Pharmacy Automation:
Integrating Barcoding Into Workflow

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Objectives/educational outcomes

At the end of the presentation, the audience should be able to:
- Identify types of barcode formats.
- Identify different types of technology.
- Describe how barcodes are used and integrated into pharmacy workflow.

Outline

During this presentation, we will be discussing:
- Barcode formats
- Pharmacy workflow
- Technology used in hospital pharmacy
- Examples of labels used
- How barcodes are integrated into workflow

Barcoding

National Drug Code (NDC)

- 10 digits codes are structured in one of three sequences:
  - 4-4-2
  - 5-3-2
  - 5-4-1
- First five digits identify the manufacturer of the drug and are assigned by the Food and Drug Administration
- Remaining digits identify the specific product and package size
Barcode Formats

- Linear:
  - GS1-128 (UCC/EAN-128)
  - Code 39
  - HiBC (Healthcare Industry Bar Code)
  - UPC

- Matrix (2D):
  - Aztec Code
  - Stacked (combination of 1D/2D)
  - Data Matrix

Barcoding

- Applications:
  - Medication storage and dispensing
  - Barcode Medication Administration (BCMA)

- Designed to prevent medication errors
- Improves quality and safety
- Utilizes a barcode reader connected to a computer
Inventory Management

- Automates:
  - Ordering and receiving of medications from the drug distribution wholesaler
  - Replenishment of automated dispensing machines (ADM)
  - Pharmacist check process
  - Floor stock requisitions
  - Inventory management

Delivery Label

Order Source Order Pick Type

Delivery to:
NORVASC 5mg TAB
AMLODIPINE BESYLATE
QTY: 1 of 1
Ord at: 04/03/2008 16:23

Secure Narcotic Storage

- Provides secure storage all for controlled substances
- Streamlines the audit of control substance usage and distribution
- Replenishment of controlled substances in automated dispensing machines (ADM)
- Utilizes barcode safety for receiving and dispensing of controlled substances

Flow Diagram

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Delivery Label

- Linear barcode that represents PARx ID. Scanned by tech during refill.
- Linear barcode that represents the record ID. Scanned by RPh during checking.
Health Information System (HIS)
- Main source of patient health information (PHI)
- Feeds data to other systems
- Used by physicians to enter electronic orders (CPOE – Computerized Physician Order Entry)
- Used by nurses to electronically document medication administration (eMAR), track interventions, and log vital signs
- Used to track laboratory orders and results
- Used to document patient allergies and home medications

Patient Specific Label
- Barcode represents the NDC #, except for multi-component orders in which case the barcode represents the order #. Scanned by nurse during BCMA.

IV Workflow Management
IV Workflow Management

- Adds barcode safety to IV production
- Provides detailed mixing instructions
- Automates dose calculation and dilution
- Standardizes beyond use dating
- Provides workflow efficiency
- Reduces waste
- Documents IV production using cameras
- Allows for remote verification of IVs
- Allows for auditing of IV preparation data

Patient Specific IV Label

- Aztec barcode that represents the dose ID. Used internally by the system for certain functions. Not used for any scanning externally.
- Linear barcode that represents the order #. Scanned by nurse during BCMA.

Stock IV Label

- Linear barcode that represents the order #. Scanned by nurse during BCMA.
- Aztec barcode that represents the dose ID. Used internally by the system for certain functions. Not used for any scanning externally.

Flow Diagram

Automated Dispensing Machines (ADM)

- Decentralizes the medication distribution
- Provides real-time tracking for all medication activity
- Par levels optimize medication storage
- Limit user access based on role
- Utilizes barcode safety during replenishment
- Medication expiration date tracking
Flow Diagram

Unit-Dose Packaging

- Automates packing of bulk medications
- Utilizes barcode safety
- System reports record:
  - Staff member that repackaged
  - Pharmacist verification
  - Date/time of activity
  - Quantity packaged

Flag Labeler

Flow Diagram

Linear barcode that represents the NDC #. Scanned by nurse during BMCA.
Flag Labeler

- Used to add a barcode to any medication
  - Multiple use medications
  - Items with short beyond use dating
- System reports record:
  - Staff member that repackaged
  - Pharmacist verification
  - Date/time of activity
  - Quantity packaged

Flag Labeler

- Linear barcode that represents the NDC #. Scanned by nurse during BMCA.

Benchmarks

- External Benchmarks available from analytic vendors
  - Refill analysis
  - Expired Medication
  - Stockouts
  - Inventory Shrinkage
- Internal Benchmarks
  - Pharmacist checking compliance (95%)
  - Technician scanning compliance for replenishment of ADNs
  - Nursing scanning compliance for BCMA

Challenges

- New items are ordered everyday
  - Items need to be added to appropriate systems to close the loop
- Create workflows to handle items that slip through the cracks
- Limitations of HIS accepted barcode standards
- Hardware issues
- Systems do not always provide a streamlined method to audit compliance

Poll

- Have you had an experience where technology has prevented a medication error?

Medication Safety Example

- Remember even with barcode safety there is still a chance that mistakes could slip through the cracks.
  - A pharmacist removed two different strengths of oxazepam from our narcotic vault for two different ADM locations. The pharmacist placed the oxazepam 10mg capsule in a bag labeled with oxazepam 15mg capsule and oxazepam 15mg capsule in oxazepam 10mg capsule. Technicians are required to inspect the products before refilling. The technician scanned a barcode but, it was the send label and not the medication. The error was caught visually by a nurse who was removing the medication for her patient.
Medication Safety Example

- In some instances the medication was not scanned during refill.
  - A pharmacist removed morphine and hydromorphone from our narcotic vault for the same ADM location. A nurse called pharmacy stating there was hydromorphone where morphine was in the Pyxis. The error was caught visually by a nurse who was removing the medication for her patient.
  - During the investigation we discovered that the technician did not scan any of the provided barcodes and instead, manually typed in his selection from the list of medications available at the station.

References