

Technology Pearls 2018

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Controlled Substance Operational Dashboard Pearls

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The speaker has no conflicts of interest to disclose.



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Learning Objectives – Pharmacists and Technicians

1. Describe the difference between a discrepancy and an exception as related to controlled substance inventory management.
2. List three examples of measures which can help detect and minimize drug diversion, and how to generate reports and analytics to assess the measures.



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Definitions

- **Discrepancy:** there is a difference between what the ADC *thinks* is in the ADC, and what is *actually* in the ADC
- **Exception:** there is a difference between what an ADC *thinks* it should receive, and what it *actually* receives



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Can you have both an exception and a discrepancy?

CPhT#1 pulls 10 lorazepam tabs for ADC restock out of CSM

CPhT#2 accidentally only puts 5 lorazepam tabs into ADC but does not change quantity when loading (defaulted to expected 10 tabs)

RN accesses lorazepam tabs and does countback

This creates an exception of "**5 short**" because the ADC is "expecting" 10 tabs

This creates a discrepancy of "**- 5**" because the ADC "thinks" there are 10 but there are only 5 tabs

Other controlled substance reporting features

Discrepancy resolution reporting

- **Ideally**, discrepancies should be resolved immediately
- **In practice**, policy is to resolve discrepancies by end of shift
- **In reality**, there are times it takes longer than one shift to resolve a discrepancy
- Reporting can help you identify certain pharmacies or ADC locations where discrepancies are NOT resolved in a timely manner, as well as areas where discrepancies are resolved inappropriately

Override report

- Overrides occasionally must occur for patient needs
- Medications on override depend on hospital policy, care area, etc.
- When necessary to pull drugs on override, follow up should include:
 - Linking override to written order
 - Documenting administration, return, or waste of product
- Reporting can help identify areas where one or more of the follow up steps are not completed appropriately

ADS Overrides

Description

This report helps track the workload of automated dispensing stations (ADS). It shows details about medications pulled on override from those ADS machines. The report displays the total number of unlinked, unadministered, and returned orders for each location and each level of grouping.

The report can be grouped by hour, medication, pharmacy, user, or DEA (Controlled Substance) Classification.

Report Filter Criteria

Start Date: [REDACTED]

End Date: [REDACTED]

Location(s): NMH NORTHWESTERN MEMORIAL HOSPITAL

Pharmacy: NMH OLSDTI OMNI, NMH ARKES 19 TRANSPLANT CLINIC OMNI, NMH FEIN 1 ED EAST OMNI, NMH FEIN 1 ED MIDDLE ...

Medication DEA Class(es): C-II High abuse potential, C-III Moderate dependence, C-IV Limited Dependence, C-V Limited abuse pot...

Grouped by: Pharmacy

[Link to Detail Report](#)

Location	Total Override Pulls	Unlinked Orders	Unadministered Orders	Returned Orders
NMH NORTHWESTERN MEMORIAL HOSPITAL	734	552	523	29
Pharmacy				
NMH FEIN 1 ED EAST OMNI	48	16	13	4
NMH FEIN 1 ED MIDDLE OMNI	23	6	4	1
NMH FEIN 1 ED TRAUMA OMNI	1	0	0	0
NMH FEIN 12E S OMNI	3	3	2	0
NMH FEIN 12W S OMNI	1	0	0	0
NMH FEIN 13E N OMNI	1	1	0	0

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Null transaction report

- Null transaction = accessing a medication bin without an action (issue, return, cycle count, etc.)
- Impact of subsequent transactions could be negative
- Reporting can be done to look at users who have the most null transactions, and can guide re-education on best practices

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Match the example with the correct term:

- 1 = exception, 2 = discrepancy
- 1 = discrepancy, 2 = exception
- Both discrepancies
- Both exceptions

Example 1

A nurse pulls 2 tramadol tablets out of an ADC when he only electronically documented he was pulling 1 tablet. The next nurse that pulls tramadol and does a countback of the bin will cause a(n) _____.

Example 2

The pharmacy sends 10 vials of lorazepam to an ADC with a pharmacy technician for restock. One of the vials rolls out of the delivery bag and when the technician restocks the ADC they only document adding 9 vials. This will cause a(n) _____.

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Which of the following reports can be used to follow up on suspected diversion?

- Discrepancy report
- Exception report
- Override report
- All of the above

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A Dual System Solution to Inventory Optimization

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

Learning Objectives - Pharmacist and Technician

1. Describe the process of concurrently implementing a new carousel inventory management system, along with an automated unit dose packaging system in a new hospital inpatient pharmacy.
2. Discuss the cost savings associated with the implementation of this project.

Background

- Simultaneous hospital move and EMR conversion
 - Inventory management improvement opportunity
 - Carousel
 - Inventory management software
 - High-speed packager
 - Automated dispensing cabinet coordination
- Decreasing size of department



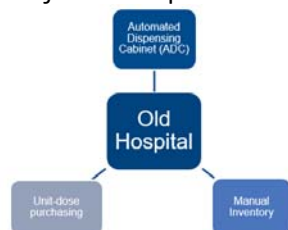
Primary Objective

- What technologies can we use to function in our reduced department space?
 - How can we maintain inventory with less space?

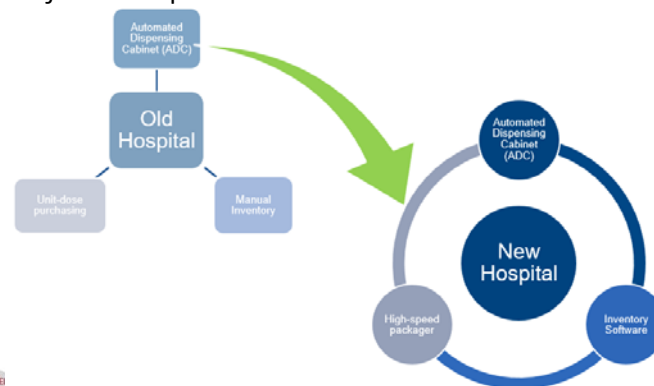
Carousel	Current	One Time	Monthly	Notes
2 Carousels plus additional software	NA	(\$63,344)	(\$7,049)	
Decrease square footage of pharmacy drug storage space needed by 1/3 (\$700/sf to build, \$3.23/sf utilities, \$5.04/sf for maintenance) ¹	NA	\$466,900	\$5,516	Decrease pharmacy drug storage square footage by 1/3 (2000 sq ft to 1333 sqft = 667 sq ft reduced)
Total Cost Savings		\$403,556	(\$1,533)	

¹ Benchmarking 2.0 Health Care Facility Management Report- Speaking their language. <http://www.hfmmagazine.com/articles/394-speaking-their-language>. Last accessed 7/20/16

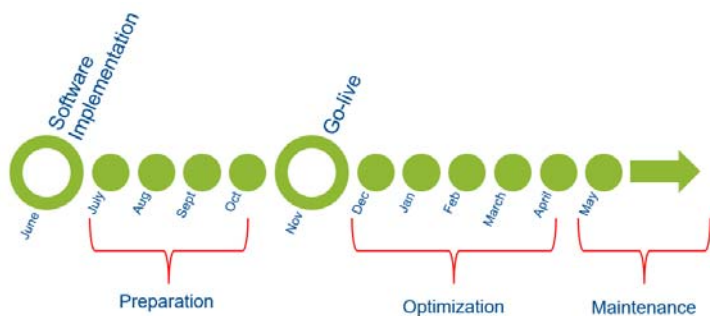
Project Purpose



Project Purpose

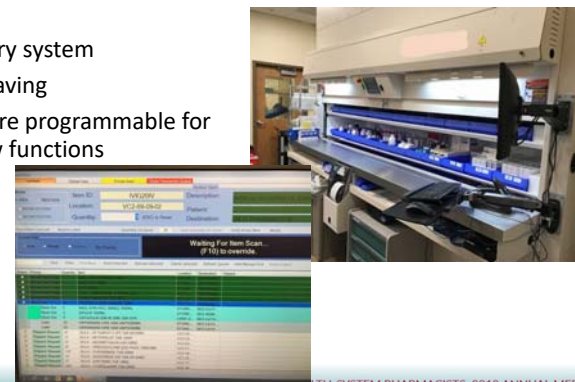


Timeline



Inventory Management System

- Carousel inventory system
- Space and cost saving
- Inventory software programmable for desired workflow functions



High-Speed Packager

- 3 modes of packaging: canister, free-pour, unit dose tray
- One way communication with carousel inventory system
 - Min and max levels in carousel can create queue in packager
 - Low canister quantity can not trigger action in carousel to "refill canister"

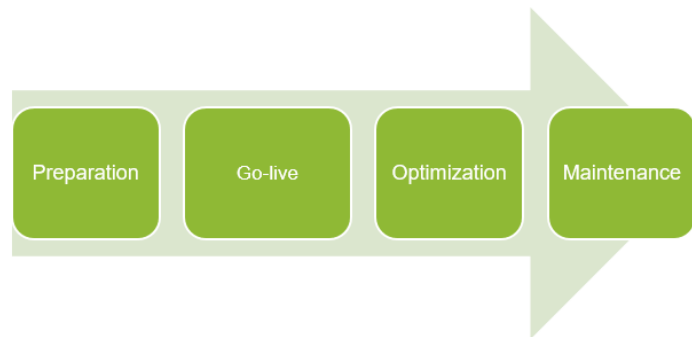


Automated Dispensing Cabinets

- Two way interface with EMR
- Communicates with carousel to drive technician workflow
- Expanded patient care areas with new hospital
 - Conversion of old cabinets
 - Addition of new cabinets



Methods



Preparation

- Organization & randomization of 2 carousels
 - Carousel 1: Unit dose tablets and liquids + common premix IVs
 - Carousel 2: Bulk bottles + IV room medication
- Coordination of inventory revolved around:
 - Type: Bulk bottles (liquids and tablets), unit dose, premix IV solutions, IV room medications
 - Physical: Weight and height (tall shelves)
 - Safety: look alike sound alike, strength
- Order of first set of packager canisters



Go-live

- New EMR conversion & hospital move
- Physical move of inventory to 2 carousels
- Validation of ~100 packaging canisters
- Move 48 old ADCs to new facility
- Add 9 new ADCs at new facility



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Optimization

- Needed a better solution to managing inventory
- Carousel:
 - Adjustment of min and max unit dose levels
- ADCs:
 - Evaluation of vend/refill ratio
 - Stock out %
- Packager:
 - Analyze monthly cabinet pulls
 - Order second set of canisters



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Maintenance

- Ongoing coordination with pharmacy buyer
 - Heavy resident work at project implementation
 - Independent maintenance work by pharmacy buyer
- Carousel & ADCs:
 - Automatically generate reports
 - Create scorecards
- Packager:
 - Third canister order + recycle canisters



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Results



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Maximizing Carousel

- Fine tune minimum and maximum levels on unit dose
 - Drive bulk inventory management

	Min	Max
Slow: ≤ 49 meds	3 days	7 days
Medium: 50-199 meds	5 days	10 days
Fast: ≥ 200 meds	7 days	14 days

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1. Row Labels	Sum of Quantities																									
2. ACTOFASTAB	2533	91	182	243	406	568	109	230	237	750	N															
3. ADAPRODOL	1507	49	97	146	263	340	184	330	631	788	Y															
4. GABAPROCAP	1111	36	70	109	182	235	109	139	200	433	N															
5. VIOXX	854	28	55	83	138	181	50	100	130	340	N															
6. ACTOFASTAB	757	23	46	69	109	182	109	75	230	375	Y															
7. PRECORTAB	659	21	43	64	109	149	51	75	130	375	N															
8. GABAPROCAP	406	13	26	39	69	92	50	40	130	240	Y															
9. GABAPROCAP	374	12	24	36	60	84	100	40	130	240	N															
10. ADAPRODOL	349	12	24	36	60	84	50	40	130	240	N															
11. THEOPHYLLINE	324	10	20	30	50	70	20	30	120	130	N															
12. TOPROL-XL	282	9	17	26	42	58	30	60	130	180	Y															
13. FULVICIN	232	7	14	21	34	46	20	30	140	170	N															
14. FULVICIN	232	7	14	21	34	46	20	30	140	170	N															
15. ADAPRODOL	197	6	13	19	30	40	100	20	60	130	N															

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Cost Savings for Packager

- Estimated monthly savings = \$6,017.95
 - Added 105 additional new medications
- Increase in technician time likely offset by overall savings

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Cost Analysis Factors

	Pre Nov	Post Nov
Carousel	\$749,887.13	\$914,137.79
ADCs	\$5,785.66/machine	\$5,547.63/machine
High-speed packager	\$11,653.54	\$5,635.59
Average daily census	198	221
Inventory per patient	\$5,189.89	\$5,567.21

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Scorecard – Carousel Inventory

Carousel Inventory											
Activity Scorecard											
Monthly Cost (Q1H18)	Cost On Hand	# of meds	# of items	Cost above Max	In Potential Savings	Max Potential Savings	Map Potential Savings				
\$ 1,708,708.10	\$ 1,308,781.05	1,049	84,882	\$ 399,927.05	\$ 399,927.05	\$ 399,927.05					
Breakdown by Cost Level											
Monthly Cost	Cost On Hand	Min Cost Savings	Max Cost Savings	Monthly Cost	Cost On Hand	Min Cost Savings	Max Cost Savings				
Low	\$ 233,374.33	\$ 167,559.76	\$ 21,043.01	Low	\$ 1,284,417.18	\$ 1,000,789.45	\$ 283,627.73				
Medium	\$ 233,374.33	\$ 167,559.76	\$ 21,043.01	Medium	\$ 1,284,417.18	\$ 1,000,789.45	\$ 283,627.73				
High	\$ 233,374.33	\$ 167,559.76	\$ 21,043.01	High	\$ 1,284,417.18	\$ 1,000,789.45	\$ 283,627.73				
Top 10 Min Cost Savings											
Medication	Cost Savings	Current Max	Goal Max								
ALTEPLASE 100MG VIAL	\$ 48,227.63	5	0.3								
VELOCARD 250 MG VIAL	\$ 16,243.53	3	0.5								
INFUSION 100MG	\$ 12,987.29	20	0.7								
PERFUTAZO 100 MG	\$ 8,447.62	80	2.8								
DOXYFENILIN 100 MG VIAL	\$ 3,963.25	5	0.7								
DOXYFENILIN 100 MG VIAL	\$ 3,837.86	3	0.5								
DOXYFENILIN 100 MG VIAL	\$ 2,874.73	25	1.4								
DOXYFENILIN 100 MG VIAL	\$ 2,868.82	20	1.3								
DOXYFENILIN 100 MG VIAL	\$ 2,777.62	15	0.5								
SULFAMETHOXAZOLE 100MG VIAL	\$ 2,777.77	20	1.2								
Top 10 Qty Above Max											
Medication	Qty Above	Cost									
BAIC 0.5% VIAL	2,823	\$ 3,872.31									
BAIC 0.5% VIAL	2,787	\$ 3,888.72									
PERFUTAZO 100 MG	1,705	\$ 2,296.00									
DOXYFENILIN 100 MG VIAL	1,081	\$ 749.89									
BAIC 0.5% VIAL	1,041	\$ 1,465.90									
DOXYFENILIN 100 MG VIAL	1,041	\$ 1,465.90									
DOXYFENILIN 100 MG VIAL	831	\$ 541.48									
DOXYFENILIN 100 MG VIAL	687	\$ 616.77									
DOXYFENILIN 100 MG VIAL	681	\$ 30.00									

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Combining a high-speed packager with a carousel storage system can provide which of the following benefits?

- A. A cost saving opportunity
- B. Decreased efficiency of pharmacy personnel workflow
- C. A process that is totally dependent on pharmacist supervision
- D. Hinders coordination of automated dispensing cabinet medication replenishment



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IV Room Workflow System: Pros and Cons

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Contributors

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Hospital Sisters Health System

- 15 hospitals spanning both IL and WI
- PGY2 Pharmacy Informatics program based out of St. Elizabeth's hospital



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Learning Objective – Pharmacist and Technician

- Describe the pros and cons on using IV room workflow software



Background

- Institute of Safe Medication Practices (ISMP) report
 - 9% error rate in sterile products
 - Majority incorrect dose/strength

Safety Gaps in IV Workflow
Syringe pull-back method
Calculations
Product Selection
Error detections

Institute for Safe Medication Practices Sterile Preparation Compounding Safety Summit DRAFT OF THE PROCEEDINGS—Aug. 2012



Background

- ISMP Targeted Medication Safety Best Practices for Hospitals
 - Technology to assist in verification of compounded sterile products
 - Recommend barcode scanning
 - Workflow software should be used to augment manual processes



Proposed Revisions to the ISMP Guidelines for SAFE Preparations of Sterile Compounds, ISMP, 2016.



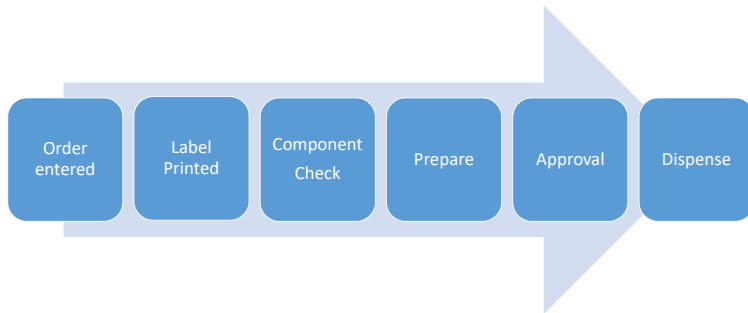
IV Workflow Systems

- Systems comprised of technologies that help with manual processes for preparing and verifying compounded products
- Examples:
 - Barcode scanning
 - Digital image capturing
 - Gravimetric verification
 - IV Robotics

ISMP Sterile Preparation Compounding Safety Summit: Guidelines for Safe Preparation of Compounded Sterile Preparations ISMP, 2013.



IV Workflow Systems



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Advantages of IV Workflow Systems

- Improved Safety
 - Automated dose calculations
 - Eliminating pull back method
 - Barcode scanning
 - Remote approval
- Historical Documentation
- Optimize/customize workflow

Safety Gaps in IV Workflow	Advantages
Syringe pull-back method	Image capturing
Calculations	Calculated in System
Product Selection	Barcode Scanning
Error detections	Automated tracking

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Barriers to IV Workflow Systems

- Time
- Increased informatics support
 - Inability to scan barcode
 - Technological troubleshooting
- Training
- Cost

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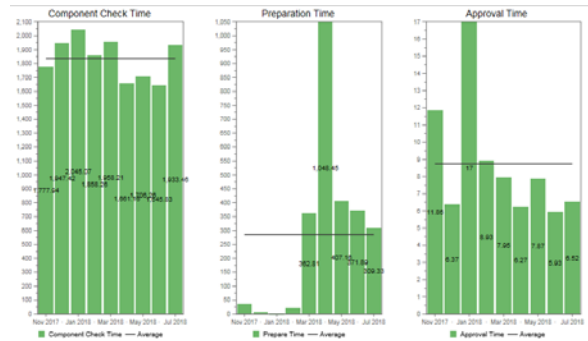
Institutional Overview

- Average: 220 - 280 IVs/day
- Bed size: 144 beds
- Live in November 2017
 - New hospital/EHR/workflow
 - 2 iPads
- Hazardous/Chemo room
- IV room

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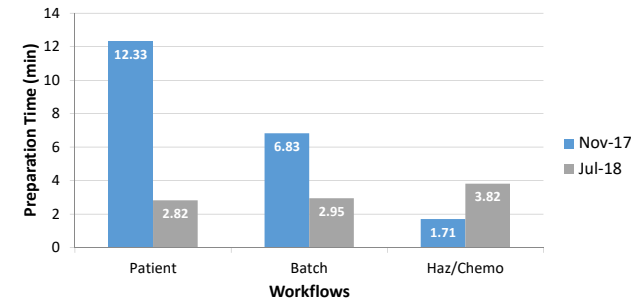
Reports



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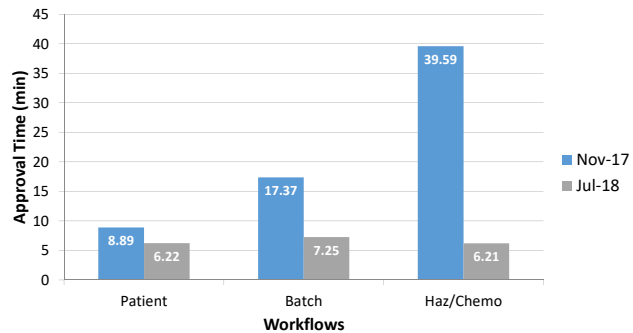
Reports: Preparation time



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Reports: Approval Time



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Reports

Reject Reason	November 2017	July 2018
Unspecified/Other	5	-
Wrong Dose/Volume	3	-
See Notes/Pharmacist	2	1
Missing Component Information	1	-
Missing Image	1	-

	November 2017	July 2018
Reject Rate	1.34%	0.05%
Error Rate	14.04%	3.2%
Total Compounded	890	1883

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Reports

November 2017

Top 5 Wrong Scanned Component	Number of Wrong Scans
Meropenem 1g Powder for solution for injection	42
Oxacillin Sodium 2g Powder for solution for injection	13
SODIUM CHLORIDE 0.9 % IV SOLN 250 ML	9
Cefepime Hydrochloride 2g Powder for solution for injection	9
ACYCLOVIR SODIUM 50 MG/ML IV SOLN	6
Total Wrong Scans	125

July 2018

Top 5 Wrong Scanned Component	Number of Wrong Scans
SODIUM CHLORIDE 0.9 % IV SOLN 100 ML	13
Oxacillin Sodium 2g Powder for solution for injection	10
EPINEPHRINE 1 MG/ML IJ SOLN	7
VANCOMYCIN HCL 500 MG IV SOLR	4
SODIUM CHLORIDE 0.9 % IV SOLN 500 ML	3
Total Wrong Scans	61

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Summary

- IV Workflow Systems detect human errors during sterile compounding
 - Barcode scanning can improve wrong product selection
 - Digital images document and detect errors missed by pull-back method
- IV Workflow Systems allows facilities to analyze the workflow

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Which of the following is NOT a benefit of using IV room workflow software?

- Removal of syringe pull-back method
- Remote approval
- Automated dose calculations
- Image capturing
- Reduced time spent

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Using Forms and Spreadsheets to Expedite Requests and Collect Documentation

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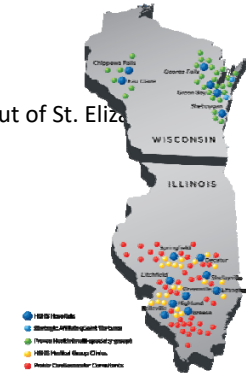


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Learning Objective – Pharmacist and Technician

- Explain how forms can be setup to expedite requests or collect documentation



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Background

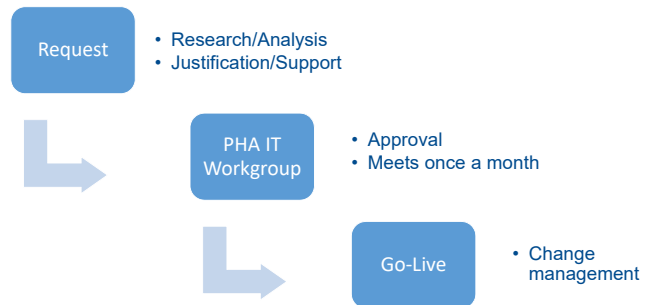
- Over 2017-2018, we began converting hospitals to one single EHR
- From 2011 to present we have had pharmacy IT workgroup
Comprised of:
 - Pharmacy Informaticists
 - Pharmacy Directors
 - Pharmacy Analysts
 - System pharmacy leaders
 - Evidence Based Medicine Coordinators



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Request Workflow



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Problems

- Everyone was moving to single build platform
 - Standardization
- Every request had the same workflow
- Not all requests required intense workup/discussion
- Delay in builder approval

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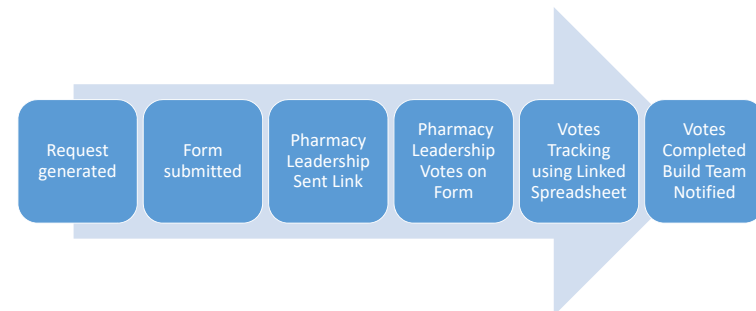
Solutions

- Create a process that operates outside of monthly meetings
- Create a tool for inputting requests
- Create a tool for collecting votes on requests

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Expedited Process



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Workflow Considerations

- Consensus
 - Required 100% consensus
- How to handle discussion needs?
 - Email
 - Move to meeting
 - Direct verbal clarifications
- Minutes inclusion
 - Add approvals to monthly agendas
- Who decides what is expedited?
 - Pharmacy Informatics



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Input Form



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Voting Form



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Google Form Considerations

- Map out your data
 - Easier to sequence in the beginning than the end
- Field presentation Drop-down, List, Check Boxes, Radio Buttons, Free Text
- Required Fields
- Should Drop-Down be synced?



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Google Form Considerations

- Is there any unique needs of this process?
 - Two different forms for one process
 - Prevent certain responses
 - Consider third party add-ons (eg. email notification for forms, form ranger)
- Do I need to send data to spreadsheet?

Google Sheets

- Landing place for data for each form

Timestamp	Does this request...	Who is requesting it?	SBAR Title	Situation	Background	Assessment	Recommendation
1/20/18 12:20:51 No							
2/14/2018 10:50:48 No			Add due time for irrigation drip rate code: CHG0075215	Shake vial with the vial per instructions	Occasionally in the chart		
2/14/2018 11:02:22 No			Prap instructions for Ambicome IV - CHG0079707	Prap instructions for Ambicome IV - CHG0079707	Prap instructions for Ambicome IV - CHG0079707	Prap instructions for Ambicome IV - CHG0079707	Prap instructions for Ambicome IV - CHG0079707

Timestamp	Site Title	T	Department	Site	Combined	Approval (Signature)	Approval (Date)	Approval (Timestamp)
01/10/18 12:43:05	Sperry and French Ave for under 7 years							
01/10/18 12:43:05	Sperry and French Ave for under 7 years							
01/10/18 12:43:05	Sperry and French Ave for under 7 years							
01/10/18 12:43:05	Sperry and French Ave for under 7 years							
01/10/18 12:43:05	Sperry and French Ave for under 7 years							
01/10/18 12:43:05	Sperry and French Ave for under 7 years							
01/10/18 12:43:05	Sperry and French Ave for under 7 years							
01/10/18 12:43:05	Sperry and French Ave for under 7 years							
01/10/18 12:43:05	Sperry and French Ave for under 7 years							

Google Sheets

- Tables for drop-downs

Pharmacy IT SBAR (Responses)				
Director Name	Site			
1	SMO			
2	SUS			
3	SFL			
4	FWO			
5	VWVO			
6	ISEO			
7	S.I.H.S.I.R.H.F.G.			
8	SAE			
9				
10				

Timestamp	Does this request...	Who is requesting it?	SBAR Title
1/20/18 12:20:51 No			
2/14/2018 10:50:48 No			Add due time for irrigation drip rate code: CHG0075215
2/14/2018 11:02:22 No			Prap instructions for Ambicome IV - CHG0079707

Google Sheets

- Add formulas to adjust data as needed

Filter	Status	Approval Votes	Rejection Votes	Discussion Votes	Total votes
		8/8	0/0	0/0	8/8
entration of 4 mg/mL. Shake vial for 30 seconds. Vent vial to approved	approved	8	0	0	8
	approved	8	0	0	8
	approved	8	0	0	8

Google Sheet Considerations

- Auto-save automatic and no way to turn off
- Excel formulas and Google Sheet formulas are not always equivalent
 - Pivot tables are possible
- Consider using an array formula to repeat a result for each new form submission
- If syncing a drop down, do you want it auto-removed with a certain condition
 - Use If statement to create blank



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ILLINOIS COUNCIL OF HEALTH SYSTEM PHARMACISTS, 2018 ANNUAL MEETING

Results

- 41 expedited requests since February 2018
- 1 rejection
- 5 required additional discussion
- 85.3% approval rate



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ILLINOIS COUNCIL OF HEALTH SYSTEM PHARMACISTS, 2018 ANNUAL MEETING

Conclusion

- Google Forms/Sheets can be effective tools
- Creating a process outside of meetings can be impactful
 - More time for review and reduce monthly agenda items



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ILLINOIS COUNCIL OF HEALTH SYSTEM PHARMACISTS, 2018 ANNUAL MEETING

Which is NOT a consideration for building a form?

- Review if data should be submitted in drop-down instead of radio button
- Build the form first and adjust as you go
- Create a linked spreadsheet to manipulate and review submitted data
- Consider third party add-ons (eg. Form Ranger, email notification for forms)



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ILLINOIS COUNCIL OF HEALTH SYSTEM PHARMACISTS, 2018 ANNUAL MEETING

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Questions

