Tales from the Command Center: Opportunities for Oncology Pharmacy Operational Optimization

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Learning Objectives

- At the completion of this program, the participant will be able to:
  - Identify key measures of oncology pharmacy operations optimization
  - Describe best practices and future directions in oncology pharmacy operations
  - Summarize the role of the pharmacist and technician in optimizing oncology pharmacy operations
From the Front Lines...

...to Command Central
The “CHIP”

CHIP Operations

- Approximately 6,500 dispenses per month
  - Majority parenteral hazardous
- Provides all chemotherapy and biotherapy needs of medical center (inpt/outpt)
  - Second check/back up staff for three satellite infusion centers
- Hours of operations:
  - M-F: 0700-2300
  - S/S/H: 0700-1530
CHIP Operations

- Staff
  - Oncology Operations Pharmacists: 10.5
    - 2 FTE’s dedicated to IDS
  - Oncology Operations Technicians: 11.5
    - 2 FTE’s dedicated to IDS
  - Pharmacy Operations Specialist: 1
  - Oncology Operations Manager: 1
Oncology Operations Priorities

- Safety
  - Prevention of errors
- Delivery
  - Optimize turn-around-time
- Inventory Management
  - Increase turn rates
  - Minimize waste

Prevention of Chemotherapy Medication Errors

- Purpose
  - “...define best practices for the safe use of chemotherapy and biotherapy agents and to assist practitioners in improving their medication-use systems to prevent medication errors and patient harm from these agents.”

Prevention of Chemotherapy Medication Errors

■ Outline
  ■ Recommendations for healthcare organizations
  ■ Recommendations for multidisciplinary monitoring of medication use and verification
  ■ Recommendations for prescribing systems and prescribers
  ■ Recommendations for medication preparation and dispensing systems and roles for pharmacists
  ■ Recommendations for medication administration systems and roles for nurses
  ■ Recommendations for patient education
  ■ Recommendations for manufacturers and regulatory agencies
  ■ Recommendations for identifying and managing medication errors


Prevention of Chemotherapy Medication Errors

■ Recommendations for healthcare organizations
  ■ Education, competency, and credentialing
    ■ What requirements do you have for oncology staff?
    ■ What is included (documented) in orientation?
    ■ What continuing education opportunities exist?
  ■ Communication and access to information
    ■ Do staff have all information they need?
    ■ Are chemotherapy orders accurate and complete?
  ■ Standardize medication ordering
  ■ CPOE
    ■ If implementing, talk to your colleagues!

Prevention of Chemotherapy Medication Errors

Prevention of Chemotherapy Medication Errors

- Recommendations for prescribing systems and prescribers
  - “Healthcare providers should locally develop standardized dosage and administration schedule modifications for each chemotherapy medication.”
  - Does your institution prepare and administer blinatumomab according to the FDA-approved product information?
  - Does your institution have a chemotherapy policy or guideline?
    - Suggested details for inclusion provided
    - Oral chemotherapy should be included


Prevention of Chemotherapy Medication Errors

- Recommendations for medication preparation and dispensing systems and roles for pharmacists
  - Standardized medication preparation
    - Chemotherapy compendium
  - Quality assurance and improvements
    - Structured medication error procedure
  - Standardized drug procurement and storage
    - Avoid sound-alike, look-alike confusion
    - Avoid multiple vial strengths/concentration
  - Standardized labeling
    - Preventing wrong route of administration

Optimization of Turn-Around-Time

- Baseline turn-around-time: 60 minutes
- Interim turn-around-time goal: 45 minutes
- Goal turn-around-time: 30 minutes

Optimization of Turn-Around-Time

- Lean/Six Sigma Methodology
  - Based on Toyota Motor Corporation process improvement strategies
  - Goal to have all employees complete formal training (Yellow Belt) upon hire

Optimization of Turn-Around-Time

- **Phase I**
  - Initial formalized turn-around-time assessment post-interim goal

- **Phase II**
  - Implementation of experiments using Lean principles in controlled setting

- **Phase III**
  - Follow-up evaluation of turn-around-time post-implementation

Optimization of Turn-Around-Time

<table>
<thead>
<tr>
<th>Variable</th>
<th>Phase I</th>
<th>Phase II</th>
<th>Phase III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total turnaround time</td>
<td>44 ±18</td>
<td>37 ±24</td>
<td>26 ±17</td>
</tr>
<tr>
<td>OK to treat to time placed on prep table</td>
<td>12 ±11</td>
<td>15 ±15</td>
<td>7 ±6</td>
</tr>
<tr>
<td>Prep table to technician start</td>
<td>9 ±10</td>
<td>5 ±8</td>
<td>3 ±4</td>
</tr>
<tr>
<td>Technician prep</td>
<td>6 ±5</td>
<td>4 ±5</td>
<td>4 ±4</td>
</tr>
<tr>
<td>End of prep to pharmacist check</td>
<td>8 ±7</td>
<td>4 ±5</td>
<td>2 ±3</td>
</tr>
<tr>
<td>Pharmacist check</td>
<td>2 ±1</td>
<td>2 ±1</td>
<td>2 ±1</td>
</tr>
<tr>
<td>Pharmacist check to delivery</td>
<td>6 ±4</td>
<td>7 ±4</td>
<td>8 ±4</td>
</tr>
</tbody>
</table>


Optimization of Turn-Around-Time

- Possible Explanations
  - Cleanroom pharmacist focused on product check
  - Non-cleanroom pharmacists conduct double check process
  - Technician preparation from batch to one-piece flow
  - Reorganization of stock
  - Implementation of pre-mix process (Ph II to III)

Optimization of Turn-Around-Time

- Conclusions
  - Each oncology pharmacy operation should have a structured approach to measuring turnaround time
  - Lean six sigma principles can improve workflow and efficiency in an adult oncology infusion clinic


Inventory Management
Inventory Management

- Inventory Turnover Rates
  - Inventory Turnover = Cost of Good Sold ÷ Average Inventory
  - Low inventory turnover can be a result of overstocking
  - High inventory turnover may lead to increased risk of stock outs
  - CHIP goal turnover rate: 14
Inventory Management

Managed Inventory Tones

Inventory Management

It's not WASTE until it's WASTED!

- PLASTICS—14% containers, tops, bags, etc.
- CONSTRUCTION & DEMOLITION—13.9% wood, carpet, asphalt, etc.
- METALS—6.5% beverage cans, "white goods," steel components, etc.
- ORGANICS—20.6% food, leaves, manure, etc.
- OTHER MATERIALS—11.6% tires, textiles, bulky items, etc.
- ELECTRONICS—3.3% TVs, computers, printers "brown goods," etc.
- HOUSEHOLD HAZARDOUS WASTE—2.2% paint, batteries, fluorescent, etc.
- GLASS—2.2% bottles, jars, composite pails, etc.
Unused Preparation

- Pharmacy
  - Incorrect Preparation
  - Prepared too early (Pre-mixing)
  - Prepared but med discontinued
- RN
  - Premature “OK to Treat” (Out Pt)
  - Scheduling Error
  - Patient Reaction (Direct vs Indirect)
  - Timely return if unused
- MD
  - Premature “OK to Treat” (In Pt)
  - Ordering Error
  - MD changes mind

Vial Waste

- Pharmacy
  - Full vial extraction
  - Vial breaks
  - Filtering
  - BUD Prioritization
  - Organizing partial vials
- MD
  - Optimizing batching
  - Scheduling same drug on same day
  - DVO
  - Incorrect preparation
  - PSS/ Storage error
  - Coring
Re-Purposing of Returned Drugs

<table>
<thead>
<tr>
<th></th>
<th>WASTED</th>
<th></th>
<th>RE-PURPOSED</th>
<th></th>
<th>% RE-PURPOSE</th>
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<tbody>
<tr>
<td></td>
<td>#DOSES</td>
<td>COST</td>
<td>#DOSES</td>
<td>COST</td>
<td></td>
</tr>
<tr>
<td>Apr 2013 - Dec 2014 Total</td>
<td>1037</td>
<td>$429,961.90</td>
<td>92</td>
<td>$29,761.34</td>
<td>9%</td>
</tr>
<tr>
<td>Jan-15</td>
<td>70</td>
<td>$38,656.19</td>
<td>2</td>
<td>$1,825.53</td>
<td>3%</td>
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<tr>
<td>Feb-15</td>
<td>59</td>
<td>$24,012.61</td>
<td>7</td>
<td>$4,948.14</td>
<td>11%</td>
</tr>
<tr>
<td>Mar-15</td>
<td>39</td>
<td>$7,050.94</td>
<td>19</td>
<td>$17,260.82</td>
<td>33%</td>
</tr>
<tr>
<td>Apr-15</td>
<td>14</td>
<td>$2,375.92</td>
<td>6</td>
<td>$2,646.78</td>
<td>30%</td>
</tr>
</tbody>
</table>

- Increase in re-purposing of returned drugs
- Move tracking sheet of returned drug from clean room to CHIP pharmacist

Single-Dose Vial Extension

- **USP <797>**
  - States single-dose vials opened and maintained in an ISO class 5 environment may be used for up to 6 hours post-puncture
  - Adherence to this 6 hour cutoff results in significant waste
  - Extension of this cutoff could result in significantly reduced waste and cost savings

Single-Dose Vial Extension

- Three Phases
  1. Theoretical Cost Modeling
  2. Actual Waste Calculation
  3. Testing of Microbial Contamination
- Nineteen Chemo/Biotherapy Agents Tested
- Closed-System Transfer Device (CSTD) (Phaseal) used in all preparations


Single-Dose Vial Extension

- Phase I (Theoretical Model)
  - Total cost of drugs wasted (2009 prices)
    - $766,709 annually

- Phase II (Actual Model)
  - Total cost of drugs wasted (2009 prices)
    - $770,888 annually

Single-Dose Vial Extension

### Positive Samples Per Time Period

<table>
<thead>
<tr>
<th>Sample</th>
<th>6 Hours</th>
<th>24 Hours</th>
<th>48 Hours</th>
<th>72 Hours</th>
<th>7 Days</th>
<th>14 Days</th>
<th>Total</th>
<th>Overall Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Drug (n=322)</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>1.86</td>
</tr>
<tr>
<td>TSB Control (n=270)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1.85</td>
</tr>
<tr>
<td>Total (n=592)</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>11</td>
<td>1.86</td>
</tr>
</tbody>
</table>


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Single-Dose Vial Extension

- Cost-savings realization study at Walter Reed Medical center
- Extension of beyond-use-date using CSTD (Phaseal)
- Mean potential percentage of drug waste was 57%
- Actual savings over 50-day observation was $96,348 which represents annual savings of $703,047

Inventory Management

- Conclusions
  - Real-time inventory management can assist in ensuring appropriate inventory turn-rates
  - Small daily practice changes can result in significant reductions in waste
  - Single-dose vial extension has demonstrated significant cost savings

Oncology Operations Optimization

- Pharmacy staff must be aware of the latest strategies and practices to prevent errors with chemotherapy
- Structured approaches to streamlining workflow can result in reduced turnaround-time
- Due to the high cost of oncology drugs, optimal management of inventory can have significant financial impacts