION ADMINISTRATION IMPROVEMENT TEAM	
• Patients and family members with diverse backgrounds and healthcare experiences	• Information technologists
	• Clinical educators
• Admitting and registration staff	• Public health professionals
• Quality and safety specialists	• Mental health and addiction professionals
• Physicians	• Hospital- and community-based pharmacists
• Nurses	
• Respiratory therapists	• Emergency medical service representatives
• Rehabilitation professionals (e.g., physical therapy)	• Long term care representatives
• Procurement officers	• Skills nursing facility representatives
• Data analysts	• Community health education representatives
• Electronic Health Record specialists	• Telehealth representatives

Table 1: Understanding the necessary disciplines for a medication administration improvement team

☐ **Understand what is currently happening and why.** Reviewing objective data and trends is a good place to start to understand the current state, and teams should spend a good amount of time analyzing data (and validating the sources), but the most important action here is to go to the point of care and observe. Even if team members work in the area daily, examining existing processes from every angle is generally an eye-opening experience. The team should ask questions of the frontline during the observations that allow them to understand each step in the process and identify the people, supplies, or other resources needed to improve patient outcomes.

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MEDICATION ADMINISTRATION PROCESSES TO CONSIDER ASSESSING

- Product labeling
- Areas in which nurses typically prepare and administer medications
- Bar code scanning
- Smart pump usage
- Availability of multiple medication strengths
- Presence of medications that have been discontinued in organizational processes/protocols
- Automated dispensing cabinet usage and overrides
- Preparation for administration, interruption during preparation, and sources of interruption
- Where documentation is occurring in the EHR
- Challenges with technology (e.g., placement of barcode scanners)
- Nomenclature in the drug library and consistency with drug information in the EHR regarding the name, dosing units, etc.
- Prompts in electronic order entry systems (e.g., allergy and drug interaction warnings)
- Adherence to ISMP's Guidelines for Optimizing Safe Implementation and Use of Smart Infusion Pumps
- Use of independent double checks
- Staff verification of order (e.g., which two documents are used by staff to verify the correct medication at the time of obtaining the medication)
- Steps to obtain the medication, whether from an automated dispensing unit, patient bin, stock medications, from refrigerator, IV fluids from supply close, from pharmacy, etc.
- The interaction with patients at the time of administration and the conversation around purpose, side effects, and special precautions
- How those on the frontline elevate discrepancies in the order to the provider
- How, when and why those on the frontline report a near miss, error, or adverse event

Table 2: Consider assessing these processes to understand where the barriers contributing to safe medication administration may be in your organization. Ensure representation from multiple facilities across the system.

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Create a process map once the workflows are well understood that illustrates each step and the best practice gaps the team has identified (IHI, 2015). Brainstorm with the advisory team to understand why the gaps exist, using whichever root cause analysis tool your organization is accustomed to (IHI, 2019). Review the map with

☐ Prioritize the gaps to be addressed and develop an action plan. Consider the cost effectiveness, time, potential outcomes, and realistic possibilities of each gap identified. Determine which are priorities of focus for the organization. Be sure that the advisory team supports moving forward with the project plan so they can continue to remove barriers. Design an experiment to be trialed in one small area for a short period of time and create an action plan for implementation.

TYPICAL GAPS IDENTIFIED IN MEDICATION ADMINISTRATION

- Similar medication packaging
- Similar name of the medication
- Little familiarity with uncommon medications
- Memory lapses (Buckley et al., 2007)
- Scheduled dose not documented as administered
- Medications administered without an order
- Missed doses and undocumented doses
- Administering incompatible drugs through the same line
- Excessive workload and long shifts
- Distractions and interruptions
- Bypassing drug library
- Overriding alerts
- Availability of certain medications at the bedside (e.g., potassium chloride) that increase risk for error

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- Lack of clarity around the administration of drugs given by bolus dose using a syringe pump
- Nurses spend an estimated .38 full time equivalent annually searching for missing medications and gathering supplies (Bennett et al., 2006)
- Variability of weights used for calculation
- Low health literacy
- Poor patient-provider communication
- Lack of universal precautions in the outpatient setting
- Excessive trust in the clinician being double checked in an independent double check
- Those administering medications do not feel empowered to question an order
- Unreadable barcodes and lack of standards for when and how to manually assess the patient without barcode scanning
- Patients don't understand what medications they were given
- System workarounds (e.g., "barcode in pocket" scanning)
- Barcode scanning errors, scanner handheld issues, printer issues, etc
- Inconsistency in drug nomenclature between EHR and drug library
- Smart Pumps and EHR are not aligned
- Gaps in Smart Pump use
- It is difficult to keep dose error reduction software up to date with current hospital updates and practice
- Carrying multiple medications for multiple patients and/or pre-scanning medications
- Lack of clear definition of independent double checks
- Children under 5 years old are often at risk for medication errors, due to their lack of identifying information, like Driver's licenses, credit cards, etc. during patient verification

Table 3: By identifying the gaps in medication administration processes, organizations can tailor their project improvement efforts more effectively

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The action plan should include the following:

- Assess the ability of the culture to change and adopt appropriate strategies
- Revise policies and procedures
- Redesign forms and electronic record pages
- Clarify patient and family education sources and content
- Create a plan for changing documentation forms and systems
- Develop the communication plan
- Design the education plan
- Clarify how and when people will be held accountable

☐ Evaluate outcomes, celebrate wins, and adjust the plan when necessary. Measure both process and outcome metrics. Outcome metrics include the rates outlined in the leadership checklist. Process metrics will depend upon the workflow you are trying to improve and are generally expressed in terms of compliance with workflow changes. Compare your outcomes against other related metrics your organization is tracking.

Routinely review all metrics and trends with both the advisory and project teams and discuss what is going well and what is not. Identify barriers to completion of action plans, and adjust the plan if necessary. Once you have the desired outcomes in the trial area, consider spreading to other areas (IHI, 2006).

It is important to be nimble and move quickly to keep team momentum going, and so that people can see the results of their labor. At the same time, don't move so quickly that you don't consider the larger, organizational ramifications of a change in your plan. Be sure to have a good understanding of the other, similar improvement projects that are taking place so that your efforts are not duplicated or inefficient.

Read this paper from the Institute for Healthcare Improvement
to understand how small local steps

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MEDICATION ADMINISTRATION METRICS TO CONSIDER ASSESSING

- Drug library compliance rates (Target <95%) with data from barcode scanning and Smart Infusion Pumps

- Number of times barcode scanning is overridden, the patient armband is not scanned, the drug is not scanned

- Barcode scanning compliance

- Automated dispensing cabinets overrides/compliance

- Utilization of the drug library (medication pump library)

- Number of multi- dose vials discarded due to problem with labeling, sterility, doubted contents, poor storage, puncture, or expiration

- Number of independent double checks performed, especially for high-alert medications

Table 4: Consider evaluating related metrics to better understand medication administration processes and outcomes

What We Know About Standardize and Safeguard Medication Administration

Medication errors, including wrong drug, dose, time, route of administration, or patient, cause serious patient harm and deaths every year. Medication administration errors can be defined as any discrepancy between the medication the patient actually received and what was intended to be given by the prescriber in the original order (McLeod et al., 2015). Globally, medication administration errors occur in 8% to 16% of doses in hospitals and this figure is even higher in the home setting (McLeod et al., 2015; Parand et al., 2016).

Because medication administration frequently occurs in the home setting by patients and family members, new technologies, such as mobile apps, are being introduced to aid in safe medication administration (Tabi et al., 2019).

The mobile app platform should:

- Have wireless capability

- Work offline

- Synchronize the downtime data back into the EHR when the system goes back online

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- Include basic documentation functionalities, such as time-stamped text logs, that work with existing electronic systems
- Be capable of syncing medicine shortages with compatible alternative medicines
- Provide relevant medicine information (weight, drug, drug concentration, ROA, and indication)
- Be manufacturer and EHR agnostic
- Be a knowledge-based mobile tool for checking medicines and indications
- Provide updated information and alerts about medicine shortages
- Have free access for all users

Resources

For Medication Administration Improvement:

- ISMP Guidelines for Timely Administration of Scheduled Medications (Acute)
- Impact of Interruptions, Distractions, and Cognitive Load on Procedure Failures and Medication Administration Errors
- Mobile Apps for Medication Management: Review and Analysis
- Improve Core Processes for Administering Medications
- Quality improvements in decreasing medication administration errors made by nursing staff in an academic medical center hospital: a trend analysis during the journey to Joint Commission International accreditation and in the post-accreditation era.
- IHI: The Five Rights of Medication Administration
- ISMP: Timely Administration of Scheduled Medications
- National Institute for Health Care and Excellence: Medication Administration

For General Improvement:

- CMS: Hospital Improvement Innovation Networks
- IHI: A Framework for the Spread of Innovation
- The Joint Commission: Leaders Facilitating Change Workshop
- IHI: Quality Improvement Essentials Toolkit
- SIPOC Example and Template for Download
- SIPOC Description and Example

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Endnotes

Conflicts of Interest Disclosure

The Patient Safety Movement Foundation partners with as many stakeholders as possible to focus on how to address patient safety challenges. The recommendations in the APSS are developed by workgroups that may include patient safety experts, healthcare technology professionals, hospital leaders, patient advocates, and medical technology industry volunteers. Workgroup members are required to disclose any potential conflicts of interest.

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