

Development of a Chemotherapy Ordering Management System

**Department of Veterans Affairs (VA)
Strategic Incubation Initiative**

Use Case for Order Entry Management Module v.1.4



August 2012

Prepared for

Department of Veterans Affairs

By

dbITpro
38 Wintergreen Avenue
Brick, NJ 08723

FOR OFFICAL USE ONLY

Revision History

Date	Version	Description	Author(s)
6/04/2012	1.0	Initial	Lou Ferrucci
6/13/2012	1.1	Functionality updates	Lou Ferrucci
7/06/2012	1.2	Scenario revisions	Lou Ferrucci
7/20/2012	1.3	Order status update	Lou Ferrucci
8/3/2012	1.4	Scenario revisions	Lou Ferrucci

Table of Contents

1.0	Order Entry Management.....	1
1.1	Brief Description	1
1.2	Use Case Diagram.....	2
1.3	Background.....	3
1.4	Stakeholders	4
1.5	Supporting Requirements.....	5
2.0	Actors.....	5
3.0	Supporting Use Case List	5
4.0	Preconditions.....	6
5.0	Use Case Scenarios	6
5.1	Scenario 1: Calculate Body Surface Area and Show Calculations.....	8
5.2	Scenario 2: Select Administration Day to View	8
5.3	Scenario 3: Select Administration Day to Edit Medication	9
5.4	Scenario 4: Select Administration Day to Edit Administration Date	10
5.5	Scenario 5: Modify Patient Performance Status.....	10
5.6	Scenario 6: Clear Regimen Order.....	10
5.7	Scenario 7: Read and Respond to COMS Messages	11
5.8	Scenario 8: Finalize and Dispense Regimen Order Medications.....	12

List of Figures

1	COMS Order Entry Management Use Case Diagram.....	3
2	COMS Order Entry Management Stakeholders.....	4

1.0 Order Entry Management

1.1 Brief Description

The second module of the Chemotherapy Ordering Management System (COMS) application customizes chemotherapy for each patient through Order Entry Management (OEM). The OEM module permits the oncology provider to prescribe or modify an order for pre-therapy, therapy, and post-therapy medications from any template currently applied to a specific patient. When a template is applied via the Chemotherapy Template Order Source (CTOS) module, an order sheet is generated and sets in motion the individualized chemotherapy regimen for curative or palliative care of oncology patients. Oncology providers utilize the OEM module to tailor templates – currently applied to patients based on diagnosis and other considerations – as a prescription for an appropriate course of therapy to meet chemotherapy treatment goals.

While CTOS templates provide a general regimen for a specific diagnosis and establish the direction for treatment, the OEM module enables oncology providers to customize the medications within each template and order sheet for each individual patient. Primary instances of customization include modification to medication, dosages, or administration dates. The OEM module supports the oncology provider in tailoring applied template medications on any particular date of administration. For any future administration date within the prescribed regimen, oncology providers may edit medication dosages after the initial order and change the administration date.

The OEM module facilitates communication among the healthcare team as the medication orders progress from “ordered” through “administered” status.

- After the CTOS module records an “ordered” status, the order may be cleared in accordance with local facility policies/practices and then viewed by the pharmacist.
- Pharmacy modifications to the order – taking local facility medication dosage calculation rounding rules into consideration – are communicated to the provider or identified for provider re-signature, as local procedures warrant.
- Once “finalized” between the provider and pharmacist, orders are transmitted to the Veterans Health Information Systems and Technology Architecture (VistA) for pharmacy preparation. Cancelled orders are not transmitted to VistA.
- Following pharmacy preparation and dispensing of the medication, a nurse may administer it to the patient and record the order as “administered” in the Nursing Documentation (ND) module.

This workflow – complemented by COMS messaging functionality – facilitates and documents dialogue among the oncology provider, pharmacy, and nursing staff as it relates to modifying the patient’s chemotherapy regimen order and any subsequently required provider approval for changes to the original order.

The OEM module also enables oncology providers to record the current performance status of the patient to reflect improvement/decline throughout the regimen. At any time, users may view

medication dosages for orders and any associated body surface area (BSA)-based calculations for dosing. Rarely changed during a treatment regimen, body weight (e.g. actual, ideal) and selection of body surface area (BSA) calculation methodology (e.g. Dubois, Mosteller) may only be changed by applying a template through the CTOS module. Since many templates use specified body weight and BSA methodology to calculate chemotherapy medication dosages, this capability further enables oncology providers to convert generalized templates into individualized treatment plans for each specific patient throughout the regimen cycle.

Altogether, the OEM module enables oncology providers to tailor pre-therapy, therapy, and post-therapy medications for each individual patient and facilitates treatment plan communication and coordination among the healthcare team. The eight most common scenarios encountered within the OEM module are the primary focus of this Order Entry Management Use Case and are detailed in section 5.

1.2 Use Case Diagram

Common OEM module scenarios involve ordering/tailoring and communicating an applied template for individualized patient treatment plans, as follows:

- Scenario 1 – Calculate Body Surface Area and Show Calculations
- Scenario 2 – Select Administration Day to View
- Scenario 3 – Select Administration Day to Edit Medication
- Scenario 4 – Select Administration Day to Edit Administration Date
- Scenario 5 – Modify Patient Performance Status
- Scenario 6 – Clear Regimen Order
- Scenario 7 – Read and Respond to COMS Messages
- Scenario 8 – Finalize and Dispense Regimen Order Medications

These scenarios are detailed in section 5 and depicted graphically in the Use Case diagram shown in **Figure 1** on the next page.

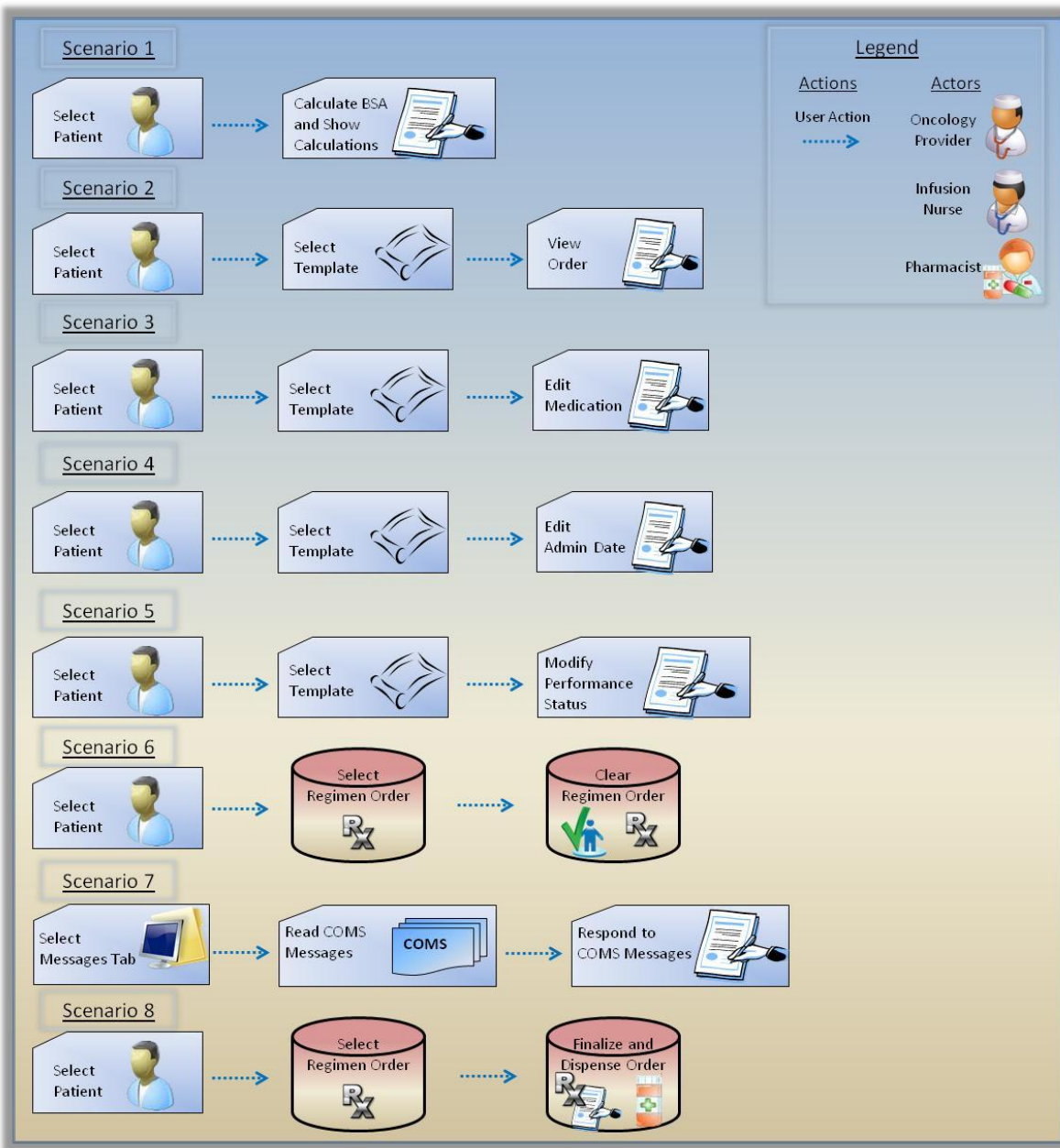


Figure 1 – COMS Order Entry Management Use Case Diagram

1.3 Background

Within the COMS application, the OEM module enables the oncology provider to fully communicate and coordinate the chemotherapy order with other healthcare professionals on the team. Orders proceed through a series of provider/pharmacist/nurse actions that are recorded as order statuses to track the medication from “ordered” through “administered”. The OEM module provides the communication mechanism and documentation of that communication to fully capture the order’s lifecycle. Overall, this functionality improves the efficiency of workflow and enhances patient safety.

Using drop-down menus with browse and search functionality, the oncology provider may select and retrieve a patient's entire treatment regimen and specific administration dates. Based upon several considerations and professional experience, the oncology provider may use the OEM module to effect changes to medications, dosages, and administration dates to customize the individualized plan towards meeting the patient's treatment goal.

As the provision of oncology services proceeds throughout the prescribed treatment regimen, the OEM module facilitates communication and coordination among the healthcare team. It provides a user-friendly environment with transparent dose calculations and consistency of ordering, communicating, and coordinating chemotherapy orders. Through the OEM module, COMS enhances and standardizes capabilities to enable and document provider ordering, pharmacist finalization, and nurse administration of chemotherapy orders. It supports oncology services through a specialty-focused application with interoperability with VA legacy healthcare systems (VistA and Computerized Patient Record System (CPRS)). The OEM module serves as the communication medium for future, current, and historical reflection of the oncology orders to provide chemotherapy.

1.4 Stakeholders

COMS stakeholders include oncology patients, those involved with management of the contract, the clinical healthcare team, and the dbITpro development team. For the OEM module, oncology providers, advanced practice nurses, and clinical pharmacists account for the most involved and concerned stakeholders. This subset of stakeholders is shown in **Figure 2**.

Name	Role	Organization	Phone	Email
Michael Kelley	Lead Innovator, Oncologist	Veterans Affairs	919.286.0411 ext 2199	Michael.Kelley6@va.gov
Janet Cogswell	Oncology Nurse	Veterans Affairs	973.676.1000 ext 1531	Janet.Cogswell@va.gov
Michele Johnson	Oncology Nurse	Veterans Affairs	432.926.1176 ext 2687	Michele.Johnson2@va.gov
Sean Keefe	Oncology Clinical Pharmacist	Veterans Affairs	816.861.4700 ext 57870	Sean.Keefe@va.gov
Steven Krasnow	Oncologist	Veterans Affairs		Steven.Krasnow@va.gov
Kourtney LaPlant	Oncology Clinical Pharmacist	Veterans Affairs	352.376.1611 ext 4428	Kourtney.Laplant@va.gov
Paige Louzon	Oncology Clinical Pharmacist	Veterans Affairs	352.376.1611 ext 4426	Paige.Louzon@va.gov
William Schubach	Oncologist	Veterans Affairs	206.764.2709	William.Schubach@va.gov
Jolynn Sessions	Oncology Clinical Pharmacist	Veterans Affairs	828.298.7911 ext 5192	Jolynn.Sessions@va.gov

Figure 2 – COMS Order Entry Management Stakeholders

1.5 Supporting Requirements

As a uniquely high-risk and high-complexity domain of health care, oncology requires fully interfaced support of all participating healthcare applications. Notably, this includes VistA, CPRS, Bar Code Medication Administration (BCMA) and COMS to create a clinical environment with standardization and direct order entry of chemotherapy. This environment will facilitate automated ordering, promote VA-wide standardization, augment adverse event tracking/reporting, and fortify patient safety through enhanced efficiencies in the provision of oncology services. Accordingly, an interoperable environment among VistA, CPRS, BCMA and COMS is essential. This interoperable environment is predominantly achieved through Medical Domain Web Services (MDWS). Therefore, MDWS serves as the critical linchpin enabling meaningful participation of COMS in the provision of VA oncology services and is considered a principal supporting requirement for this Order Entry Management Use Case.

2.0 Actors

Prescribing chemotherapy regimens and directing the provision of oncology services, oncology providers fulfill the initial role within the OEM module. As additional key participants on the healthcare team, oncology nurses and pharmacists are also involved with OEM module actions and benefit from its communication and coordination. Within the OEM module, the oncology provider reviews/revises chemotherapy regimen order sheets for individual patients. For each administration day order, the OEM module facilitates communication among the provider, nurse, and pharmacist to clear the patient for chemotherapy and finalize the order for preparation, dispensing, and administration. COMS supports local facility policies and procedures to clear the patient, calculate the medication dosage within rounding rules parameters, finalize the order for pharmacy preparation and dispensing, and ultimately administer the prescribed medication to the patient. Throughout the regimen, the oncology provider may also review and modify performance status to reflect the patient's daily living abilities.

The OEM module facilitates and captures the dynamic dialogue among the healthcare team. The individual and collective actions of the oncology provider, nurse, and pharmacist directly influence the patient's prognosis. Accordingly, their actions within the OEM module serve as the foundation to forge the desired clinical environment within the construct of standardization and direct order entry of chemotherapy. The healthcare team utilizes this standardized and interoperable environment between COMS and VistA/CPRS to facilitate customizing and coordinating chemotherapy orders in COMS for administration and documentation of healthcare within VA's electronic health record.

3.0 Supporting Use Case List

The Chemotherapy Template Order Source (CTOS) module Use Case supports this OEM module Use Case. The actions described within the CTOS module Use Case scenarios provide the foundation for COMS functionality and support OEM module Use Case scenarios.

4.0 Preconditions

Building upon the CTOS module to enable the oncology provider to communicate chemotherapy medication orders and patient treatment plans, the OEM module requires several preconditions to function properly. In addition to all CTOS module preconditions, the following are required to support the Order Entry Management Use Case scenarios detailed in section 5:

- A template applied to a patient is essential to Modify Patient Performance Status and documented height/weight values with selected weight methodology/body surface area formula is required to Calculate Body Surface Area and Show Calculations.
- A patient with an applied template and generated order sheet is required to Select Administration Day to View, Select Administration Day to Edit Medication, or Select Administration Day to Edit Administration Date.
- A regimen medication order, by virtue of the applied template, is required to Clear Regimen Order, to Read and Respond to COMS Messages, and to Finalize and Dispense Regimen Order Medications.

5.0 Use Case Scenarios

The intent of the following scenarios is to walk the user through common process flows associated with the OEM module and application of templates to a specific patient. For Use Case scenario testing, patients will be assigned to each test team as follows:

Team	Use Case Patient	Patient Identifier
1	PATIENT FOURHUNDRED	F0400
2	PATIENT FOURHUNDREDFIFTEEN	F0415
3	PATIENT FOURHUNDREDTWENTYFIVE	F0425
4	PATIENT FOURHUNDREDFORTYFIVE	F0445
5	PATIENT FOURHUNDREDFIFTY	F0450
6	PATIENT FOURHUNDREDFIFTYTWO	F0452
7	PATIENT FOURHUNDREDFIFTYFIVE	F0455
8	PATIENT FOURHUNDREDSIXTY	F0460
9	PATIENT FIVEHUNDREDFIFTEEN	F0515
10	PATIENT FIVEHUNDREDFIFTY	F0550

Scenarios 1 – 5 require the selection of the test team’s specific patient as follows:

Step	Action	COMS Reaction
1	From the Patient tab, enter the patient identifier for team’s assigned patient in the Patient panel and click on the “Query CPRS for Patient” link	Displays “Please Click Here to Confirm This is the Patient You Want”
2	Select the link for team’s assigned patient to confirm the patient	Presents patient information for team’s assigned patient
3	Select/Open/Expand the “Patient Information” panel	Expands “Patient Information” panel

Step	Action	COMS Reaction
4	View patient gender, age, and amputation(s); Body Surface Area (BSA) weight method, BSA method, and BSA calculations; template information; regimen status; type(s) of cancer; allergies; and clinical trial information	Permits viewing of information
5	Select/Open/Expand the “Patient History” panel	Expands “Patient History” panel
6	View vital signs historical information (date taken, temperature, pulse, blood pressure respirations, pain level, oxygen saturation, performance status, height, weight, and four columns for BSA information of weight formula, body weight, BSA method, and calculated BSA)	In reverse chronological order, displays information as obtained from VistA, COMS OEM module, and COMS ND module/ General Information panel
	ALTERNATE	ALTERNATE
1	From the Patient tab, enter the patient identification for team’s assigned patient in the Patient panel and press enter	Displays “Select Patient from CPRS” pull-down menu
2	Select the team’s assigned patient from the pull-down menu	Presents patient information for team’s assigned patient
3	Select/Open/Expand the “Patient Information” panel	Expands “Patient Information” panel
4	View patient gender, age, and amputation(s); Body Surface Area (BSA) weight method, BSA method, and BSA calculations; template information; regimen status; type(s) of cancer; allergies; and clinical trial information	Permits viewing of information
5	Select/Open/Expand the “Patient History” panel	Expands “Patient History” panel
6	View vital signs historical information (date taken, temperature, pulse, blood pressure respirations, pain level, oxygen saturation, performance status, height, weight, and four columns for BSA information of weight formula, body weight, BSA method, and calculated BSA)	In reverse chronological order, displays information as obtained from VistA, COMS OEM module, and COMS ND module/ General Information panel
	ALTERNATE	ALTERNATE
1	From the Patient tab, using the Enter a Range of Administration Dates to Search functionality and the default of today’s date for the “from” range, select a future date from the pop-up calendar “to” range, and click on the “Select Patient by Administration Date(s)” link	Displays “Select Patient from CPRS” pull-down menu
2	Select team’s assigned patient from the pull-down menu	Presents patient information for team’s assigned patient
3	Select/Open/Expand the “Patient Information” panel	Expands “Patient Information” panel
4	View patient gender, age, and amputation(s); Body Surface Area (BSA) weight method, BSA method, and BSA calculations; template information; regimen status; type(s) of cancer; allergies; and clinical trial information	Permits viewing of information
5	Select/Open/Expand the “Patient History” panel	Expands “Patient History” panel
6	View vital signs historical information (date taken, temperature, pulse, blood pressure respirations, pain level, oxygen saturation, performance status, height, weight, and four columns for BSA information of weight formula, body	In reverse chronological order, displays information as obtained from VistA, COMS OEM module, and COMS ND module/ General

Step	Action	COMS Reaction
	weight, BSA method, and calculated BSA)	Information panel
Step	Action	
7*	Proceed to Step 7 for OEM Module Use Case Scenarios 1 – 5	N/A

5.1 Scenario 1: Calculate Body Surface Area and Show Calculations

Step	Action	COMS Reaction
7*	Select/Open/Expand the “Patient Information” panel	Expands “Patient Information” panel and presents various information for the patient
8a	Select “Calculate BSA” link to calculate the Body Surface Area (BSA)	Displays pop-up form with calculated BSA value given current weight methodology and BSA formula selections (identified when applying template) and current height/weight entries
8b	View displayed information	Permits viewing of BSA calculations
8c	Close pop-up form for “Calculate BSA”	Closes form and continues display of patient information panel
9a	Select “Show Calculations” link for BSA	Displays pop-up form with calculations used to obtain BSA value given weight methodology and BSA formula selections (identified when applying template) and current height/weight entries
9b	View displayed information	Permits viewing of BSA calculations
9c	Close pop-up form for “Show Calculations”	Closes form and continues display of patient information panel

5.2 Scenario 2: Select Administration Day to View

Step	Action	COMS Reaction
7*	Select “Order Entry Management” module tab	Opens the OEM information
8	Scroll to “Select Admin Day to View” pull-down menu	Permits scrolling
9	Select a date from the pull-down menu	Presents Pre-Therapy, Therapy, and Post-Therapy information (as appropriate) for the selected date; specific medication instructions are displayed in

Step	Action	COMS Reaction
		italic text below the medication
10a	For Therapy medication, select link for displayed calculated dose to view Body Surface Area (BSA) dosage calculation	Presents dosage calculations based on BSA value
10b	View displayed information	Permits viewing of BSA dosage calculations
10c	Close pop-up form for BSA dosage calculation	Closes form and continues display of administration day

5.3 Scenario 3: Select Administration Day to Edit Medication

Step	Action	COMS Reaction
7*	Select "Order Entry Management" tab	Opens the OEM information
8	Scroll to "Select Admin Day to View" pull-down menu	Permits scrolling
9	Select a future administration date from the pull-down menu	Presents Pre-Therapy, Therapy, and Post-Therapy information (as applicable) for selected date
10	Select the "Edit" link next to a medication listed in the Pre-Therapy field	Displays the "Edit Pre-Therapy Drug" pop-up screen
11	Change medication's dosage amount	Permits editing of medication dosage to entered value
12	Using the pull-down menu, select the reason "Order Change Notification"	Indicates "Order Change Notification" as the reason for the editing the medication
13	Select the "Save" button	Displays selected administration day with entered dosage value, as edited, and sends a COMS message to prescribing provider
	ALTERNATE AFTER SELECTING PATIENT	ALTERNATE AFTER SELECTION
7*	Select "Order Entry Management" tab	Opens the OEM information
8	Scroll past the "Select Admin Day to View" pull-down menu to a future administration date	Permits scrolling
9	Select the "Edit" link next to a medication listed in the Pre-Therapy field	Displays the "Edit Pre-Therapy Drug" pop-up screen
10	Change medication's dosage amount	Permits editing of medication dosage) to entered value
11	Using the pull-down menu, select the reason "Order Change Notification"	Indicates "Order Change Notification" as the reason for the editing the medication
12	Select the "Save" button	Displays selected administration day with entered dosage value, as edited, and sends a COMS message to prescribing provider

5.4 Scenario 4: Select Administration Day to Edit Administration Date

Step	Action	COMS Reaction
7*	Select "Order Entry Management" module tab	Opens the OEM information
8	Scroll to "Select Admin Day to View" pull-down menu	Permits scrolling
9	Select a future administration date from the pull-down menu	Presents Pre-Therapy, Therapy, and Post-Therapy information (as appropriate) for the selected administration date
10	Select the "Change Administration Date" link next to the displayed administration date	Presents a pop-up calendar for new date selection
11	From the pop-up calendar, select a future date to re-schedule the administration and select "Save"	Permits date change and modifies all future administration dates by the same date interval (i.e. each date is now "rolled" one day forward)

5.5 Scenario 5: Modify Patient Performance Status

Step	Action	COMS Reaction
7*	Select "Order Entry Management" module tab	Opens the OEM information
8	Scroll to "Performance Status" (the last OEM information before administration days)	Permits scrolling
9	Select "Change Performance Status" link	Opens Performance Status window
10	Select "Performance Status" value of "3" and select "Save"	Presents modified status as "3 – Capable of only limited self care, confined to bed or chair more than 50% of waking hours"

5.6 Scenario 6: Clear Regimen Order

Step	Action	COMS Reaction
1	Select/Open "Orders" tab (on same line as Patient tab)	Expands "Orders" tab
2	View active orders	Displays active orders by columns for Patient, Template, Admin Day, Admin Time, Type (pre-therapy, therapy, or post-therapy), Drug, Dosage, Units, Route, Fluid/Volume, Flow Rate, Instructions, Order Status, and Set Status)
3	Click on any column to sort by that column	Displays information in alphabetical order by the value in the selected column
4	Click on the same column to re-sort by that column	Displays information in reverse

Step	Action	COMS Reaction
		alphabetical order by the value in the selected column
5	Select pull-down menu for any column and select "Sort Ascending"	Displays information in alphabetical order by the value in the selected column
6	Select pull-down menu for the same column and select "Sort Descending"	Displays information in reverse alphabetical order by the value in the selected column
7	Under the "Order Status" column, click in any cell for a specific medication order <u>with "Ordered" as the current order status</u> and select "Cleared" from the pull-down menu	Permits selection and indicates "Cleared" as selected order status
8	Select "Update Status" button from the "Set Status" column for the same medication order	Displays "Cleared" Order Status in the medication order cell; the order status has been updated.

5.7 Scenario 7: Read and Respond to COMS Messages

Step	Action	COMS Reaction
1	Select/Open "Messages" tab (on same line as Patient tab)	Expands "Messages" tab and displays COMS messages in columns of Date Sent, Time, To, From, CC, Subject, and Action
2	Select pull-down menu for any column and select "Columns" then de-select "Time"	Removes de-selected column "Time" and associated information from display
3	Select pull-down menu for any column and select "Columns" then select "Time"	Adds "Time" column name and associated information to Messages display
4	Click on any column to sort by that column	Displays information in alphabetical order by the value in the selected column
5	Click on the same column to re-sort by that column	Displays information in reverse alphabetical order by the value in the selected column
6	Select pull-down menu for any column and select "Sort Ascending"	Displays information in alphabetical order by the value in the selected column
7	Select pull-down menu for the same column and select "Sort Descending"	Displays information in reverse alphabetical order by the value in the selected column
8a	Select "Open" link for any message with an "INFO" prefix in subject line	Opens new window and displays contents of selected message and options to reply, forward, or delete the message
8b	View contents of informational message	Permits viewing without further clinical decision requested

Step	Action	COMS Reaction
8c	Close viewing window	Closes viewing window and displays Messages tab
9a	Select “Open” link for any message with “Resign Required” in subject line (Note: Available only to prescribing providers)	Opens new window and displays contents of selected message
9b	View contents of message requiring further review of change to medication order	Permits viewing of message with link to medication change details
9c	Within viewing window, select link for medication change details (Note: Available only to prescribing provider)	Presents medication change details for review/re-signature
9d	Select “Approve” link for the medication change and enter CPRS Access Code and Verify Code	Indicates change approval; closes viewing windows and displays Messages tab

5.8 Scenario 8: Finalize and Dispense Regimen Order Medications

Step	Action	COMS Reaction
1	Select/Open “Orders” tab (on same line as Patient tab)	Expands “Orders” tab
2	View active orders	Displays active orders by columns for Patient, Template, Admin Day, Admin Time, Type (pre-therapy, therapy, or post-therapy), Drug, Dosage, Units, Route, Fluid/Volume, Flow Rate, Instructions, Order Status, and Set Status)
3	Click on any column to sort by that column	Displays information in alphabetical order by the value in the selected column
4	Click on the same column to re-sort by that column	Displays information in reverse alphabetical order by the value in the selected column
5	Select pull-down menu for any column and select “Sort Ascending”	Displays information in alphabetical order by the value in the selected column
6	Select pull-down menu for the same column and select “Sort Descending”	Displays information in reverse alphabetical order by the value in the selected column
7	Under the “Order Status” column, click in any cell for a specific medication order <u>with “Cleared” as the current order status</u> and select “Finalized” from the pull-down menu	Permits selection and indicates selection “Finalized” as selected order status
8	Select “Update Status” button from the “Set Status” column for the same medication order	Displays “Finalized” Order Status in the medication order cell; the order status has been updated.
N/A	Note – Finalized orders are automatically passed to VistA. Once dispensed through VistA, orders are recorded as “Dispensed” in COMS and available for administration.	N/A

Step	Action	COMS Reaction
	Dispensed medication orders also pre-populate the Treatment panel within the Nursing Documentation module.	