



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

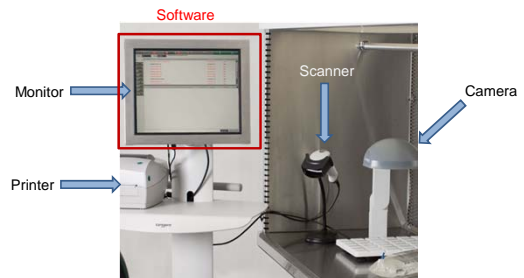
Self-Assessment Questions

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, 2009 Vol 13 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

MSH IV Workflow Procedure

MSH IV Workflow Procedure

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 Types Prevented

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	dexametomidine 100 mcg/mL 2mL (sandoz)
dexametomidine - Incorrect drug for 0.9% NA CL	INJ 16MG,0.9% NA CL 50ML in 60.5mL	
Incorrect drug for dextrose 5% in water sodium bicarbonate - Incorrect drug for sodium chloride 23.4%	potassium chloride 20mEq,dextrose 5% in water 1,000mL,sodium chloride 23.4% 34mEq in 1,000mL	sodium bicarbonate 8.4% 50 mL vial
0.9% sodium chloride - Incorrect drug for ceFTRIAXone 0.9% sodium chloride - Incorrect drug for dextrose 5% in water	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



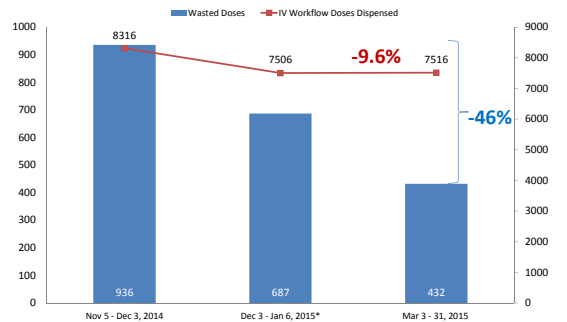
MSH IV Workflow Procedure



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	4.7	4.9	4.5
On average, how often do you receive missing IV medication inquiries?	4.9	4.8	4.2	3.5
How satisfied are you with our current missing medication tools?	3.1	3.8	4	4.8

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
Total Hard Cost Savings	\$32,500 - \$60,500

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
Total Hard Cost Savings	\$13,900 - \$38,400

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

Acknowledgements



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