

Optimizing Medication Distribution using Automated Dispensing Cabinets

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Conflict of Interest Declaration

- I have no actual or potential conflicts of interest in relation to this presentation or activity to disclose

Learning Objectives

- Describe the major types of medication distribution models
- Review the primary functionality of automated dispensing cabinets and their impact on pharmacy operations
- Explain the methods and metrics that can be used to monitor and optimize the medications available within an automated dispensing cabinet

Challenges in Pharmacy ¹

- Resource management (Human and Financial)
- Internal and external pressures
 - Deliver excellent care AND manage resources efficiently
- Target distribution models for efficiency
- Timely and accurate medication delivery
- Leverage automation and technology to support patient care services

Audience Pre-Test Assessment

- ADCs have been shown to increase rates of medication errors
- ADCs are designed for automated, decentralized medication dispensing in a variety of settings
- ADCs do not facilitate unit dose medication distribution for end users
- ADCs are decreasing in prevalence in health-care organizations throughout the country

Pharmacy Automation and Technology ^{1,2}

- Advancements in medication management technologies
 - Unit dose medication packaging
 - Pharmacist led medication dispensing
- Automated dispensing cabinets (ADCs)
 - Minimize medication errors
 - Maximize patient safety
 - Inventory accountability
 - Nursing/Patient satisfaction

Medication Distribution Models ^{3,4}

Distribution Model Type	Descriptions
Centralized Model	"Cart-fill model" • Pharmacist checks a patient specific product • Product is delivered to a patient cart or room
Decentralized Model	"Cabinet model" • Pharmacist checks a non-patient specific product • Product delivered to an automated dispensing cabinet (ADC)
Hybrid Model	• Combination of both centralized and decentralized

Evaluating Medication Models ^{1,3,5}

- No one-size-fits-all approaches
- Factors to take into consideration
 - Costs of automation/technology
 - Nurse : Patient ratios
 - Inventory demands
 - Pharmacy labor costs
 - Medication security

What medication distribution model is currently in use at your institution?

- Medication distribution without the use of any ADCs
- Hybrid model (centralized and decentralized)
- Centralized, cart-fill only model (all patient specific doses)
- All medications from the ADCs, no cart-fill

Growth of Decentralized Models ^{6,7}

- In 2011, 60% of hospitals had a centralized distribution system
 - 73.9% reported a centralized model in 2005
- 89% of respondents to an ASHP survey in 2011 used ADCs
 - Compared to 49% of respondents in 1999
- Evidence of ADC growth in the future

Benefits of ADC Optimization ^{2,3,8}

- Primary goal = enhance operational efficiency
- Hybrid models are highly dependent on ADC usage
- 70-90% of all medication doses (unit dosed) administered
- Optimization typically revolves around:
 - Stocking frequently used medications
 - Removal of unused medications
 - Improve refill and stock-out workflows
 - Proper placement of inventory

Audience Discussion

- Find a partner next to you and take a minute to discuss how ADCs at your institution are managed on daily basis. Do you have staff designated to maintenance and report analysis of your ADCs?

Targets

- Reporting
- Drawer Configuration
- Medication Removal
- Par Levels / Refills
- Restocking
- Stock-Outs
- Medications with Active Orders
- Dispensing Data
- Expirations
- End User Satisfaction

Reporting / Data Collection ³

- Designated staff for running reports from a database
- Pharmacy dashboards
- Canned reports
 - Accurate and reproducible
- Analysts to perform data analysis
- Tackle optimization in a phased approach
 - Patient care units
 - Service lines
 - Floors

Drawer Configuration ^{1,3,8}

- Locations decided with the end user in mind
- Consider ideal ergonomics and frequency of use
- Top and bottom drawers should hold slow-movers
- Stock fast movers and larger medications primarily in waist-height drawers
- Controlled substances near eye-level heights for accuracy in counting
- Organize layout to minimize the number of steps

When are medications removed from the ADC at your facility due to non-utilization?

- After 30 days
- After 60 days
- After 90 days
- There is no set timeframe to drive this activity

Medication Removal ^{2,3}

- Patterns of use reflect unit based needs
- Determine the best interval for the department
 - 30 days
 - 60 days
 - 90 days
 - 120 days
- Considerations for standard stock items
- Reduce expirations, improve organization and space availability

Par Levels / Refills ^{2,3,9}

- Day supply emphasis
 - 1-3 day minimum
 - 6-9 day maximum
- Major considerations
 - Average daily dispenses
 - Delivery turnaround time
 - Size and shape of medications
- High Vend : Fill ratio – increase vends, decrease refills
- Weekly refills for low-cost drugs without short dating
- Centralized storage should drive refill quantities

unit	item_id	item_name	par	ro	cl	totalQty	unit_iss	unit_oss	avg_oss	minQty	maxQty	avgQty
UN03144	ACEHYDR325	Hydrocodone										
UN03144	1	Aspirin 75-325 MG	12	2	1	99	CUP	0	0	1	10	2.96
UN03144	ACEDEXT	MS	22	12	2	268	EACH	0	0	1	22	5.15
UN03144	ACEDEXT	EMERGENCY MEDICATION										
UN03144	ASMK	KIT	2	1	1	2	KIT	0	0	1	1	1
UN03144	ALPREDST	ALPRAZOLAM	30	5	5	23	TAB	0	0	1	4	1.4
UN03144	ALPREDST	ALPRAZOLAM	15	10	5	30	TAB	0	0	1	8	3.33

Restocking 4,5,10

- Monitor technician workload to ensure efficiency
- Reports to show time taken to complete a restock
- Consistent delivery schedules
- Even distribution of workload based on cabinet demands
- Balance restock frequencies with the risk of expirations

Stock-Outs 2,3

- Canned reports to stock-out rates specific to each drug at each machine
 - # of stock-outs / total number of dispenses
- Goal stock-out percentage of less than 1%
- Indicates the management of changes in usage based on inventory levels
- Review stability in stock-out rates and turn around times for consistency

Medications with Active Orders

- Database search to show which medications have active orders and are not loaded as a common stock item
- Filter reports for ease of manipulation
 - Patient care area
 - Unit dose, bulk, compounded, short expiration, fridge meds
 - Controlled substances
- Frequency of reporting determined by staffing levels
- Inventory adjustments made accordingly

Medications with Active Orders

Last Activity	Item Name	Item ID	Transaction Type	Status
None in this area	ACETAMIN-COD 120-12 MG/5 5ML CUP	TYL35L		Y
07/10/17 10:31 PM	ACETAMINOPHEN-CODEINE 300-3 1Tab	TYL3T	I -- Issue	Y
06/05/17 11:17 PM	ALPRAZolam 0.5mg Tab	ALPR05T	I -- Issue	Y
03/18/17 8:22 PM	ALPRAZolam 0.25mg Tab	ALPR025T	I -- Issue	Y
05/15/17 8:58 PM	APIXABAN 5MG TABLET	APIXST	I -- Issue	Y
05/15/17 4:43 PM	Adenosine 3MG/1ML 2ML Vial	ADEN3SOLN	O -- Supplemental Restock	O
07/09/17 5:23 AM	Albumin Human 25% IV 50ML Inj	ALB2550	I -- Issue	Y
05/28/17 10:49 AM	Albuterol In 100MG/20ML 20ML Bot	ALBUNS	S -- Restock	Y

Dispensing Data 2,10

- Review previous dispensing and ordering patterns
 - EHR data
 - Historical ADC dispensing data
 - Centralized data (medication carousels or cart-fill)
 - Doses dispensed from central per patient day
- Monitor prescribing trends
 - Seasonal patterns
 - Annual patterns
- Immediate access to critical medications
- Eliminates transport time from pharmacy

Expirations 2,3,10

- Emphasize accurate expiration date tracking at the ADC
- Track which drugs expire
- Can also be used to update par levels
- Decrease in average number of expirations post-optimization

Item ID	Item Name	Exp Date	Hardware Type	Location
MIX1620454	acetaminophen-codene (TYLE 10mL	08/10/17 7:20 PM	12 Bin Locking	Zone 1, Drawer 7, Bin 9

OmniSupplier Summary Items to expire within the given date range: 1

End User Satisfaction ^{1,11}

- Impact of ADCs on nursing satisfaction is inconsistent
- Unit based surveys
- Daily huddles
- Assess end user satisfaction regularly
 - Pharmacy personnel responsiveness
 - User friendly physical layout
 - Accurate filling processes
 - Medication administration without delay
 - Order verification turn around times
 - Wait times for cabinet access

Summary ^{10,11}

- Various optimization methods create efficiency
- Identify meaningful end goals
- Initiate a phased approach
- Plan – Do – Check – Act (LEAN Methodology)
- Measure the impact of implemented changes
- Share your success stories!

Audience Post-Test Assessment

- Which of the following statements is true in regards to the use of automated dispensing cabinets (ADCs)?
 - A. ADCs have been shown to increase rates of medication errors
 - B. ADCs are designed for automated, decentralized medication dispensing in a variety of settings
 - C. ADCs do not facilitate unit dose medication distribution for end users
 - D. ADCs are decreasing in prevalence in health-care organizations throughout the country

Which of the following statements are true?

- A. Historical dispensing data cannot be used to determine cabinet inventory
- B. Standard stock medications should be removed from the ADC if they show up on expiration reports
- C. The electronic health record (EHR) can be used to facilitate optimization and ADC utilization
- D. All of the above statements are true

Which of the following statements are true?

- A. ADC restock delivery schedules should be consistent for optimization efforts
- B. Proper distribution of cabinet workload does not have an effect on restock times
- C. Expiration of medication are not affected by restock intervals
- D. Database reports are unable to help quantify restock times at each ADC

Which of the following are effective methods to drive ADC optimization?

- A. Ensure proper drawer configuration for the end user
- B. Remove unused medications on a regular interval
- C. Increase vend : fill ratios on medications
- D. Reduce stock out rates
- E. All of the above

A pharmacy operations manager has been assigned to improve ADC utilization for the hospital's cardiac ICU. The first task identified is to review 6 months of medication administration data to identify which high demand medications are not currently stocked in the cabinets. Which of the following optimization methods is this review an example of?

- A. Par Levels
- B. Stock-outs
- C. Expirations
- D. Dispensing Data

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Questions/Comments

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