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Institute for Safe Medication Practices (ISMP)

Guidance on the Interdisciplinary Safe Use of Automated Dispensing Cabinets

Institute for Safe Medication Practices

a nonprofit organization

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About ISMP

ISMP, a 501c3 public charity based in suburban Philadelphia, is devoted entirely to medication error prevention and safe medication use. The organization is known as the premier resource for impartial, timely, and accurate medication safety information. A continuously expanding core of knowledge in medication safety, provided through analysis of errors reported to the ISMP Medication Errors Reporting Program and onsite consultations with healthcare facilities, fuels the Institute's highly effective initiatives to improve the medication-use process. More information on ISMP's mission and safety tools for healthcare practitioners can be found at www.ismp.org.

Background on ADC Safety

Automated dispensing cabinets (ADCs) are computerized drug storage devices or cabinets that allow medications to be stored and dispensed near the point of care, while controlling and tracking drug distribution. They also are called unit-based cabinets (UBCs), automated dispensing devices (ADDs), automated distribution cabinets or automated dispensing machines (ADMs).

Hospital pharmacies have traditionally provided medications for patients by filling patient-specific cassettes of unit-dose medications that were then delivered to the nursing unit and stored in medication cabinets or carts. ADCs, which are designed to replace non-automated floor stock storage, were introduced in hospitals in the 1980s and have facilitated the transition to alternative delivery models and more decentralized medication distribution systems.

Adoption of this technology in healthcare started slowly--only about 50% of hospitals were using ADCs in 1999, but by 2007 more than 80% had implemented them[1].They are now used in the majority of hospitals, and have become more prevalent in the outpatient setting as well. Many healthcare organizations have moved beyond storing only narcotics and floor stock in ADCs and are using ADCs as their primary method of drug delivery; this change in the pharmacy distribution model has had broad implications for pharmacist, pharmacy technician, and nurse workflow and the safety of associated practice.

ADCs offer a variety of benefits to the organization and the user. They can provide nurses with near total access of medications needed in patient care areas, which has been reported to decrease the delivery turn around time from

the pharmacy to the patient care unit of new medications ordered. ADCs also can ensure greater control of the charge capture of medications, support security measures, and potentially influence medication error rate. Expanded ADC software can provide additional clinician support aimed at enhancing patient safety, including machine-readable bar codes for restocking and selection of medications; integration into automated refilling systems; drug safety alerts and decision support when selecting medications from the cabinets; and the capacity to link with telepharmacy operations for after-hour drug verification and distribution[2].

One of the most important ADC safety enhancements that has evolved over the last decade is profiled systems, which support The Joint Commission medication management standard for pharmacist review of all new orders[3]. Profiled ADCs allows the pharmacist to review and approve medications before they are available for selection and administration by the nurse, respiratory therapist, or physician

But despite these additional features, ADCs cannot improve patient safety unless cabinet design and use is carefully planned and implemented to eliminate opportunities for wrong drug selection and dosing errors. Despite the growing popularity of ADCs, there is little formalized, truly interdisciplinary guidance available to direct healthcare facilities in the safe use of this automation technology. The safe use of ADCs is dependent on cooperation between the healthcare professions. Nursing holds as large a stake as pharmacy in the process, since they perform the majority of transactions related to ADCs.

In 1998, the American Society of Health System Pharmacists published guidelines on the safe use of automated medication storage and distribution devices, with recommendations primarily for pharmacy practitioners[4]. Since this technology has continued to advance and there exists a need for interdisciplinary collaboration in the use of ADCs, the Institute for Safe Medication Practices (ISMP) convened a national forum of stakeholders in spring 2007 to help fill the void. Forum participants developed a set of updated recommendations for promoting safe practice when establishing this new technology.

Stakeholder Collaboration

In 2005, ISMP began discussions with the primary vendors of ADCs to determine what resources were available to direct practitioners in the safe use of these devices. The following year, the Institute invited ADC vendors to attend an informal meeting to discuss safety issues. Representatives from five vendors participated and agreed that updated, interdisciplinary guidance for safe ADC processes was needed.

During this first meeting, the vendors helped formulate a plan to bring together pharmacy and nursing practitioners, familiar with the use of ADCs. The goal of a national meeting would be to discuss current practices and prepare a safe practice recommendations document that would be made available to U.S. hospitals and health systems. They envisioned that after the document was completed and publicly reviewed, a self-assessment tool would be created to help disseminate the information and provide a baseline of current ADC practices in U.S. hospitals. Participants helped develop a list of core processes that significantly influence safer use of ADCs.

In March of 2007, ISMP invited an interdisciplinary group of practitioners to a national ADC forum, where they were asked to share their experiences and opinions and help develop ADC safe-use guidelines that focused on a collaborative approach to safe medication use. Forum participants included pharmacists and nurses with extensive operational knowledge of ADC systems, who represented large regional groups, academic medical centers, and freestanding, specialty, and critical access hospitals. Vendor representatives and ISMP staff also attended--Appendix A contains a list of all participants.

Project Guidance

The focus of the national ADC forum was to create interdisciplinary guidelines for the safe use of ADCs. During the forum, attendees reviewed a list of core elements believed to significantly influence the safe use of ADCs and developed process recommendations for each element.

Safe processes were developed by facilitated group consensus, with final analysis and oversight of the recommendations by ISMP staff. Each process was defined by one or more key characteristics of a safe medication system, as defined by ISMP's conceptual model, the *Key Elements of the Medication Use System^{TM}*.[5]

Some additional processes were discussed internally by ISMP staff following the meeting. These recommendations are based on the Institute's knowledge and understanding of the common causes of medication errors, from the analysis of numerous error reports received both from practitioners in the U.S. and internationally, and also through direct observations made by the ISMP consulting teams during onsite hospital risk assessments. These were combined with the core processes developed by the forum and were made available for public comment.

Core Processes

#1	Provide Ideal Environmental Conditions for the Use of ADCs
#2	Ensure ADC System Security
#3	Use Pharmacy-Profiled ADCs
#4	Identify Information that Should Appear on the ADC Screen
#5	Select and Maintain Proper ADC Inventory
#6	Select Appropriate ADC Configuration
#7	Define Safe ADC Restocking Processes
#8	Develop Procedures to Ensure the Accurate Withdrawal of Medications from the ADC
#9	Establish Criteria for ADC System Overrides
#10	Standardize Processes for Transporting Medications from the ADC to the Patient's Bedside
#11	Eliminate the Process for Returning Medications Directly to Their Original ADC Location
#12	Provide Staff Education and Competency Validation

The further development of each core process below includes a description of the element of practice discussed at the forum, a rationale for the process, and when available, examples of errors that have been reported to ISMP. These guidelines are intended to be universally incorporated into practice, in an effort to promote safe ADC use and subsequently improve patient safety.

The immediate implementation of all elements of the *Guidelines for Safe Use of Automated Dispensing Cabinets*, as defined below, is an ambitious goal. Ideally, these ADC guidelines are meant to support organizations (facilities and vendors) in making future resource decisions and strategic planning around the use of ADCs, as well as to facilitate ongoing safety enhancements in ADC's existing processes/products/applications. ISMP is not a standards-setting organization, and as such, the results of the forum and the subsequent document are not purported to represent a minimum standard of practice and should not be considered as such.

Core Process # 1
Provide Ideal Environmental Conditions for the Use of ADCs

Rationale: *The physical environment in which the ADC is placed can have a dramatic effect on medication errors. In 2004, reports submitted to the USP-ISMP Medication Error Reporting Program suggested that poor environmental conditions contributed to errors. Specifically, the work environment and a busy, chaotic work area were cited as the top two contributing factors in medication errors[6].*

Guidelines:

- Location and Number of ADCs

    - Purchase a sufficient quantity of ADCs, depending on their intended use (e.g., limited narcotic and unit stock versus total drug distribution), and install them in areas that are easily accessible to staff and in close proximity to patients in order to reduce excessive walking and work-arounds by staff.

    - Locate ADCs in an isolated "sterile cockpit" environment or an area of limited foot traffic, where a minimal number of distractions would be the norm.

    - Locate ADCs in close proximity to IV tubing, supplies, and refrigerated medications.

    - Ensure sufficient space around ADCs to allow for the opening of access doors to the medication area and medication drawers in the cabinet. Provide space for the use of medication administration records (MARs) and patient charts, and for the movement of staff without encumbrances.

    - Ensure adequate ventilation and temperature control of the area or room where ADCs are placed to avoid overheating of the electronic systems and to maintain proper storage temperature for medications.

    - Provide sufficient overhead lighting to allow for easy reading of the ADC screen, medication label, and MAR. Auxiliary lighting should be available day or night. Even on low-light units, there should be the ability to brighten the medication areas around ADCs for short periods to prepare and dispense medications.

    - Ensure ADCs are placed in locations that are secure when cabinets are not being used.

- Auxiliary Resources

  - o Utilize adequately-sized ADC tower units as necessary for additional storage of large volume IV infusions and other equipment.

  - o Install a designated computer monitor screen that is readable from each ADC to review electronic MARs (e-MARs), as necessary. If manual/paper MARs are used, then provide sufficient space to place the MAR at the ADC in a location where they can be read during the ADC transaction.

  - o Ensure that a phone is readily available near the ADC, for outgoing calls only.

  - o Store drug information texts, charts, and other drug information resources in close proximity to the ADC.

  - o Provide refrigerated storage within close proximity to the ADC for medications and vaccines.

- Downtime Procedures

  - o Ensure that there are well-designed downtime procedures in case of software or hardware malfunctions, drawer failures, or unexpected power loss to ADCs.

Core Process #2
Ensure ADC System Security

Rationale: Security processes must be established to ensure adequate control of medications outside of the pharmacy and to reduce the potential for medication diversion from ADCs.

Guidelines:

- Establish a clear process for how passwords will be assigned (e.g., establish security clearance, department(s) responsible, how updated and/or renewed) within the organization.

- Develop procedures that prohibit the use of temporary passwords, the sharing of passwords, and the reuse of passwords.

- Define user privileges based on the need to limit access to specific medications for specific practitioners or patient care areas.

- Update the system database daily to remove passwords that should no longer be active and to update new passwords issued within the hospital or healthcare system.

- Utilize biometric user identification or, at a minimum, change user passwords quarterly.

- Provide a remote locking mechanism for refrigerated storage associated with the ADC.

- Document the destruction of medication waste at the time of removal of the medication whenever possible. Record this waste via the ADC, and match the administered dose with ordered dose. Have a process to routinely review/reconcile the documented medication waste that incorporates the following principles:

  o Require two signatures for narcotic waste as appropriate.

  o Conduct random medical record audits to verify that removed medications were administered and documented as dispensed.

  o Proactively monitor drug usage patterns, waste reconciliation, and discrepancies.

  o Immediately address any discrepancies with medication counts and waste at the time of discovery.

Core Process # 3
Use Pharmacy-Profiled ADCs

Rationale: The use of a "profiled" ADC ensures that the pharmacist will validate the new medication order, including first doses, in the pharmacy computer system prior to the medication being dispensed or accessed by the nurse or other healthcare professional.

Guidelines:

- Ensure that all ADCs have pharmacy-profiling functionality. This should include outpatient areas (e.g., the Emergency Department [ED], same day surgery, outpatient clinics) even if the software may not be fully utilized immediately for all medications.

- Store only a limited variety and quantity of medications in "non-profiled" ADCs. At a minimum, implement policies requiring an independent double-check when removing organization-identified high-alert medications from non-profiled ADCs (or when accessing medications via "override" function in pharmacy-profiled ADCs).

Core Process #4
Identify Information that Should Appear on the ADC Screen

Rationale: Having sufficient patient information and drug information when dispensing and administering medications is key to the safety of the medication use process.[7] Because there is limited space available on the ADC screens, it is important to focus on presenting the information that is of the greatest value to practitioners, allowing for the clear identification of specific patients, their active medication profiles, and supporting information for safe drug use.

Guidelines:

- Have the ADC screen display patient demographics, including:
    - Complete patient name, ensuring that there are a sufficient number of characters in the field to avoid abbreviations or initials.
    - At minimum, a second organization-defined identifier to be used before medication administration.
    - Patient allergies.
    - Patient location.

- Ideally, medication information should be displayed in the following fashion:
    - List name of the medication, generic and brand (if appropriate). Include any safety font enhancements (e.g., tallman lettering) when appropriate, along with the patient-specific dose and route of administration.
        - The name of medication on the display screen should match the medication label and the MAR.
        - Abbreviated or truncated drug names should not be used.
    - On the next line, include any instructions for preparing the dose (e.g., 2 x 10 mg tablets = 20 mg).
    - Provide special instructions (e.g., do not cut or crush, take with food or meals).
    - Identify location of the medication (e.g., specified ADC "pocket," refrigerated storage).
    - Display the time that the last dose was removed.
    - Use active alerts (compared to flat text) whenever possible (e.g., having an ADC alert appear when attempting to select a

medication for which the patient is allergic versus relying on the nurse to read the allergy field and determine if the drug should be used).

- o Display selective warnings for medications that require a double-check or witness for withdrawal (e.g., alerts for high-alert medications, look- and sound-alike confusion, or other key safety information).

- Supplemental Information—ideal systems may:
  - o Utilize a profiled system icon that indicates the ADC is online, suggesting to the user that the ADC is actively connected to the pharmacy information system and recent updates have been received.
  - o Utilize a drug information icon that provides the ability to research any drug or a direct link to associated drug information from the current medication listed on the screen.
  - o Flag orders on the ADC screens as "new" or "changed."
  - o Provide a summary screen listing the medication, dose, strength, and dosage form selected for a specific patient during the current transaction.

Core Process #5
Select and Maintain Proper ADC Inventory

Rationale: The ADC inventory should be determined based on the needs of the patients served and replenished on a regular basis. Medications should be routinely reviewed and adjusted based on medication prescribing patterns, utilization, and specific unit needs (taking into account typical patient ages and diagnoses). Standard stock medication should be identified, and approved, for each patient care area.

Guidelines:

- Give the Pharmacy and Therapeutics (P & T) Committee or other committee with medication safety oversight administrative control of drug availability in the ADC, both for initial and subsequent modifications to the inventory.

- Establish criteria for including or excluding medications in the inventory. Hazardous drugs or medications that require extensive dilutions or calculations should not be part of ADC standard inventory. Bulk drug supplies should be avoided and all medications including oral solutions should be in ready-to-use, unit-dose or unit-of-use containers.

- Regularly analyze ADC activity reports to determine what medications have low usage and can be eliminated from storage.

- Establish appropriate maximum par levels designed to prevent multifold overdosing.

- Perform monthly pharmacy audits of complete inventory.

Core Process #6
Select Appropriate ADC Configuration

Rationale: Restricting access to medications limits the potential for inadvertently selecting the wrong medication. Medications stocked in ADCs may be high-alert or high-cost, and it is important to ensure that only the right drug is selected. For these reasons, it is important that each drug have its own unique and segregated location within the ADC, so only the specific drug needed is accessible.

Guidelines:

- Store each medication and strength in an individual lidded ADC compartment that opens only when the specific medication is selected.

- If matrix drawers (compartments) must be utilized, limit them to medications such as non-opiate analgesics (e.g., acetaminophen, ibuprofen) and antacids.

- Do not use matrix drawers, including open storage in refrigerated units, to store high-alert medications, reversal agents, and drugs prone to diversion.

- Avoid placing non-medications (e.g., keys, cameras, patient belongings) in ADCs at the expense of storing additional medications.

Core Process #7
Define Safe ADC Restocking Processes

Rationale: The restocking process encompasses a number of sub-processes that can involve both pharmacy and nursing staff. It is important that the process contain redundancies to ensure that the correct medication is placed in the correct location within the ADC. In the past, mistakes in drug selection resulting from incorrectly stocked items have resulted in fatal medication errors[8]. It is also important that the process be defined and organized so staff involved can only follow the correct pathway and the potential for process variation is limited.

Guidelines:

- Recommended Processes within the Pharmacy

  - Create a sequestered location in the pharmacy for all stock designated for ADC distribution.

- o Ensure there is a sufficient supply of the medications:
    - ➢ Par levels should reflect real-time notification of low ADC inventory
    - ➢ Establish a process to notify pharmacy when par levels reach low critical levels

- o Select one medication at a time for ADC distribution.
- o Make sure unit-dose products most closely match the usual doses used by the associated patient care area (e.g., prepare/package commonly-used ½ tablets in the pharmacy to stock in the ADC). Patient-specific doses should still be provided by the pharmacy, if they are not available in the ADC.
- o Use bar-code scanning to confirm that the medication selected for distribution to the ADC matches the medication listed on ADC fill report.
- o Use the same drug name nomenclature throughout the entire medication-use process; this includes the identical expression of the drug name and dosage units in the pharmacy computer system and on pharmacy shelving units, ADC inventory print out, ADC screens, pharmacy-generated labels, and MARs.
- o Assign an individual(s) (daily, weekly, permanently) to process inventory requests for ADCs.
- o Develop a check process prior to dispensing:
    - ➢ Provide an area for review without interruptions or distractions.
    - ➢ Ensure that the medication is appropriate for the patient population served.
    - ➢ Place each line item representing a specific medication, dose, and dosage form in a separate bag. Organize medications by patient care unit, drawer, and bin.
    - ➢ Arrange medications sequentially for easy/accurate checking.
    - ➢ Provide an independent double-check of all medications to be distributed to ADCs, ensuring the right drug, strength, dosage form, correct count, and expiration dates are verified by a final check performed by a pharmacist. It is recommended that a bar-code system be used to automate these processes.
- o Drug selection for ADC distribution should be audited to ensure accuracy.

- Recommended Processes for the Delivery of Medications to the ADC

  - Segregate and secure all medications designated for an individual ADC during transport.

  - Plan delivery times in conjunction with the workflow of the patient care area, avoiding restocking during scheduled medication times.

  - Ideally, use bar-code scanning to identify the correct drawer and pocket/container and to scan the drug being delivered to promote accurate placement in the designated ADC location. When bar-code restocking is not available, have a nurse verify the accuracy of restocking for high-alert medications and narcotics.

  - Process/restock one individual medication and strength at a time.

  - Use "blind counts" for narcotics.

  - Take steps to differentiate look- and sound-alike medications within the ADC. This may include a more secured configuration of lidded drawers or locked-lidded drawers. Other options may be to separate these medications or make the bins more distinctive (e.g., using brightly-colored adhesive tape to outline neuromuscular blocking agent storage bins).

  - Avoid multitasking during the restocking process.

  - Create/utilize an audit tool to evaluate the distribution process.

Core Process #8
Develop Procedures to Ensure the Accurate Withdrawal of Medications from the ADC

Rationale: Processes must be developed that reduce the risk or mitigate the harm associated with the administration of the wrong medication, dose, route, or frequency due to retrieval errors of medications from the ADC. The contents (variety, concentrations, and volume) and configuration of the ADC play a large role in the practitioner's ability to safely select and remove medications from the ADC.

Guidelines:

- To limit the risk of wrong selections from ADCs:

  - Configure all ADCs in the inpatient units (and ideally outpatient areas) to dispense in a pharmacy-profiled mode, which only allows medication retrieval after orders have been verified by a pharmacist. Do not allow users to select medications using the inventory or unit stock mode, unless in an emergency.

- o Include, as part of orientation and annual competency assessments, education and training on the risks associated with drug selection from ADCs

- o Use fingerprint biometrics or individual passwords to access ADCs.

- o Investigate and correct any identified discrepancies between the ADC screen, the MAR, and the pharmacy or medication label prior to the selection of the medication.

- o Ensure only medications that are available for administration initially appear on the active profile. Medications that need to be renewed before administration or those recently selected should appear to the user as initially unavailable for use. If the practitioner determines it is necessary to select a dose of a medication prior to its scheduled time, then additional strategies (e.g., an independent double-check for high-alert medications, and documentation of rationale for the override) should be implemented.

- o Have ADC screens indicate to the user the location of the medication to be removed. If it is not contained on the ADC screen, the location of the medication should appear on the MAR. For example, display the associated drawer designation as a letter and the bin designation as a number (e.g., location "A-9" to indicate "drawer A, bin 9"). Avoid using all numbers (e.g., "drawer 3-pocket 4") which can be easily confused. Different vendors may have their own proprietary methods of identifying specific pockets.

- o Do not allow for the selection of a patient's medications from more than a single ADC at a time

- o Refer to Core Processes #4, which describes the information which should appear on the ADC screen.

- Require that practitioners remove medications from the ADC one patient at a time.

  - o Upon removal from the ADC, validate that the correct drug has been selected with visual verification of the actual label by comparing the drug label to the MAR/medical record (human check). This manual check should include:

    - ➢ Proper drug identification (chemical name and/or brand if available).

    - ➢ Validation of drug concentration, dose, and dosage form. Usual ADC selection involves removing <u>no more than three</u> vials, capsules, tablets, or ampuls. Larger doses should indicate the need to investigate the original order and the product.

o Configure the ADC to require a blind count of the remaining product for the removal of narcotics or controlled substances from multi-dose bins. Upon withdrawal, require the user to manually count the remaining product and enter this information as part of the transaction. Do not provide the user with the tallied count of remaining medication requiring a single yes or no confirmation.

o Promptly report all discrepancies discovered between the ADC screen listing of medications and the MAR, or the ADC and the contents of the ADC.

o Ideally, limit the user's access to selected items by implementing ADC configurations discussed in Core Process #6.

o Have only patient-specific, unit-doses available wherever possible, since they require little or no manipulation by the user (e.g., ½ tablets; prepared oral syringes with oral liquid medications).

o Display PRN medications separately in a different section of the ADC drug profile screen.

o Return all medications to a common secure one-way return bin and not to an individual pocket or bin within the ADC.

o Document narcotic medication waste and record this waste with an independent witness.

o Create/utilize an audit tool to evaluate the withdrawal process.

Core Element #9
Establish Criteria for ADC System Overrides

Rationale: *Use of ADC overrides should be situationally dependent, and not based merely on a medication or a list of medications. While there may be a list of drugs with the potential to be obtained emergently, there may be many other situations when there is sufficient time for the pharmacist to review the medication prior to retrieving the dose. Criteria for system overrides should be established that allow emergency access in circumstances in which waiting for a pharmacist to review the order before accessing the medication could adversely impact the patient's condition.*

Guidelines:

• Ensure medications available for override are unit specific and removed only when there is emergent need.

• Implement strategies that reduce the risk of error when an override is used**,** including:

- o Limiting the quantity and number of drug concentrations available.

- o Minimizing use of multi-dose containers**.**

- o Using a process where the drug and dose are checked against the patient's allergies and weight as appropriate, to determine if the drug and dose are appropriate**.**

- o Providing preparation instructions if the nurse is required to reconstitute or dilute medications**.**

- o Requiring an independent double-check with another licensed healthcare provider when removing organization-identified high-alert medications on override.

- o Requiring documentation of override rationale**.**

- o Developing a required staff competency assessment related to the safe use of overrides**.**

- o Reviewing and approving all override policies through the P&T Committee, Medication Safety Committee, or their equivalent group.

- o Routinely reviewing override reports to identify and address barriers to the pharmacist's review of the medication order prior to drug administration.

Core Process #10
Standardize Processes for Transporting Medications from the ADC to the Patient's Bedside

Rationale: A process should be developed that reduces the risk of medications being administered to the wrong patient at the wrong time during the transportation of medications from the ADC to the patient. Supporting safety may require the availability of additional ADCs or the placement of ADCs in strategic locations to prevent work-arounds. Not having sufficient ADCs, or having them located far from patient rooms, fosters the at-risk behavior of taking medications for more than one patient at a time or taking medications for more than one scheduled administration time. The safety of this practice also is impacted by the organization's ability to secure medications during transport between the ADC and the patient's bedside.

Guidelines:

- Transport medications in their original unit-dose package. Practitioners need the ability to clearly identify the patient's medications at the time of administration for the purpose of bar-code point-of-care systems, last minute check of the medications while at the bedside, and patient education.

- Secure transport:
    - Hand-carry a single patient's medication for one administration time directly to the patient's bedside.
    - If during a single medication administration time more than one patient's medication must be transported, use computers on wheels (COWs), mobile carts, or workstations on wheels (WOWs) with labeled patient-specific drawers and the ability to lock if unattended.

- Avoid transport of medications in clothing pockets, attached to clipboards, inside medical records, or in MAR binders.

- Ensure medications transported from the ADC are in a ready-to-use form for administration. Whenever possible, a patient-specific, unit-dose should be prepared by the pharmacy and available to the nurse for administration, negating any manipulation.

- Have the MAR (manual or electronic) available at the bedside to support safe administration.

- Open packages at the patient's bedside. The only exception may be for medications that need to be crushed, measured, or wasted.

- Create/utilize an audit tool to evaluate the transportation process.

Core Process #11
Eliminate the Process for Returning Medications Directly to their Original ADC Location

Rationale: One source of incorrectly stocked items is allowing practitioners to return a medication directly to the ADC bin or pocket. Occasionally medications are inadvertently returned to the wrong pocket, either because of user distraction, look- and sound-alike medications in a matrix bin, or a slip in procedure. Limiting return of medications to a designated ADC bin will help to eliminate this source of error.

Guidelines:

- Return all medications to a common secure one-way return bin that is maintained by pharmacy, not to an individual pocket or bin within the ADC.

Core Process #12
Provide Staff Education and Competency Validation

Rationale: All users of the ADCs (pharmacists, technicians, nurses, respiratory therapists, designated physicians, and others) must be educated and have regular competency validation in the safe use of the device in order to meet expectations for safe use. Most often this education occurs during the practitioner's orientation period, or upon ADC installation, but an annual update may be required in order to ensure ongoing appropriate use. Users who are not properly oriented to the device may develop practice habits and device work-arounds that are considered unsafe.

Guidelines:

- Inform the ADC user during orientation to the ADC, and annually through on-going education and competency validation, of the risks associated with drug selection. These educational requirements should apply to all ADC users.

- Share with staff lessons learned from the regular review and discussion of ADC-related medication errors and near misses reports. In addition, use external sources of error information to promote safe practice.

References

1. HIMSS 2008 Annual Conference; unpublished data; ASHP Section of Pharmacy Informatics and Technology, ASHP Survey of U.S. Hospital and Health System Adoption and Implementation of Health Information Technology.

2. Grissinger M, Cohen H, Vaida AJ. Using technology to prevent medication errors. In: Cohen M, ed. *Medication Errors.* 2nd ed. Washington DC: American Pharmacists Association; 2007:413.

3. The Joint Commission Medication Management Standard MM.5.01.0 page. The Joint Commission Web site. Available at: http://www.jointcommission.org/NR/rdonlyres/A29E4577-6290-4B95-A097-0FDAFA1A7EAA/0/cah_sii_mm_revised_chapter.pdf. Accessed October 10, 2007.

4. American Society of Health-System Pharmacists. ASHP guidelines on the safe use of automated medication storage and distribution devices. *Am J Health-Syst Pharm.* 1998; 55:1403-7.

5. *Key Elements of the Medication Use System[TM]* FAQs page. Institute for Safe Medication Practices Web site. Available at: http://www.ismp.org/faq.asp#Question_9. Accessed October 3, 2007.

6. Smetzer J, Cohen M. Medication Error Reporting Systems. In: Cohen M, ed. *Medication Errors.* 2nd ed. Washington DC: American Pharmacists Association; 2007:531.

7. Smetzer J, Cohen M. Preventing drug administration errors. In: Cohen M, ed. *Medication Errors.* 2nd ed. Washington DC: American Pharmacists Association; 2007:235.

8. Institute for Safe Medication Practices (ISMP). Infant heparin flush overdose. *ISMP Medication Safety Alert!* 2006 Sept;19:1-2.

Appendix A – Participants

PARTICIPANTS	HOSPITAL/ORGANIZATION
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Linda Moore	tng - Project Facilitator
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Appendix B

Glossary

ADC   A drug storage device or cabinet that electronically dispenses medications in a controlled fashion and tracks medication use. An automated dispensing cabinet is equivalent to a unit-based cabinet (UBC), automated dispensing device (ADD), automated distribution cabinet, or automated dispensing machine (ADM).

Blind count   Upon the withdrawal of a controlled medication, the ADC prompts the user to physically count the number of remaining product in that location and enter this count at the time of drug removal.

High-alert medications   Drugs that bear heightened risks of causing significant patient harm when used in error.

Lock-lidded drawers   A drawer configuration that is used to isolate medications from one another and provide a high level of security by restricting access to one pre-selected medication at a time.

Matrix drawers   A high-capacity, low-security drawer, suitable for holding large quantities of less-controlled medications. Its configuration allows the user open access to all medications within the drawer.

Override   The process of bypassing the pharmacist's review of a medication order to obtain a medication from the ADC, when assessment of the patient indicates that a delay in therapy (to wait for a pharmacist's review of the order) would harm the patient.

Passwords   Passcodes used to provide security and limit access to the ADC.

Profile ADC software functionality that allows the pharmacist to review and approve medications before they are available for selection and administration by the nurse, respiratory therapist or physician.

Profiled ADC   An ADC that allows a practitioner to select a drug from a patient-specific list on the ADC screen and obtain a medication only after the order has been verified by a pharmacist.

Tallman lettering   The use of mixed cases or enlarged font size to visually distinguish the different portions of look-alike drug names.

Work-arounds   An action by a practitioner whereby normal safe processes are bypassed, trading efficiency/convenience for safety.