CPOE Implementation with Chemotherapy Orders for Inpatient-Outpatient Population

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Objectives

- The learner will understand the decisions behind implementation
- The learner will understand the complexity of:
  - Oncology Specific Challenges
  - Chemotherapy Orders
  - Workflow between outpatient and inpatient
  - Special chart transfers—close chart..transfer ADT
    Problems.
- The learner will understand “Lessons Learned”
Oncology Setting

- NCI-designated comprehensive cancer center
- CPOE had been deployed throughout all inpatient units in the hospital; oncology was last
- Web-accessible pre-printed standard chemotherapy order sets had been used in the department for up to 10 years; Separate chemotherapy order section in patient’s chart
- Well established policies and procedures for ordering and administration of chemotherapy
- Encompassed five inpatient units with multiple oncology services and chemotherapy orders; Two of the five units also provide critical care beds to the inpatient oncology units
- Required inclusion of chemotherapy orders/eMAR crossover into a unique intensive inpatient/outpatient clinic (IPOP)
## Oncology Units

<table>
<thead>
<tr>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IPOP</strong> - Intensive</td>
<td>Open 365 days</td>
</tr>
<tr>
<td>Ambulatory Inpatient/Outpatient</td>
<td>Open 7:00 a.m. to 7:30 p.m.</td>
</tr>
<tr>
<td></td>
<td>Average 35 patients daily</td>
</tr>
<tr>
<td><strong>Combined Unit</strong></td>
<td>15 bed unit - IMC beds</td>
</tr>
<tr>
<td><strong>BMT Unit</strong></td>
<td>16 bed unit – critical care and IMC beds</td>
</tr>
<tr>
<td><strong>Leukemia Unit</strong></td>
<td>16 bed unit - critical care and IMC beds</td>
</tr>
<tr>
<td><strong>Solid Tumor Unit</strong></td>
<td>16 bed unit - IMC beds</td>
</tr>
<tr>
<td><strong>Hematology Unit</strong></td>
<td>8 bed unit</td>
</tr>
</tbody>
</table>
Modular Approach to Order Sets

Existing Order Sets Reviewed For Common Elements

Common Elements Combined To Create Modules & Templates

- Pre-Medication
- Anti-Emetics
- Hydration
- Notification Parameters

Modules Combined With Unique Requirements To Create Order Sets
Team Planning for Oncology

- Design Team Meetings
  - Pediatric Oncology
  - Gynecology Oncology
  - Medical Oncology
    - Lots of meetings to discuss design for continuity
    - Agreed to not Go-Live without Chemotherapy Orders
- Workflow Meetings
- Implementation Meetings
Prior to Go-Live the nursing staff had been using Eclipsys (Emtek) eMAR with interface to BDM (GE Pharmacy system) with uni-directional interface to pharmacy

Prior to Go-Live, pharmacy handled all timing and rescheduling of medications and regimens

Volume of blood products

Admissions – Transfers in services and levels of care; billing

Pre-admit status – Need for pharmacy and attending approval of chemotherapy

Role of Attending Physician in Oncology

Role of Residents in Oncology
Oncology Specific Challenges - Chemo

- Security is defined by rigorous institution chemotherapy policy
- Security level in signing off chemotherapy orders differs from all other medication orders in the hospital
- Tracking chemotherapy for each dose ordered and administered
- Standardized chemotherapy order sets versus research versus generic chemotherapy template and individualized plans
- Role of Attending Physician in Oncology
- Rigorous chemotherapy administration checklist

<table>
<thead>
<tr>
<th>Fellow/Research nurse enters orderset</th>
<th>Pending verification and on hold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attending Reads-Verifies-Signs orderset</td>
<td>Preliminary and still on Hold</td>
</tr>
<tr>
<td>Nurse performs chemotherapy checks and releases orderset</td>
<td>Active and no longer on hold</td>
</tr>
</tbody>
</table>

Pharmacy now has the orderset
Workflow of chemotherapy is complex, sequential, and time sensitive: Example - Sarcoma Regimen

- Day 1: Hydration prior to Mesna Bolus (Continues until urine output >100 ml/hr for 4 consecutive hours)
- Days 1-4: Hydration with additives to begin with Mesna Bolus
- Day 1: Mesna Bolus over 2 hours prior to Ifosfamide
- Days 1-5: Antiemetics, first dose prior to Ifosfamide
- Days 1-4: Albumin in select patients
- Days 1-3: Mesna, 24 hour Continuous Infusion to begin with Ifosfamide
- Days 1-4: Ifosfamide over 3 hours
- Days 1-3: Doxorubicin, 24 hour Continuous Infusion to begin with Ifosfamide
- Day 4: Mesna, 12 hour Continuous Infusion to begin with Day 4 Ifosfamide
IPOP: Inpatient Outpatient Clinic

- Intensive Ambulatory Clinic open 365 days/year 7:00 a.m. -7:30 p.m.
- BMT and Hematologic malignancy outpatient population
- Complicated leukemia/lymphoma trials
- High acuity patients
- Staffed by rotating inpatient nurses
- Uses the same electronic documentation systems and shares the same electronic chart
IPOP

- **Continuum of Care Medical Record**
  - CPOE chart creation (registration/insurance clearance issues)
  - Chart close versus chart transfer to and from inpatient units and IPOP clinic

- **Chemotherapy Continuation Policy**
  - Conversion from paper to CPOE

- **Unique Outpatient challenges:**
  - Prescription management/Overdue task cleanup
  - Self Administration/Eclipse balls
  - Lab management
Multidisciplinary Implementation team (I Team) started meeting 10 months before Go-Live

- Concerns regarding flow of patients between physical units, IPOP, level of care, and services
- Provider time commitment required for the preparation prior to, during, and post Go-Live
- Training system, scenarios, and training schedule for all staff
- Number of clinical and IT resources for Oncology training, chart preparation, activation, and post-activation support
Decisions Regarding Implementation

- **Timeline:**
  - Big Bang or
  - Multi-Day

- **Sequence:**
  - Service by Service or
  - Unit by Unit
Mock Chart Preps

- Multidisciplinary Teams got together with IT Team to walk through preparing charts and entering the orders into the training system

Oncology staff participated in testing for the IT Team; Oncology pharmacists performed all chemotherapy medication testing

Chart prep occurred two days prior to Go-Live for each unit; Staff began cleaning charts (discontinuing unnecessary orders, obtaining clarification, etc.) prior to chart prep
Teams

- Preparation – chart summarization and orders entered on hold was accomplished four days prior to unit activation.
  - Clinical Nurse Specialist, Pharmacy Clinical Specialist, Fellow/NP, Attending (for Chemo), Nurse Super User, Decentralized Pharmacist, PharmIS, IT personnel

- Staging – updated orders and entered chemotherapy.
  - Clinical Nurse Specialist, Pharmacy Clinical Specialist, Fellow, IT personnel
<table>
<thead>
<tr>
<th>Activity</th>
<th>Before Friday (1-4 Days before)</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chart Clean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chart Prep/Stage</td>
<td></td>
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<tr>
<td>Activation</td>
<td></td>
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<td></td>
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<tr>
<td>Post Activation</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Legend:
- IPOP
- BMT
- Combined
- Solid Tumor
- Leukemia
- Hematology
## Activation Chart Counts by Location

<table>
<thead>
<tr>
<th>Location</th>
<th>Prep/Staging Team(s)</th>
<th>Activation Team(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPOP</td>
<td>2 Teams</td>
<td>2 Teams x 60 Charts</td>
</tr>
<tr>
<td>Combined</td>
<td>2 Teams</td>
<td>2 Teams x 15 Charts</td>
</tr>
<tr>
<td>BMT</td>
<td>2 Teams</td>
<td>2 Teams x 16 Charts</td>
</tr>
<tr>
<td>Leukemia</td>
<td>2 Teams</td>
<td>2 Teams x 16 Charts</td>
</tr>
<tr>
<td>Solid Tumor</td>
<td>2 Teams</td>
<td>2 Teams x 16 Charts</td>
</tr>
<tr>
<td>Hematology</td>
<td>1 Team</td>
<td>1 Team x 8 Charts</td>
</tr>
</tbody>
</table>
How are we doing?

Since October, 2009

- 8970 Chemotherapy orders sets entered
- 6494 Chemotherapy orders sets released
- 18,355 Chemotherapy doses administered
Lessons Learned

- Repeated “Mock” activations to help better define the staff roles and pitfalls during activation
- Mandatory training for all users
- Enrolling the help of the Oncology Fellowship Program to bridge gap between rotating house staff and Oncology
- During activation –daily wrap up meetings to “fix” problems and distribute last minute education
- Establishment of robust “command center” manned by IT specialists involved in the Oncology build-24 hr a day
- Oncology “Boot Camp” for IT support Team
Lessons for future opportunity

- Improve training of all types of super users; Including different views for each type of user is helpful for the super user to understand their specific workflow.
- Defined the “preferred method” for completing a task as there are multiple ways of arriving at the same end point but some are more complex and the multiple choices create confusion.
- Have a physician champion for each service to drive adoption and resolve challenges within their specialty.
Chemotherapy - SCOl06

![Chemotherapy - SCOl06 Image](image-url)
### Lifetime Anthocyacline Dose

- **Dose**: 50 mg/kg
- **Route**: IV
- **Frequency**: once
- **Duration**: 1 Day
- **Start Date**: 05/07/2010
- **Base Solution**: D5W 250 ml
- **Comments**: Infuse over 1 hour

### Chemotherapy Medications

<table>
<thead>
<tr>
<th>Order</th>
<th>Dose (mg/kg/Dose)</th>
<th>Route</th>
<th>Frequency</th>
<th>Duration</th>
<th>Start Date</th>
<th>Base Solution</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50 mg/kg/Dose</td>
<td>IV</td>
<td>once</td>
<td>1 Day</td>
<td>05/07/2010</td>
<td>D5W 250 ml</td>
<td>Infuse over 1 hour</td>
</tr>
</tbody>
</table>

### Nursing

- **Vital Signs**: T q5min Routine
- **Instructions/Comments**: Baseline - Pre Infusion
- **Additional Instructions**: If clinical deterioration, q5 minutes until resolution of symptoms except fever, if clinical deterioration requiring dose reduction or interruption of infusion, q15.
- **Vital Signs**: T q5min Routine
- **Instructions/Comments**: Baseline - Pre Infusion
- **Additional Instructions**: If clinical deterioration, once 1 hour following completion of infusion.