Chemotherapy Order Management System (COMS)

Electronic Ordering and Administration Documentation for Oncology

Michael J Kelley, MD
National Program Director for Oncology
Poll Question #1

My primary role in the VA is __________.

- Research investigator
- Physician
- Pharmacist
- Data manager
- Other (specify)
Poll Question #2

My primary role in the care of Veterans is ________.  

- Oncology Specialty Care Provider  
- Quality Manager  
- Pharmacist  
- Researcher  
- Other (specify)
Outline

- History and current state of chemo ordering
- Business requirements
- COMS component modules and architecture
- COMS pilot software
- Development team and contact information
Current State of Chemotherapy Ordering in VHA

- Largest integrated health care system
- Increasing incidence of cancer
- Increasing complexity of anti-cancer drugs
- Limited direct order entry
  - COTS product
  - CPRS
- Paper orders common
Chemotherapy has a narrow therapeutic window
  ◦ High toxicity
  ◦ Low tolerance for error
Implementation of Electronic Health Record in VHA in late 1990s did not accommodate chemotherapy ordering
Multiple requests for electronic ordering of chemo dating to early 2000s
In 2009, VA Center for Innovations Employee Innovation Competition selected chemotherapy ordering
Business Requirements

• National set of chemotherapy order templates
• Standardization of calculation method of dose and dose rounding
• Standard documentation for chemotherapy treatment plans, administration, and summaries
  ▸ Accommodation of local facility policies for clinical preferences/processes
  ▸ Exportability of chemotherapy templates
  ▸ Fulfills legal and professional requirements,
    ◦ Joint Commission compliance
    ◦ Documentation in VistA
    ◦ Enhances patient safety
COMS Components

- **Chemotherapy Template Order Source (CTOS)** – central library of vetted chemotherapy regimen templates plus functionality to create, download, and modify templates
- **Order Entry Management (OEM)** – application of a template to a patient with dose calculation and order editing and entry
- **Treatment Documentation (TD)** – tool to document drug administration
- **Flow Sheet (FS)** – matrixed time-line of oncology-relevant clinical data
- **End of Treatment Summary (EoTS)** – a chronological history of oncological diagnosis, treatment, toxicity, tumor response, and recommendations for future care
COMS Architecture

**COMS**
- Chemotherapy Template Order Source
- Flow Sheet
- Order Entry Management
- Nursing Documentation
- End of Treatment Summary

**Integration**
- COMS Backend Database
- VistA Communication Framework
- RESTful Web Services
- Bi-directional Data Exchange
- MDWS Data Exchange
- FileMan Data Exchange

**VistA**
- Oncology
- Laboratory
- Pharmacy
- Other Data Sources
- Master Patient Index
- MUMPS Package
- FileMan
- MDWS
COMS Architecture: CTOS Module

CTOS #1
Create Template

CTOS #2
Modify Template

CTOS #3
Apply Template
(with clinical option)

CTOS #6
Indicate Clinical Trial or Amputation

CTOS #4
Edit Template Applied to Patient

CTOS #5
View Template Previously Applied

Provider

Provider, Nurse, or Pharmacist
**Chemotherapy Order Management System (COMS)**

**Proof of Concept - Demo System**

Welcome Programmer, All Roles -- Help Switch to High Contrast Mode

### Patient Selection

Enter a range of Administration Dates to search

**From:** 10/06/2014  
**To:**

Select Patient by Administration Date(s)

**OR**

Enter Patient Identification (SSN) to query CPRS

**Patient Identification (SSN):**

Query CPRS for Patient

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Note: The Innovations Sandbox/Future Technology Lab contains hundreds of available patients with a numeric last name and "Patient" first name. To search for a patient, use the first letter from the spelling of the number, a zero, and the three digit number itself.

For example, "ThreeHundredTwenty, Patient" is available as t0320 or T0320;
"OneHundredThirty, Patient" is available as c0130 or 00130 (where the first character is the letter "Oh" as opposed to the number "Zero").

Due to multiple users accessing patients throughout the COMS Enhancement Period, patients will be allocated as follows:

- VHA/OI&T Stakeholders may use the 100, 200, and 300 series
- Implementation Readiness Analysis and Review Team may use the 400 series
- Development Team may use the 500 series

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**CANCER CHEMOTHERAPY IV ORDER SHEET**

Max Number of Cycles: 4  Cycle Length: 4 Weeks
Chemotherapy Regimen Name: 2014-1-0001-ABCD-CARBOPLATIN INJ 250CISPLATIN INJ,SOLN 300DIPHENHYDRAMINE CAP,ORAL 75-20140605
Description: COMS Testing
Emetogenic level: Moderate
Febrile Neutropenia risk: 12 %
Reference: No Clinical Reference - COMS Testing

### Pre Therapy

Instructions: Pre-Therapy Medications for COMS Testing

<table>
<thead>
<tr>
<th>Sequence #</th>
<th>Drug</th>
<th>Dose</th>
<th>Route</th>
<th>Administration Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RANITIDINE TAB</td>
<td>150.000 mg</td>
<td>Oral</td>
<td>1-28</td>
</tr>
<tr>
<td></td>
<td>Fluid/Volume:</td>
<td></td>
<td>Infusion Time:</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DEXAMETHASONE INJ,SOLN</td>
<td>20.000 mg</td>
<td>IVPB</td>
<td>1-28</td>
</tr>
<tr>
<td></td>
<td>Fluid/Volume:</td>
<td>D5W 50 ml</td>
<td>Infusion Time:</td>
<td>0 hrs / 30 min</td>
</tr>
<tr>
<td>3</td>
<td>DILTAZEM INJ</td>
<td>400.000 MicroGram</td>
<td>IVP</td>
<td>1-28</td>
</tr>
<tr>
<td></td>
<td>Fluid/Volume:</td>
<td></td>
<td>Infusion Time:</td>
<td></td>
</tr>
</tbody>
</table>

Patient to ingest prior to chemotherapy
Administer in dextrose to stabilize blood sugar
Provide IV push to control tachycardia

### Therapy

Instructions: Therapy Medications for COMS Testing

<table>
<thead>
<tr>
<th>Sequence #</th>
<th>Drug</th>
<th>Dose</th>
<th>Route</th>
<th>Administration Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CARBOPLATIN INJ</td>
<td>250 AUC</td>
<td>IVPB</td>
<td>1-28</td>
</tr>
<tr>
<td></td>
<td>Fluid/Volume:</td>
<td>Ringer's Lactate 50 ml</td>
<td>Infusion Time:</td>
<td>0 hrs / 30 min</td>
</tr>
<tr>
<td>2</td>
<td>CISPLATIN INJ,SOLN</td>
<td>300 mg</td>
<td>IV</td>
<td>1-28</td>
</tr>
<tr>
<td></td>
<td>Fluid/Volume:</td>
<td>Ringer's Lactate 500 ml</td>
<td>Infusion Time:</td>
<td>3 hrs / 0 min</td>
</tr>
<tr>
<td>3</td>
<td>DIPHENHYDRAMINE CAP,ORAL</td>
<td>75 mg</td>
<td>Oral</td>
<td>1-28</td>
</tr>
</tbody>
</table>
COMS: Current Development

- Currently in enhancement phase
  - Stakeholders access test environment
  - Developer-led demonstrations every three weeks with feedback from stakeholders
- Pilot deployment in November 2014
  - Durham VAMC
  - Puget Sound Health Care System (Seattle VAMC, Tacoma VAMC)
- Pilot period runs through August 2015
### Examples of Enhancements and Corrected Defects

<table>
<thead>
<tr>
<th>Closed Enhancements - 54 Items</th>
<th>Closed Defects - 33 Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exact Minute Documentation</td>
<td>COMS Error - Loading Patient Data</td>
</tr>
<tr>
<td>Name for ND Module</td>
<td>ND Module / Treatment Panel - Entries Disappear when Signing</td>
</tr>
<tr>
<td>Medication Selection (IVP &amp; fluids)</td>
<td>Processing of Performance Status Updates</td>
</tr>
<tr>
<td>Rename Patient History Panel to Patient Vitals</td>
<td>Patient Failed to Load</td>
</tr>
<tr>
<td>Quick View of Last/Next Administration Dates - FS &amp; TD</td>
<td>COMS Logout Functionality</td>
</tr>
<tr>
<td>Managing Delivery Mechanism Documentation Options</td>
<td>Unique Name Templates</td>
</tr>
<tr>
<td>Security of Verify Codes</td>
<td>Site Appearance Symptoms</td>
</tr>
<tr>
<td>Printing Templates</td>
<td>TD Module Permitted Future Time Entry</td>
</tr>
<tr>
<td>Template Saving</td>
<td>Display of COMS-generated Template Names</td>
</tr>
<tr>
<td>Remove Drug Functionality</td>
<td>Incorrect Message for Success of Template Applied</td>
</tr>
<tr>
<td>Recently Used Templates</td>
<td>Template Failed to Fully Apply</td>
</tr>
<tr>
<td>Body Location for Temperature</td>
<td>Misaligned Performance Status Pop-Up</td>
</tr>
<tr>
<td>Rationale for Changing Templates</td>
<td>Remove Drug Confirmation for Therapy Medications</td>
</tr>
<tr>
<td></td>
<td>Incomplete Display of Treatment Regimens &amp; Summaries</td>
</tr>
<tr>
<td></td>
<td>Oxygen Saturation Percentage</td>
</tr>
<tr>
<td></td>
<td>Differing KG Weights for Same LG Weight</td>
</tr>
<tr>
<td></td>
<td>Incorrect Weight Units Displayed in BSA Calculations</td>
</tr>
</tbody>
</table>
Requirements for COMS

- Web Server and Database Server (Physical or Virtual)
- Office of Information Technology Support (Regional and/or Local)
- Information Security Officer Support
- Clinician Support (Provider, Pharmacist, Nursing)
Expected Advantages of COMS

- VA-developed application
  - No software cost to facilities
  - Open source
- Increased efficiency
- Error reduction
- Effective knowledge transfer and sharing
- Useful clinical workflows
- Reduced rework
COMS: Summary

- Comprehensive chemotherapy order management and oncology documentation
- Government developed pilot software
  - Significant cost advantage over COTS
- Readily deployable as enterprise tool to VHA Oncology Services nationwide
COMS: Team Organization

VAManagement and Contracting

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Puget Sound HCS

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Louis Ferrucci, CACI
Sean Cassidy, dbITpro

with contributions from many, many others
Questions?
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