



## Enhancing Medication Safety and Decreasing Drug Expense with an Intravenous Workflow System

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The speaker has no actual or potential conflicts of interest in relation to this presentation

## Learning Objectives

- Discuss the benefits of an intravenous (IV) compounding workflow management system
- Describe how IV workflow systems can decrease drug expenses
- List the challenges of implementing an IV workflow system

## Self-Assessment Questions

1. An IV workflow system can help with all of the following except:
  - A. Ensuring correct diluent selection
  - B. Ensuring correct product selection
  - C. Documenting IV compounding procedure
  - D. Eliminating a final pharmacist check

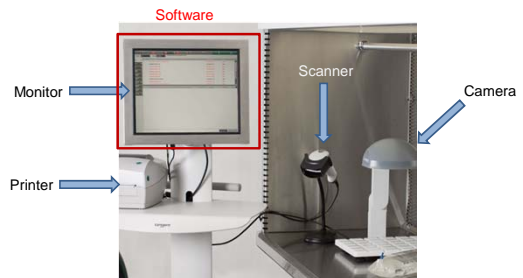
## Self-Assessment Questions

2. An IV workflow system can decrease drug expenses by assisting with all of the following except:
  - A. Preventing drug selection errors
  - B. Switching orders from IV to PO route
  - C. Locating lost IV medications
  - D. Confirming if a dose was already made

## Self-Assessment Questions

3. Which of the following is not a challenge to implementing an IV workflow system?
  - A. Obtaining staff buy-in
  - B. Demonstrating medication safety benefits
  - C. Acquiring information technology resources
  - D. Obtaining capital funds

## IV Workflow System



## IV Room Safety

*“Sterile compounding is a significant but perilous core pharmacy process in dire need of improvement.” – ISMP Jan 2015*

- Syringe pullback method deemed unsafe practice in 2010
- IV workflow system - Level 1 Recommendation (Best Practice)

Institute for Safe Medication Practices (ISMP). Proceedings from the ISMP Sterile Preparation Compounding Safety Summit: Guidelines for SAFE Preparation of Sterile Compounds, 2012. Week 1 April 2014. Acute Care ISMP Medication Safety Alert, March 12, 2015 Vol 20 Issue 5. Acute Care ISMP Medication Safety Alert, July 2, 2010 Vol 15 Issue 11.

## History of IV Workflow Systems

- Introduced in November 2007
- Adoption seen in bigger institutions
  - High-risk areas (i.e. pediatrics and oncology)

### IV Workflow Adoption Trends

Year	Adoption (%)
2010	4%
2011	7%
2012	8%
2013	8%
2014	11%
2015	15%

### Trends in Implementation Plans

Year	Implementation (%)
2011	19%
2012	20%
2013	21%
2014	24%
2015	29%

The 10th Annual State of Pharmacy Automation, IV Workflow Management, Pharm. Purch. Prof., 2015, 12(6):54-55.

## Barriers

- Pharmacist tradition
  - Discomfort
  - Distrust
- Viewed as an unnecessary expense
- Insufficient support staff

## Benefits

### Medication Safety

- Barcode Verification
- Automated calculations
- Automated beyond-use dating
- Standardized instructions

### Improved Productivity

- Telepharmacy
- Automated IV work queue prioritization
- Discontinued dose function
- Documentation

## Benefits

### Waste Reduction

- Dose tracking
- Multi-use vial tracking

### Data

- Turnaround time
- Workflow
- Productivity

## Mount Sinai Hospital Medical Center



- Safety Net Hospital
- 319 bed teaching hospital in Chicago
  - Sinai Children's Hospital - 74 beds
  - Level I Trauma Center
  - 60,000 emergency room visits annually
- Average daily census: 250 acute care
- Pharmacy staff
  - 52 full-time equivalents (FTEs)
    - 20 Technician FTEs
    - 32 Pharmacist FTEs
  - Triage position is primarily responsible for checking compounded IVs

### Mount Sinai Hospital Medical Center

- Timeline
  - March 14, 2012 - Contract signed
  - May 28, 2014 - Go-live
  - December 3, 2014 - Tracking system go-live

### MSH IV Workflow Procedure

IV workflow system was implemented in the inpatient setting only

Includes: pediatrics  
Excludes: chemotherapy, total parenteral nutrition, and premix

### Phase 1 IV Workflow System Implementation

### MSH IV Workflow Procedure

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### Implementation Challenges

- “Takes more time”
  - Could lead to bypassed medications
  - Bypass – circumvent IV workflow system
- “Not safer”
  - Technology is not perfect
- Learning curve for staff
  - Picture quality
  - Troubleshooting

### Time Study

- Before IV workflow system – two time studies were performed involving STAT IV medications
  - 2011 – 8.7 minutes
  - 2012 – 7.2 minutes
- 5 months post-IV workflow system go-live (includes non-STAT medications)
  - 2015 = 3.7 minutes
- Suggests other operational inefficiencies affect turnaround time

### Prevented Errors Results

- 174 prevented errors at drug selection over 10 month period\*
- Common Errors
  - Incorrect electrolytes
  - Incorrect diluents
  - Sound alike-look alike

Error Type	Percentage
Wrong Diluent	47%
Wrong Drug	53%

\*May 28, 2014 to March 31, 2015

### Medication Safety

Scanned Error Description	IV Compound Description	Scanned Product
dexametomidine - Incorrect drug for ONDANSETRON HCL INJ	DEXAMETHASONE PHOSPHATE INJ 10MG,ONDANSETRON HCL INJ 16MG,0.9% NA CL 50ML in 60.5mL	dexametomidine 100 mcg/mL 2mL (sandoz)
dexametomidine - Incorrect drug for 0.9% NA CL	potassium chloride 20mEq,dextrose 5% in water 1,000mL,sodium chloride 23.4% 34mEq in 1,000mL	sodium bicarbonate 8.4% 50 mL vial
Incorrect drug for dextrose 5% in water sodium bicarbonate - Incorrect drug for sodium chloride 23.4%	Dilution: ceFTRIAXone 40 mg/ml dilution in dextrose 5% in water - 100mL	sodium chloride 0.9% 100mL (Baxter Healthcare Corp) #3

### Potential for Adverse Drug Event

Potential Level	Percentage
Low	83%
Moderate	9%
High	7%
Unknown	1%

### Prevented Errors - Cost Savings

Savings from Prevented Errors  
**\$4,540**

Projected Annualized Savings  
**\$5,500**

Cost savings is insignificant in comparison to the prevention of an adverse drug event

## Monitoring and Maintenance

- Inappropriate bypassing
- Safety features for different concentrated products
- Product library updates
- Experienced and inexperienced IV technicians
- Labels mistakenly crossing over from sister hospital

## Phase 2 Dose Tracking Implementation

### MSH IV Workflow Procedure



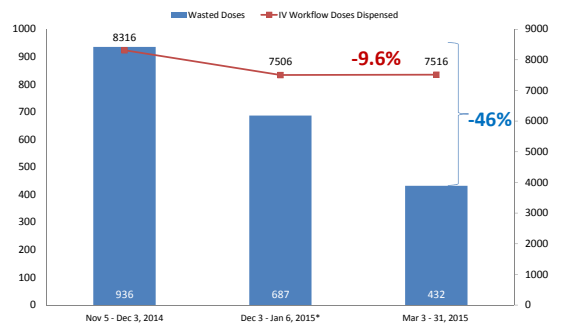
### MSH IV Workflow Procedure



## Waste



## Dispensed IV Waste Results



### Dispensed IV Waste – Cost Savings

Estimated Savings Per Month  
 \$2,300 - \$4,600

Projected Annualized Savings  
 \$27,000 - \$55,000

### Staff Survey for Tracking System

Questions:	Pre-Tracking RPh	Post-Tracking RPh	Pre-Tracking Tech	Post-Tracking Tech
How much do you value the IV workflow system?	4.1	<b>4.7</b>	4.9	4.5
On average, how often do you receive missing IV medication inquiries?	4.9	4.8	4.2	<b>3.5</b>
How satisfied are you with our current missing medication tools?	3.1	<b>3.8</b>	4	<b>4.8</b>

Scale: 1 - Very Low, 2 - Low, 3 - Somewhat Low, 4 - Somewhat High, 5 - High, 6 - Very High

### Vancomycin Waste Discovery

Post Sample 1  
216  
Expired Vancomycin Bags

➔

Post Sample 2  
61  
Expired Vancomycin Bags

- Batch 1250 mg, 1500 mg, and 1750 mg doses
  - Refrigerate - 9 day expiration (Pharmacy)
  - Room Temp - 24 hours (Nursing Floors)
- Implemented new procedure to refrigerate vancomycin bags on nursing floors
- Other wasteful discoveries: Pantoprazole and Cisatracurium

### Return on Investment

Annualized Cost Savings	
Prevented Errors	\$5,500
Dispensed IV Waste	\$27,000 - \$55,000
<b>Total Hard Cost Savings</b>	<b>\$32,500 - \$60,500</b>

**Return on Investment\*** **30% to 142%**

\*Not including initial implementation or equipment costs

### Return on Investment

Annualized Cost Savings (GPO Pricing Adjusted)	
Prevented Errors	\$3,600
Dispensed IV Waste	\$10,300 - \$34,800
<b>Total Hard Cost Savings</b>	<b>\$13,900 - \$38,400</b>

**Return on Investment\*** **-44.4% to 53.6%**

\*Not including initial implementation or equipment costs

- ### Self-Assessment Questions
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### Key Takeaways



- Key Takeaway #1
  - IV workflow systems do not replace a pharmacist final check or an IV trained technician
- Key Takeaway #2
  - IV workflow systems can deliver a ROI depending on size and scope of your institution
- Key Takeaway #3
  - Data is a powerful tool to drive positive change

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