

Chemotherapy Order Management System (COMS)

User Manual

Version 2.5



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Table of Contents

1. Background and Introduction	1
2. Orientation	2
3. Application Overview.....	3
3.1. Chemotherapy Template Order Source Module.....	3
3.2. Order Entry Management Module.....	4
3.3. Treatment Documentation Module.....	5
3.4. Flow Sheet Module.....	6
3.5. End of Treatment Summary Module.....	8
3.6. Miscellaneous Functionality.....	9
3.7. VistA Interoperability.....	10
3.8. Patient Selection.....	11
4. User Roles	12
4.1. Provider	12
4.2. Nurse	14
4.3. Pharmacist.....	15
4.4. Administrator	16
5. Module Functionality	17
5.1. Chemotherapy Template Order Source (CTOS).....	17
5.1.1. Create New Template.....	18
5.1.2. Modify Existing Template.....	20
5.1.3. Apply Template to a Patient and Generate Orders.....	24
5.1.4. Edit Template Currently Applied to a Patient.....	25
5.1.5. Print or Save Template Applied to a Patient	27
5.1.6. Change Template for Patient During On-Going Regimen.....	27
5.1.7. View Template Previously Applied to a Patient.....	28
5.2. Order Entry Management (OEM)	28
5.2.1. Print Medication Orders.....	30
5.2.2. View Patient's Flow Sheet Information.....	30
5.2.3. Modify Patient's Performance Status.....	31
5.2.4. Select Administration Day to View.....	32
5.2.5. View Dosage Calculations.....	33
5.2.6. Change Administration Date(s) or Edit Medication.....	34
5.2.7. Cancel or Hold/Release from Hold Medication.....	35
5.3. Treatment Documentation (TD).....	36
5.3.1. View Chemotherapy/Biotherapy Header and Patient's Flow Sheet	38
5.3.2. Review Laboratory Information.....	39
5.3.3. Document and View General Information Panel.....	40
5.3.4. Record Toxicities on Assessment Panel.....	41
5.3.5. Annotate IV Site Panel.....	42
5.3.6. Document Administration Panel and Make Addendum.....	43
5.3.7. Record Infusion Reactions Panel.....	47
5.3.8. Annotate Discharge Instructions Panel and Print Instructions/Reminders.....	48
5.4. Flow Sheet (FS)	51
5.4.1. View Chemotherapy/Biotherapy Header and Patient's Flow Sheet	52
5.4.2. Review Performance Status and Weight for Specific Dates.....	54

5.4.3. Annotate Disease Response, Toxicity Side Effects, and Other Comments.....	54
5.4.4. Tailor Flow Sheet View.....	56
5.4.5. Review Medication Administration Details.....	57
5.4.6. View Disease Response, Toxicity History, and Other Comments.....	57
5.4.7. View Laboratory Information.....	59
5.5. End of Treatment Summary (EoTS)	59
5.5.1. Stop Treatment Regimen.....	61
5.5.2. Initiate an End of Treatment Summary.....	61
5.5.3. View Pre-Populated Components of an End of Treatment Summary.....	63
5.5.4. Review Patient Disease Response, Toxicity History, and Other Comments.....	63
5.5.5. Compose Provider Report and Specify Follow-up Appointments.....	64
5.5.6. View a Completed End of Treatment Summary.....	65
6. Miscellaneous Functionality - Non-Administrative.....	67
6.1. Normal or High Contrast Mode.....	69
6.2. Patient Information Panel.....	70
6.2.1. View Patient Specific Information.....	70
6.2.2. Add or Edit Patient Amputation Designation(s).....	71
6.2.3. Update Body Surface Area Formula and Calculations.....	72
6.2.4. Add or Delete Patient's Type(s) of Cancer.....	73
6.2.5. Enter Historical Dosing of Cumulative Lifetime Tracked Medications.....	74
6.3. Medication Reminders Panel.....	75
6.3.1. View Medication Reminders for the Treatment Regimen.....	76
6.3.2. Add Medication Reminders to Regimen Template.....	76
6.4. Adverse Events History Panel.....	76
6.4.1. View Adverse Events History	76
6.4.2. View Adverse Events Alerts.....	77
6.5. Patient Vitals Panel.....	77
6.5.1. Review Patient Vital Signs.....	78
6.5.2. Record Patient Vital Signs.....	78
6.6. Laboratory Panel.....	79
6.6.1. Review Laboratory Results.....	79
6.6.2. Configure Display of Laboratory Results.....	80
6.7. Orders Tab.....	80
6.7.1. View Active Orders.....	80
6.7.2. Clear Medication Orders.....	81
6.7.3. Finalize and Dispense Medication Orders.....	82
6.8. Template Authoring Tab.....	82
6.8.1. Create New Template	82
6.8.2. Modify Existing Standard Template.....	83
6.9. Template List Tab.....	83
6.9.1. Review Patients Undergoing Treatment on an Existing Template.....	83
6.9.2. View, Print, or Save Existing Template.....	84
6.10. Template Promotion Tab.....	85
6.10.1. View Templates for Promotion.....	85
6.10.2. Designate Templates for Promotion.....	85
6.11. Reports Tab.....	85
6.11.1. Create and View Inventory Reports.....	86
6.11.2. Generate and View Patterns of Care Determination Reports.....	87
6.11.3. Configure Lab Reports Functionality.....	87

6.12. Messages Tab.....	87
6.12.1. Read COMS Messages.....	88
6.12.2. Respond to COMS Messages.....	88
7. Miscellaneous Functionality - Administrative (Site Configuration Tab).....	88
7.1. Documentation Lists and Contents Panel.....	91
7.1.1. View, Add, Edit, or Delete Clinic Information.....	91
7.1.2. Manage Discharge Instructions.....	92
7.1.3. View, Add, Edit, or Delete COMS Database Lookups.....	93
7.1.4. Manage Medication Documentation.....	93
7.1.5. Configure Common Toxicity Criteria Terminology for Assessments.....	94
7.2. Template Management Panel.....	95
7.2.1. Delete Templates.....	96
7.2.2. Manage Disease Staging.....	96
7.2.3. Specify Emetic Medications.....	97
7.2.4. Manage Febrile Neutropenia and Emesis Risks.....	98
7.2.5. Import and Export Templates.....	99
7.3. User Access Panel.....	99
7.3.1 View and Release Locked Sections.....	100
7.3.2. Designate User Roles.....	101
7.4. Clinical Decision Support Panel.....	101
7.4.1. Manage Cumulative Dose Medications.....	102
7.4.2. Configure Intelligent Data Elements.....	103
7.5. Facility Preferences Panel.....	104
7.5.1. View and Manage Active Workflows.....	104
7.5.2. Lockdown Intravenous Fluid Types for Specific Medications.....	105
7.5.3. Manage Medication Hold Functionality	106
7.5.4. Specify Medications Not Rounded.....	107
7.5.5. Set Rounding Rules.....	107
7.5.6. Synchronize Medication Lists.....	108
7.5.7. Manage Signature Verifications.....	108

List of Figures

1	Patient Tab for Patient Selection.....	11
2	COMS Role-Based Permissions.....	12
3	CTOS Module Role-Based Actions.....	18
4	Header Section for Create New Template.....	19
5	Template Pre-Therapy and Therapy Sections.....	19
6	Template Post-Therapy and Footer Sections.....	20
7	Header Section for Select Existing Template.....	21
8	Collapsed Patient Information Panels.....	21
9	Expanded Patient Information Panels.....	22
10	Template Selection for Patient Treatment Regimen.....	23
11	Template Selection for Patient Treatment Regimen.....	23
12	Regimen Details to Apply Template to Patient.....	24
13	Apply Template to Patient.....	25
14	Regimen Details to Edit Template Applied to a Patient.....	26
15	Print or Save Template Applied to Patient.....	27
16	Treatment Regimens & Summaries Panel.....	28
17	OEM Module Role-Based Actions.....	29
18	Print Orders from OEM Display.....	30
19	External Flow Sheet.....	31
20	Change Performance Status.....	32
21	Select Administration Day to View.....	33
22	View Dosage Calculations.....	34
23	Change Administration Date or Edit Medication.....	35
24	Cancel or Hold/Release from Hold Medication.....	36
25	TD Module Role-Based Actions.....	37
26	TD Module Chemotherapy/Biotherapy Information.....	38
27	External Flow Sheet.....	39
28	TD Module General Information Panel.....	40
29	TD Module Assessment Panel.....	42
30	TD Module IV Site Panel.....	43
31	TD Module Administration Panel.....	44
32	Authentication for Sign to Verify Medication Administration.....	45
33	Confirmation for Completing Treatment Documentation.....	45
34	Cumulative Dose Warning.....	46
35	Initiate Addendum to Administration Record.....	46
36	Make Addendum to Administration Record.....	47
37	TD Module Infusion Reactions Panel.....	48
38	TD Module Discharge Instructions Panel.....	49
39	TD Module Discharge Instructions Panel.....	50
40	FS Module Role-Based Actions.....	52
41	FS Module Chemotherapy/Biotherapy Information.....	52
42	External Flow Sheet.....	53
43	FS Module General Information.....	54
44	Annotate Disease Response, Toxicity Side Effects, and Other Comments.....	55
45	Tailor Flow Sheet View.....	56

46	Flow Sheet Medication Administration Details.....	57
47	View Disease Response, Toxicity Side Effects, and Other Comments.....	58
48	View Laboratory Information within Flow Sheet.....	59
49	EoTS Module Role-Based Actions.....	60
50	Stop Treatment Regimen.....	61
51	Reason Options for Generating an End of Treatment Summary.....	62
52	Change Reason for Generating an End of Treatment Summary.....	62
53	Pre-populated Components of an End of Treatment Summary.....	63
54	Review of Flow Sheet Annotations for an End of Treatment Summary.....	64
55	Compose Narratives for End of Treatment Summary.....	64
56	Select an End of Treatment Summary to View.....	65
57	Completed End of Treatment Summary.....	66
58	Miscellaneous Functionality (Non-Admin) Role-Based Actions.....	69
59	Switch to High Contrast Mode.....	70
60	High Contrast Mode.....	70
61	Patient Information Panel.....	71
62	Add or Edit Patient Amputation Designations.....	72
63	Update Body Surface Area Formula and Calculations.....	73
64	Add Patient Type(s) of Cancer.....	73
65	Delete Patient Type of Cancer.....	74
66	Enter Historical Dosing of Tracked Medications.....	74
67	Cumulative Dose Warning.....	75
68	Medication Reminders.....	76
69	Adverse Events History Panel.....	77
70	Review Patient Vital Signs.....	78
71	Record Vital Signs from Patient Vitals Panel.....	79
72	Laboratory Information Panel.....	80
73	Orders Tab with Active Orders.....	81
74	Orders Tab – Clearing Medication Orders.....	81
75	Orders Tab – Finalizing and Dispensing Medication Orders.....	82
76	Template List Tab Display.....	83
77	Review Patients Undergoing Treatment on Specific Template.....	84
78	View, Print, or Save Existing Template.....	84
79	Template Promotion Tab.....	85
80	Reports Tab.....	86
81	Inventory Reports.....	86
82	Patterns of Care Determination Reports.....	87
83	Messages Tab.....	88
84	Site Configuration Tab.....	84
85	Miscellaneous Functionality (Administrative) Role-Based Actions.....	90
86	Site Configuration – Documentation Lists and Contents Panel.....	91
87	Site Configuration – Clinic Information.....	91
88	Site Configuration – Discharge Instructions.....	92
89	Site Configuration – COMS Database Lookups.....	93
90	Site Configuration – Medication Documentation.....	94
91	Site Configuration – Toxicity.....	95

92	Site Configuration – Template Management Panel.....	95
93	Site Configuration – Delete COMS Template.....	96
94	Site Configuration – Disease Staging.....	97
95	Site Configuration – Emetic Medications.....	98
96	Site Configuration – Febrile Neutropenia and Emesis Risks.....	99
97	Site Configuration – User Access Panel.....	100
98	Site Configuration – Lockout.....	100
99	Site Configuration – User Roles.....	101
100	Site Configuration – Clinical Decision Support Panel.....	102
101	Site Configuration – Cumulative Dose Medications.....	102
102	Site Configuration – Intelligent Data Entry.....	103
103	Site Configuration – Facility Preferences Panel.....	104
104	Site Configuration – Active Workflows.....	105
105	Site Configuration – IV Fluid Types.....	106
106	Site Configuration – Medication Holds.....	106
107	Site Configuration – Medications Not Rounded.....	107
108	Site Configuration – Rounding Rules.....	108
109	Site Configuration – Pharmacy Management.....	108

1. Background and Introduction

The Veterans Health Administration (VHA) has one of the largest cancer populations in the country; it is also the fastest growing group of VHA patients. VHA provides oncology services at more than 100 different locations by integrated oncology care teams consisting of, but not limited to, a physician/provider, nurse, and pharmacist. Teams typically provide care on an outpatient basis, although some patients may require hospitalization and inpatient services.

A uniquely high-risk and high-complexity domain of health care, Oncology services support has not been effectively implemented within the existing VHA Electronic Health Record primarily due to the lack of functionality required for the specialty. VHA's oncology processes are a mix of paper-based and computer-based practices, presenting potential error, adverse events, and inefficiencies. This creates a clinical environment with minimal standardization and limited direct order entry of chemotherapy. For these reasons, the VHA Office of Health Information (OHI) Patient Safety Workgroup rated this issue as having a high level of patient safety risk. Accordingly, an initiative within VHA's Innovations Program sought to enhance the clinical environment and safety for oncology patients through development of the Chemotherapy Order Management System (COMS) application as part of VHA's Strategic Incubation.

The COMS application enhances the clinical environment and safety for oncology patients through development and implementation of an automated ordering and management process available within VHA's clinical practice setting. In either an outpatient or inpatient setting, the COMS application supports the unique needs of oncology healthcare teams with standardized capabilities to meet direct order entry, clinical documentation, and assessing the administration of chemotherapy. COMS provides interoperability with VHA's electronic health record, interfacing and interacting with existing applicable systems, modules, capabilities, and processes within Computerized Patient Record System (CPRS) graphical user interface and Veterans Health Information Systems and Technology Architecture (VistA) databases.

The web-based COMS application consists of an interface via Hypertext Precursor (PHP), Java Script, Node.js, Simple Object Access Protocol (SOAP), and Representational state transfer (REST) web services. The application provides five clinical modules – Chemotherapy Template Order Source, Order Entry Management, Treatment Documentation, Flow Sheet, and End of Treatment Summary – and miscellaneous functionality that collectively serve to deliver robust functionality to support users in executing their roles and responsibilities in various oncology care processes. Within current legacy system functionality, the COMS application provides provider order entry and promotes patient safety via read/write interoperability with the electronic health record. The application uniquely offers exportability of chemotherapy templates for national vetting and proliferation to facilitate VHA-wide standardization of chemotherapy regimens for oncology services and patients across the VA enterprise.

[\(Return to TOC\)](#)

2. Orientation

This COMS User Manual is for use in conjunction with VHA's COMS application. It outlines COMS user interface actions for ordering, documenting, and assessing chemotherapy treatment; reviewing all documentation; and establishing local site configuration preferences. The intended audience of this manual is all respective COMS users to include the following:

- Primary Oncology service COMS users (i.e., providers, nurses, and pharmacists)
- Secondary VHA users (e.g., radiation oncology, social workers, billers, and coders)
- COMS support users (e.g., application administrators).

This manual provides an overall explanation of COMS from a user perspective with the assumption that the reader is familiar with the following:

- CPRS/VistA computing environment
- General oncology terms and processes
- Common healthcare terminology
- Microsoft operating environment

This manual does not detail installation or technical aspects of the COMS application. Such topics are available in the COMS Install Guide and COMS Technical Manual, respectively.

Disclaimer: All snapshots of on-line computer displays (i.e., screenshots) are of the COMS application within the VHA Innovations Sandbox/Future Technologies Laboratory. Accordingly, patient information, treatment regimen details and associated documentation, and configuration parameters are notional and not intended to represent any live patient, actual treatment, or operating location.

[\(Return to TOC\)](#)

3. Application Overview

COMS automates chemotherapy ordering and documentation while accommodating local facility policies for clinical preferences/processes and implements several VA defined system-wide protocols. These protocols include a national set of chemotherapy order templates, standardization of the calculation method for medication dosage and dose rounding, and a standard documentation format for chemotherapy treatment plans, administration, assessments, and summaries. COMS creates and manages chemotherapy templates; clears and places medication orders in VistA; enables treatment documentation; displays a temporal flow sheet for relevant clinical data, medications administered, and user assessment of response to treatment; and creates a treatment summary for the current healthcare team, referring/primary care providers, and other clinical and support staff. The COMS application fulfills legal/professional requirements, fosters Joint Commission compliance and enhances patient safety with VistA/CPRS interoperability and documentation ultimately stored in VA's electronic health record.

This manual instructs users on the capability aspects of COMS application functionality, navigation of the application, and effective use of COMS to record and reflect treatment provided to oncology patients. COMS consists of five clinical modules: Chemotherapy Template Order Source (CTOS), Order Entry Management (OEM), Treatment Documentation (TD), Flow Sheet (FS), and End of Treatment Summary (EoTS) plus miscellaneous functionality.

3.1. Chemotherapy Template Order Source (CTOS) Module

The CTOS Module permits the oncology provider to download a chemotherapy regimen template from a central library and modify it for local use. It also enables authorized users to create original, new templates or create a template from an existing one, while maintaining version control. User-created templates are available immediately for local use and ultimately for national use upon review and inclusion in the central library.

Each template provides pre-therapy, therapy, and post-therapy information including recommended medications; dosages and parameters for dosing; total number of cycles; number of days and administration days within each cycle; medical references; medication reminders for the regimen; and information on the number of patients currently undergoing treatment with the template (for existing templates). CTOS incorporates standardized template naming conventions with version control, acceptable medical terminology and abbreviations, and other applicable medical guidelines to reflect the existing care practices. At any time, users may review clinical practice guidelines and references relevant to the template supporting the provision of chemotherapy for a specified treatment regimen.

The CTOS Module affords flexibility to enable the user to assign a unique, user-friendly template name. These templates may be applied to a particular patient record to generate an order sheet for the regimen and used throughout the remaining modules of the COMS application. During the process of applying a template to a patient, the oncology provider has

the opportunity to identify the effective date; select the body weight and body surface area formula to use for medication dosage calculations; categorize the regimen for the patient as curative or palliative care; indicate whether the patient/regimen are part of a clinical trial and specify the name of the clinical trial, if applicable; identify patient amputation(s); and document the current performance status of the patient. Although users may only apply one template to a patient at any given time, all templates previously applied to the patient remain available for review within the Treatment Regimens and Summaries panel.

3.2. Order Entry Management (OEM) Module

The OEM Module permits the oncology provider to prescribe, modify, or print an order for pre-therapy, therapy, and post-therapy medications from any template currently applied to a specific patient. When a provider applies a template via the CTOS Module, COMS generates an order sheet 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 medications, 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, cancel, or hold medications after the initial order and change the administration date for a specific date or future dates in the treatment cycle or regimen.

The OEM Module 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 be changed through the Patient Information panel or by applying a new template through the CTOS Module. Since many templates use specified body weight and BSA methodology to calculate chemotherapy medication dosages, the capability to make changes further enables oncology providers to convert generalized templates into individualized treatment plans for each specific patient throughout the regimen cycle.

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

- After the CTOS Module initiates 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 and identifying the rationale – 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) instance for pharmacy preparation. Cancelled or held orders are not transmitted to VistA, but remain within OEM for visibility of the initial order and subsequent action.
- Following pharmacy preparation and dispensing of the medication, a nurse may administer it to the patient, effectively recording the order as “administered” in the Treatment Documentation (TD) Module. Note, order status of “administered” and “in-coordination” require precursor user actions and are not available for direct selection.

This OEM 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. Authorized users may print the order at any time.

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.

3.3. Treatment Documentation (TD) Module

The TD Module permits the oncology nurse to view relevant historic and current clinical data and document the provision of chemotherapy and nursing assessments of the patient since the previous administration and throughout the current treatment. These assessments of adverse reactions or no adverse reactions may be entered into COMS – regardless of administration day or day of rest – for inclusion in the Flow Sheet (FS) and consideration for End of Treatment Summary (EoTS).

Following the Chemotherapy Template Order Source (CTOS) establishment of the regimen and Order Entry Management (OEM) customizing medications for each individual patient, the TD Module facilitates the crucial role of documenting the administration of the regimen’s prescribed medications as finalized and dispensed. Pre-populated data from the OEM Module serves as the foundation for recording medications administered (Note, held or cancelled medications remain visible, but unavailable for administration documentation). The attending nurse documents doses administered to the patient, including dates, exact minute start/stop times, administration comments, patient and dose verification, symptom assessments, and infusion reactions.

The TD Module supports the oncology nurse with a chemotherapy/biotherapy header and six activity-specific panels to convey information previously obtained and to facilitate the documentation of new information relevant to the administration of prescribed medications.

- General Information – Provides laboratory results and historic vital signs in standard and metric values; enables the nurse to document patient verification (from two sources) and confirmation consent documentation is on file, patient teaching, dual verification of medication dosing, and vital signs obtained that day.

- Assessment – Enables the nurse to document the top chemotherapy symptoms and clinical grading of those side effects (using Common Toxicity Criteria terminology, as loaded in Site Configuration) plus any other symptom the patient has encountered since the previous administration, identify those to trigger an adverse event alert, or record no adverse reactions.
- IV Site – Facilitates nurse documentation of the intravenous (IV) site access date; device, needle gauge, and delivery mechanism; body location and site appearance; as well as verification of the patient’s brisk blood return before, during, and after treatment.
- Administration – Enables the nurse to annotate the administration of pre-therapy, therapy, and post-therapy medications, as sequenced in the applied template regimen. These medications are pre-populated from the OEM Module once orders are cleared for preparation and medications are dispensed by the pharmacy. In support of clinical practices and guidelines, “positive action” by the nurse is required to properly document medication administration (held or cancelled medications are identified, but not available for administration documentation).
- Infusion Reactions – Facilitates documentation of details for three common chemotherapy infusion reaction categories (Extravasation, Cytokine-Release Syndrome, and Hypersensitivity/ Anaphylaxis) and any other reaction to the administration of medications on the treatment day.
- Discharge Instructions – Facilitates communication of specific clinic information; key regimen, medication, or side effects information; and patient reminders for the next administration day, and scheduled laboratory tests. Consistent with CPRS documentation templates, enables the nurse to record patient education topics to include teaching methodology/preferences, attendees, and other key aspects of discharge instructions.

Altogether, the TD Module enables users robust functionality to document individual assessment, treatment, and instructions provided for oncology patients.

3.4. Flow Sheet (FS) Module

The FS Module offers a snapshot of care for the healthcare team to view relevant clinical data; the disease response/toxicities/side effects and other general narratives for patient reaction to the chemotherapy; an overview of administered/held/cancelled medications; and pertinent laboratory results. Through direct entry of information and display of specific information from OEM and TD Modules, the FS Module provides the healthcare team with an efficient, user-tailored display of relevant information and patient-centered documentation of chemotherapy administration.

The FS Module supports direct entry of disease response, toxicity/side effects, – using Common Toxicity Criteria terminology, as loaded in Site Configuration – and other general information annotations. Authorized users may enter detailed, free text comments regarding the tumor response to the administered medications from the regimen prescribed in the CTOS Module; customized, held, or cancelled in OEM Module; and administered as documented in the TD Module. Fields dedicated to toxicity/side effect selection, grade, details, and free text entry during a particular administration day or rest day within the regimen provide insight into patient

reaction to the chemotherapy agents. Users may also enter an uncategorized “other” comments to clearly communicate observations and recommendations. Members of the healthcare team may view disease response, toxicity/side effects, and other comments through dedicated panels within the FS Module at any time throughout the regimen.

The COMS application retrieves and displays relevant laboratory results from the electronic health record (VistA and CPRS). In this manner, FS supports rapid view of laboratory results within the context of the prescribed regimen, administered/held/cancelled medications, and other significant clinical documentation. The FS Module also automatically retrieves and presents pre-therapy, therapy, and post-therapy medication administration specifics from the TD Module or held/cancelled actions processed in the OEM Module. With administration day columns, the FS Module presents relevant information for medications and dosages prescribed and subsequently held, cancelled, or administered to the specific patient. Eliminating dual entry, COMS directly populates this documentation from the OEM Module or the Administration panel within the TD Module, respectively. Members of the healthcare team may view this overview as a snapshot of held/cancelled/administered medications for each administration day throughout the regimen, selected cycles, or specified date(s).

The first section of the FS Module enables user entry while the remaining sections concisely display patient-centric, regimen-specific information for the healthcare team.

- General – Provides date, patient performance status, and weight; enables entry and viewing of disease response, toxicity/side effects, and other comments relevant to the patient’s treatment.
- Pre-Therapy – Presents specific pre-therapy medication administration details for each administration day; automatically populates from the OEM Module for held/cancelled medications and the TD Module’s Administration panel for administered medications.
- Therapy – Displays specific administration details of prescribed chemotherapy agents for each administration day; automatically populates from the OEM Module for held/cancelled medications and the TD Module’s Administration panel for administered medications.
- Post-Therapy – Presents specific post-therapy medication administration details for each administration day; automatically populates from the OEM Module for held/cancelled medications and the TD Module’s Administration panel for administered medications.
- Disease Response Panel – Provides all disease response narratives in reverse chronological order, as entered through the “Add General Information” functionality.
- Toxicity/Side Effects Panel – Displays all toxicity/side effects information – toxicity title, grade, details, and narrative – in reverse chronological order, as entered through the “Add General Information” functionality or TD Module’s Assessment panel or Infusion Reactions panel.
- Other Panel – Presents all other narratives in reverse chronological order, as entered through the “Add General Information” functionality
- Laboratory Results – Displays laboratory results relevant to the provision of oncology services; automatically populates from CPRS.

Altogether, the FS Module provides an efficient display of relevant information and patient-centered documentation of chemotherapy administration.

3.5. End of Treatment Summary (EoTS) Module

The capstone Module of the COMS prototype is the End of Treatment Summary (EoTS). The EoTS Module supports the oncology provider to stop a treatment regimen and create the summary of care rendered, including results achieved throughout the specified treatment regimen. The EoTS Module also enables the healthcare team to view completed treatment summaries. Following the conclusion or discontinuation of a regimen and its applied template, the provider typically generates the treatment summary through EoTS functionality. To aid in generation of the summary report, the EoTS Module retrieves relevant information from various COMS modules and patient-specific panels then pre-populates several sections of the treatment summary for provider consideration when preparing narratives for provider report sections.

The EoTS Module supports pre-population of patient and regimen details, type of cancer, vital signs data (in standard and metric values), body surface area information, clinical trial, allergy, performance status, and medications administered. Further retrieval from the Flow Sheet (FS) Module enables the provider to review healthcare team entries throughout the regimen regarding disease response, toxicity side effects, and other general information for creation of the summation narrative and overall categorization of the disease response. The EoTS Module also supports an overall provider report with free text entry to communicate patient and regimen specific assessment to the current and future healthcare team. This information is contained within COMS and transmitted to the patient's electronic health record for healthcare team members without COMS access.

The EoTS Module treatment summary worksheet provides five main sections to guide the provider through generation of the End of Treatment Summary.

- Pre-populated Components – Provides pre-populated data for patient and regimen details, type(s) of cancer, amputation(s), initial and final vital signs information for the regimen, body surface area factors and values, clinical trial, allergy, performance status, and medications administered to the patient throughout the regimen.
- Patient Disease Response – Enables the provider to review FS Module entries for Patient Disease Response, categorize the disease response (complete response, partial response, minor response, progression, or stable), and create summation narrative.
- Toxicity Side Effects – Enables the provider to review FS Module and Treatment Documentation (TD) Module assessments for Toxicity Side Effects and create summation narrative.
- Provider Report – Supports free text narrative for provider to enter patient and regimen specific overall assessment as a summary for the chemotherapy treatment, results, and/or prognosis.
- Follow-Up Appointments – Supports free text narrative for provider to enter information relevant to the patient's follow-up appointments.

Altogether, the EoTS Module facilitates stopping a treatment regimen and provides a chronological history of diagnosis, treatment, changes in treatment, disease response, and patient outcomes.

3.6. Miscellaneous Functionality

COMS miscellaneous functionality is the underpinning that supports the five clinical modules and general application performance. These clinical modules and general application capabilities are influenced by COMS miscellaneous functionality not specifically associated with any particular module, but integral and supportive of overall operational effectiveness. Miscellaneous functionality is classified as non-administrative – patient specific functionality and general functionality – and administrative.

Patient specific functionality includes patient relevant information and history where users may view patient/regimen details and view or enter (with intelligent data detection) the patient's vital signs. General functionality for orders within the application and messaging affect all members of the healthcare team utilizing COMS from order creation to medication administration. Extensive administrative functionality exists for COMS administrators to setup and maintain the application's database contents, accessibility, and interoperability while tailoring COMS support to accommodate local facility policies for administrative and clinical preferences and processes.

COMS Miscellaneous Functionality is provided through 11 non-module sections.

- Patient Information Panel – Expandable/collapsible display of patient-/regimen-specific information, including patient demographics, body surface area details, template, regimen status, type(s) of cancer, allergies, and clinical trial retrieved from various COMS modules and Veterans Health Information Systems and Technology Architecture (VistA) legacy application
- Medication Reminders Panel – Expandable/collapsible display of regimen-specific reminders for adjunct therapy or other considerations relevant to the selected patient to include title, description, and prescribed timing throughout the regimen
- Adverse Events History Panel – Expandable/collapsible display of patient-specific information regarding toxicities and/or adverse events documented throughout oncologic treatment to include the event, grade, details, comments, date of observation, and designation for flagged as an alert, as appropriate
- Patient Vitals Panel – Expandable/collapsible display of chronologic vital signs data (in both standard and metric values, as appropriate) retrieved from various COMS modules and VistA; permits documentation of patient vital signs – within intelligent data entry parameters, if established – with or without a template applied
- Laboratory Information Panel – Expandable/collapsible display of chronologic laboratory test results retrieved from VistA for viewing within COMS
- Orders Tab – Location for all active orders within the application that facilitates and monitors progression of medication orders through the continuum of ordered, cleared/in-coordination, finalized (or held or cancelled), dispensed, and administered (note, administered and in-coordination require precursor actions and are not available for direct selection); displays chemotherapy orders for administrations over the next three calendar days for all patients within the COMS instance

- Messages Tab – Communication hub for application messaging associated with provider notifications for information, alerts, or action
- Template List Tab – Location for all treatment regimens/templates within the application for viewing and printing plus current total of patients undergoing treatment with each regimen
- Template Promotion Tab – Restricted functionality for Local Template Manager (LTM) users and Central Template Authoring Group (CTAG) to promote templates from individual user to local to national template availability
- Reports Tab – Location for users to generate and view inventory, patterns of care determination, and laboratory reports
- Site Configuration Tab – Robust core for administrative functionality to support database setup, maintenance, and interoperability; manages capabilities for documentation lists and contents (clinic information, discharge instructions, lookups, medication documentation, and toxicity); template management (delete template, disease staging, emetic medications, neutropenia/emesis risks, and import/export templates); user access (lockout and user roles); clinical decision support (cumulative dose medications and intelligent data entry); and facility preferences (active workflows, IV fluid types, medication holds, medications not rounded, rounding rules, pharmacy management, and signature verifications).

Altogether, miscellaneous functionality enables the application to support standardized direct order entry, healthcare team coordination, documentation of chemotherapy treatment, and clinical module and overall application capabilities.

3.7. VistA Interoperability

The COMS Installation Guide provides details regarding the application's initial configuration and the Technical Manual covers subsequent information. Two specific components of the installation are essential to establishing VistA interoperability and permitting role-based user access. The Installation Guide contains procedures to set COMS global variables within the application to identify the location-specific site code and domain for connectivity with VistA. This User Manual provides information to establish COMS users and control their access to various functionalities within the application. This User Manual presumes proper establishment of COMS global variables and users for successful VistA interoperability.

3.8. Patient Selection

The Patient Tab is the default view when accessing the COMS application. It is used to access patient-specific functionality, but not required to access Orders, Template Authoring, Template List, Template Promotion, Messages, or Site Configuration functionality (Note, availability of various tabs is dependent upon user role).

To apply an existing template to a specific patient, the oncology provider must first select the patient from the database. During the patient selection process, providers may also review vital signs historical information for the selected patient. COMS offers alternative methods for patient selection. Users enter a range of administration dates to search for the specific patient and selecting the “Select Patient by Administration Date(s)” link. Alternatively, users may enter the

patient identifier (i.e. first letter of patient's last name and last four digits of patient's social security number) and select the "Query CPRS for Patient" link (or press the Enter key), as depicted in **Figure 1**.

The screenshot shows the 'Patient Selection' tab of the COMS interface. At the top, there is a header bar with the title 'Chemotherapy Order Management System (COMS)' and a welcome message 'Welcome Programmer, All Roles - [Help](#) [Switch to High Contrast Mode](#)'. Below the header is a navigation menu with tabs: Patient (selected), Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, and Site Configuration. The main content area is titled 'Patient Selection' and contains two search methods: 'Enter a range of Administration Dates to search' with 'From:' and 'To:' date input fields, and 'Enter Patient Identification (SSN) to query CPRS' with a 'Patient Identification (SSN):' input field containing 'f0505' and a 'Query CPRS for Patient' button. A confirmation message 'Please click here to confirm this is the patient you want : [PATIENT FIVEHUNDREDFIVE](#)' is displayed at the bottom.

Figure 1: Patient Tab for Patient Selection

To select a patient by administration date(s), COMS passes one or more dates (the "From" date if only one date passed) and will return a list of patients who have Administration Dates within the specified date range. By default, COMS returns all patients who have future Administration Dates and displays them for user selection. When users enter the patient identifier (e.g., F0505), COMS queries the patient registry via the Data File Name (DFN). This provides a Patient Index and returns a single Patient Record or a list of patients matching the identifier if the passed DFN does not uniquely define a single patient.

Regardless of the patient selection methodology, COMS presents a link to confirm the specified patient, as presented in Figure 1, when a single match is available. For multiple matches, COMS presents a list for the user to select the desired patient. The data returned by the patient selection process is used to retrieve electronic health record information and populate various sections of the Patient Tab.

[\(Return to TOC\)](#)

4. User Roles

COMS primary roles include Provider, Pharmacist, Nurse, and Administrator. Each role has specific purpose, function, and associated permissions within the application. **Figure 2** below shows the Read and Write privileges for each role.

	Provider	Nurse	Pharmacist	Administrator
Chemotherapy Template Order Source	R,W	R	R	R
Order Entry Management	R,W	R	R,W	R
Flow Sheet	R,W	R,W	R	R
Treatment Documentation	R	R,W	R	R
End of Treatment Summary	R,W	R	R	R
Miscellaneous Functionality	R,W	R,W	R, W	R,W

Figure 2: COMS Role-Based Permissions

Throughout this User Manual, the role of provider refers to any credentialed provider (e.g., physician, physician's assistant, advanced nurse practitioner). Similarly, the role of nurse refers to the healthcare professional typically providing hands-on care and chemotherapy administrations. The pharmacist role refers to the traditional definition more commonly known now as dispensing pharmacist. Lastly, the administrator refers to any trusted agent provided access to the non-clinical areas of the COMS application for setup and maintenance of site configuration capabilities to include facility-specific preferences.

4.1. Provider

Directing the provision of oncology services and prescribing the healthcare regimen for patients under their care, credentialed oncology providers fulfill the primary role in the CTOS Module. Within the CTOS Module, the oncology provider creates/reviews/revises chemotherapy regimen templates; applies selected templates to each individual patient; and may review lifetime cumulative dosage considerations throughout the template creation, application, and treatment processes. For each template, the oncology provider will determine pre-therapy/ therapy/post-therapy medications, dosages and parameters for dosing, routes of administration, and sequencing; indicate type of cancer, Emetogenic level, febrile neutropenia risk, clinical reference(s) and medication reminders, as appropriate, for each regimen; must specify the total number of cycles, number of days, and administration days within each cycle; will identify each template source as a national template, local template, or "my" template; may save version-controlled templates with a user-friendly name correlated to a COMS-generated standard naming

convention template name; and may print any template contained within the application. The oncology provider may also review and modify templates currently applied to a specific patient then save the new, version-controlled template for subsequent application to patient(s) undergoing the current regimen or future application to other patients (Note, treatment regimen must be stopped and a new template applied to effect changes for a patient undergoing a currently applied template).

Within the OEM Module, credentialed oncology providers prescribe chemotherapy regimens and direct the provision of oncology services. The 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 (or hold/cancel the order) and finalize the order for preparation, dispensing, and administration. COMS supports local facility policies and procedures to clear the patient, calculate medication dosages within rounding rules parameters, finalize the order for pharmacy preparation and dispensing, and ultimately document the administration of 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 and any member of the healthcare team may print an order, as required.

Prescribing chemotherapy regimens and directing the provision of oncology services, credentialed oncology providers set the course for information contained within the Flow Sheet Module. The provider-applied template information of Regimen and Cycle identification complement the administration day and date within the Flow Sheet's Chemotherapy/Biotherapy header. Provider annotation of the patient's performance status and actions to hold or cancel medication orders are also displayed in the Flow Sheet along with the patient's recorded weight and relevant laboratory results for each administration day. The provider may record the disease response to the individualized treatment plan and document toxicity/side effects and other comments for any calendar day throughout the regimen. As the regimen progresses, the annotations of oncology providers are displayed within the FS Module to foster collaboration among the oncology care team.

Discontinuing a regimen and generating the executive summary of oncology care rendered during that treatment regimen, oncology providers fulfill the primary role in the EoTS Module. To initiate a treatment summary within the EoTS Module, the oncology provider indicates the reason for generating the report. The provider then reviews pertinent, pre-populated information – patient and regimen details, type(s) of cancer and amputation(s), regimen initial and final vital signs, body surface area factors and values, clinical trial information, allergies, performance status, and medication administration details – assembled from multiple COMS modules/patient-specific panels, VistA, and CPRS. After reviewing patient disease response and toxicity side effects documentation, the provider authors the narrative for various sections to summarize disease response and toxicities associated with the specific treatment regimen. The provider concludes the End of Treatment Summary with an overall provider report, specification of follow-up appointments, and saving the treatment summary. As authorized COMS users, members of the current and future healthcare team may view the completed treatment summary through the EoTS Module; those without COMS access may view the provider's summary as a note within the electronic health record.

Utilizing the clinical modules of COMS, oncology providers – and the entire healthcare team – perform critical actions directly and indirectly associated with miscellaneous functionality within the application. All members may perform actions to review patient information; print templates; participate in COMS messaging; clear orders (consistent with local facility policy); view patient’s adverse history and the regimen’s medication reminders; and switch between normal and high contrast modes. Providers also have access to other miscellaneous functionality, including modifying patient information such as patient amputations, changing BSA calculation formulas and information, and entering historical dosing of cumulatively tracked medications. A designated user, typically a super user provider, will serve as the Local Template Manager (LTM) for promotion of templates from the individual user level to local level and identify templates for consideration to be promoted to the national template level by the Central Template Authoring Group.

The oncology provider is the critical human link to facilitate the interoperable environment among VistA, CPRS, and COMS. Oncology provider actions within the CTOS, OEM, FS, and EoTS Modules serve as the foundation to forge the desired clinical environment for standardization, direct order entry of chemotherapy, and documentation of care throughout the treatment regimen. Within the interoperable environment, a more complete spectrum of the provision of oncology services – ordering chemotherapy, administering prescribed medications and providing patient care, and assessing patient reactions and disease response to treatment – is available to support the healthcare team. Further, this standardized and interoperable environment facilitates appropriate documentation of oncology services within VA’s electronic health record for the healthcare team, referring/primary care providers, and other clinical and support staff.

4.2. Nurse

Credentialed nurse practitioners may perform many of the same functions as an oncology provider, within the practice limitations established at each facility. Oncology nurses participate in OEM Module actions and benefit from its healthcare team communication and coordination. For each administration day order, the OEM Module facilitates communication among the provider, nurse, and pharmacist to clear the patient for chemotherapy (or hold/cancel the order) and finalize the order for preparation, dispensing, and administration. In accordance with local facility policies and procedures, oncology nurses may clear the patient order for ultimate administration of the prescribed medications to the patient. 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.

As the primary healthcare professionals interacting with patients in the administration of medications and providing hands-on treatment, oncology nurses fulfill the central role for TD Module actions. Within the TD Module, the oncology nurse reviews existing patient documentation and orders; verifies patient identification and medication dosages; annotates assessments, treatments and presence or absence of adverse reactions using CTC terminology and identifying those to trigger an adverse events alert; and provides the majority of documentation for medication administration and overall provision of medical care. For each

administration day and non-administration days where the patient presents for care, nurses utilize the TD Module to record granular documentation of patient care and reaction to that treatment.

Documenting nursing activities through the TD Module, oncology nurses are the critical human link to facilitate oncology services documentation of chemotherapy administration within VA's expansive healthcare enterprise. Oncology nurse actions within the TD Module serve as the annotation capstone of the desired clinical environment within the construct of standardization and direct order entry of chemotherapy.

The oncology nurse utilizes the standardized and interoperable environment among COMS, VistA/CPRS, and BCMA to facilitate appropriate documentation of healthcare within VA's electronic health record. The collective actions of oncology providers and nurses foster the desired clinical environment with the FS Module serving as the patient treatment dynamic snapshot visible to all members of the healthcare team. Throughout the regimen, any member of the healthcare team may print an order, review the status of the order as part of the individualized patient treatment regimen, and view the patient's performance status. As authorized COMS users, oncology nurses on the current and future healthcare team may view the completed treatment summary through the EoTS Module.

Utilizing the clinical modules of COMS, oncology nurses – and the entire healthcare team – perform critical actions directly and indirectly associated with miscellaneous functionality within the application. All members may perform actions to review patient information; print templates; participate in COMS messaging; clear orders (consistent with local facility policy); view patient's adverse history and the regimen's medication reminders; and switch between normal and high contrast modes. Nurses also have access to other miscellaneous functionality, including modifying patient information such as patient amputations, confirming BSA calculations and formulas, and entering historical dosing of cumulatively tracked medications.

4.3. Pharmacist

Credentialed pharmacists may perform many of the same functions as an oncology provider, within the practice limitations established at each facility. Additionally, pharmacists are key participants on the healthcare team who are involved with OEM Module actions and benefit from its communication and coordination. For each administration day order, the OEM Module facilitates communication among the provider, nurse, and pharmacist to clear the patient for chemotherapy (or hold/cancel the order) and finalize the order for preparation, dispensing, and administration. In accordance with local facility policies and procedures, pharmacists may clear the patient, calculate the medication dosage within rounding rules parameters, and finalize the order for pharmacy preparation and dispensing. Throughout the regimen, any member of the healthcare team may print an order, review the status of the order as part of the individualized patient treatment regimen, and view the patient's performance status.

The pharmacist contributes to OEM Module dialogue among the healthcare team. The individual and collective actions of the oncology provider, nurse, and pharmacist directly influence the patient's prognosis. With the FS Module, pharmacists may view provider annotations for disease response, toxicity side effects, and other comments. Within the construct of standardization and direct order entry of chemotherapy, the collective actions of oncology

providers and nurses foster the desired clinical environment with pharmacists accessing the FS Module for the dynamic snapshot of the patient’s treatment. As authorized COMS users, pharmacists on the current and future healthcare team may view the completed treatment summary through the EoTS Module. Pharmacists benefit from the standardized and interoperable environment among COMS, VistA/CPRS, and BCMA through facilitated communication and documentation of healthcare within VA’s electronic health record.

Utilizing the clinical modules of COMS, oncology pharmacists – and the entire healthcare team – perform critical actions directly and indirectly associated with miscellaneous functionality within the application. All members may perform actions to review patient information; print templates; participate in COMS messaging; clear orders (consistent with local facility policy); view patient’s adverse history and the regimen’s medication reminders; and switch between normal and high contrast modes. Pharmacists also have access to other miscellaneous functionality, including viewing patient amputations, confirming BSA calculations, and entering historical dosing of cumulatively tracked medications.

4.4. COMS Administrator

Utilizing the five primary modules of COMS, all members of the healthcare team – oncology providers, nurses, and pharmacists – perform critical actions directly and indirectly associated with miscellaneous functionality within the application. This miscellaneous functionality is typically setup and managed by COMS administrators. COMS administrators perform essential tasks for the setup and maintenance of the application’s database contents, accessibility, and interoperability. Specifically, COMS administrators may manage capabilities for documentation lists and contents, template management, user access, clinical decision support, and facility preferences.

Collectively, the healthcare team clinical users and COMS administrator facilitate the interoperable environment among VistA, CPRS, BCMA, and COMS. Their actions within the CTOS, OEM, TD, FS, and EoTS Modules and the application’s complementary miscellaneous functionality create the desired clinical environment for standardization and direct order entry of chemotherapy. Within the interoperable environment, a more complete spectrum of the provision of oncology services – ordering and finalizing chemotherapy, administering prescribed medications and providing patient care, and assessing patient reactions and disease response to treatment – is created to support the healthcare team. Further, this standardized and interoperable environment facilitates appropriate documentation of oncology services within VA’s electronic health record more closely aligned with that of primary care disciplines.

[{Return to TOC}](#)

5. Module Functionality

The COMS application consists of five clinical modules – CTOS, OEM, TD, FS and EoTS – and miscellaneous functionality. These modules and miscellaneous functionality are interrelated and collectively provide general application performance and overall operational effectiveness of the COMS application. Clinical functionality standardizes and facilitates actions to create and edit regimen templates, manage orders, document medication administration and patient care, automate flow sheet activities, and create and view end of treatment summaries.

5.1. Chemotherapy Template Order Source (CTOS)

Within the COMS application, the CTOS Module displays chemotherapy order templates available to the oncology provider. Templates may be based upon – and include references to – industry standard chemotherapy regimens, such as those published by the National Comprehensive Cancer Network (NCCN), American Society of Clinical Oncology (ASCO), or other recognized source. While national templates are approved and maintained by an authoring panel comprised of VHA experts for VA-wide use, other templates may be created and used locally by any authorized user in accordance with local facility policies and procedures.

Using radio buttons, drop-down menus, and browse and search functionality, the oncology provider may select and retrieve the appropriate national template, local template, or “my” template based on type of cancer or by opting to show all templates. An oncology provider may then modify the selected template and save as one of the provider’s “My Templates”. Any template contained within the COMS application – National Templates (vetted by VHA), Local Templates (created by same facility colleagues), or “My Templates” – may be applied to any registered patient to initiate the chemotherapy process. An oncology provider may also edit/tailor templates applied to a patient as the patient’s condition, performance status, or other considerations warrant.

In support of the template application selection process and provision of chemotherapy, the COMS application queries VA legacy healthcare systems (VistA and CPRS) and retrieves applicable patient data. From VistA/CPRS, COMS presents patient-specific information such as gender, age, height, weight, allergies, and relevant laboratory results. COMS also displays any chemotherapy template currently and previously applied to the patient through the application. Once an order template is selected and applied, it is available for tailoring to the specific patient and customizing into an individual care plan throughout the various cycles and multiple administration days of the regimen. An applied template provides information regarding the patient’s maximum lifetime dosage for tracked medications and any relevant medication reminders throughout the regimen.

As the first module within the COMS application, CTOS requires few preconditions to function properly. In addition to VistA interoperability, the following preconditions are required to support the CTOS Module functionality:

- To Create New Template or Modify Existing Template, sufficient supporting data such as types of cancer and clinically relevant stages must be loaded in various Site Configuration panels within COMS. Additionally, availability of clinically valid information (e.g. Emetogenic level, febrile neutropenia risk, maximum/number of cycles,

clinical references, and medications reminders) is required to support the creation or modification of chemotherapy regimen templates.

- To Apply Template to a Patient and Generate Orders, Edit Template Currently Applied to a Patient, Print or Save Template Currently Applied to a Patient, Change Template for Patient During On-going Regimen, or View Template Previously Applied to a Patient, a valid national/local/my template must be available in COMS and a patient must exist in the electronic health record.
- To Apply Template to a Patient and Generate Orders, the oncology provider must have knowledge of the patient's performance status and specific amputation(s) of the patient. Further, the provider must determine the regimen's effective date and goal, weight and body surface area formula to use for calculating medication dosages, whether care is curative or palliative, and specific clinical trial, if applicable.

Figure 3 depicts the seven common role-based actions for the Chemotherapy Template Order Source (CTOS) Module.

Chemotherapy Template Order Source (CTOS) Module	Provider	Nurse	Pharmacist	All Clinical
1. Create New Template	●			
2. Modify Existing Template	●			
3. Apply Template to a Patient and Generate Orders	●			
4. Edit Template Currently Applied to a Patient	●			
5. Print or Save Template Currently Applied to Patient				●
6. Change Template for Patient During On-going Regimen	●			
7. View Template Previously Applied to Patient				●

Figure 3: CTOS Module Role-Based Actions

Miscellaneous Functionality primarily supports CTOS Module capabilities. Subsequently, each of the remaining clinical modules – Order Entry Management (OEM), Treatment Documentation (TD), Flow Sheet (FS), and End of Treatment Summary (EoTS) – benefit from actions completed within the CTOS Module.

5.1.1 Create New Template

Within the Template Authoring Tab, providers utilize the CTOS Module to create a new template for local use. Oncology providers select the radio button to “Create New Template” then are required to identify the type of cancer and (clinically contextual) cancer stage from the respective pull-down menus and specify other template information for maximum number of

cycles, cycle length, Emetogenic level, and febrile neutropenia risk percentage, as shown in **Figure 4**.

Figure 4: Header Section for Create New Template

Immediately after the template header section, the authoring provider will specify the pre-therapy and therapy medications for the regimen. These sections contain information for each individual medication and overall instructions for the pre-therapy/therapy administrations. Specific medication information includes drug name; dosage amount; administration days; medication instructions; route of administration; administration time (not a required field); and fluid type, fluid volume, flow rate, and infusion time (auto-calculated) for intravenous preparations. The pre-therapy and therapy sections of the template are shown in **Figure 5**.

Figure 5: Template Pre-Therapy and Therapy Sections

Similarly, the post-therapy section of the template enables oncology providers to specify medication details for post-therapy treatment. Located beneath the post-therapy section, the template footer enables oncology providers to document a reference for template creation, identify any medication reminders relevant for the treatment regimen, and specify a user-friendly

name for the template that correlates to the COMS-generated, standard naming convention template name. **Figure 6** depicts the post-therapy and template footer sections.

The screenshot shows the COMS application interface. At the top, there is a header bar with the text "Post Therapy". Below this, the "Drug Regimen" section is displayed, containing a table with columns for Sequence, Admin Day(s), Admin Time, Drug, Dosage Amount, Units, Route, Fluid/Volume, Flow Rate, Infusion Time, Fluid/Type, and Instructions. A single row is present in the table, detailing a regimen for COMPAZINE PROCHLORPERAZINE. At the bottom of the drug regimen section are three buttons: "Add Drug", "Remove Drug", and "Edit Drug".

Below the drug regimen section is a "References" section, which includes a table with columns for Reference and Reference Link. It lists a reference by Tester WJ et al. with a link to <http://www.ncbi.nlm.nih.gov/pubmed/9024710>. At the bottom of the references section are three buttons: "Add Reference", "Remove Reference", and "Edit Reference".

At the bottom of the page, there are several input fields and buttons. These include:

- "Chemotherapy Regimen Name: 2014-1-0001-ABCD-PACLITAXEL INJ,CONC 200-20140605" with a "Generated" label next to it.
- "Template Name: NSCLC - Single Agent Paclitaxel" with an "Optional" label next to it.
- "Patients Currently Undergoing This Regimen: 0"
- Buttons for "Save Template" and "Clear Template".

Figure 6: Template Post-Therapy and Footer Sections

A template is required to order chemotherapy within the COMS application. Authorized users, presumably credentialed providers, will have access to this functionality to create a new template for future use as a treatment regimen. Similarly, authorized users will access this functionality to modify an existing template and save it with a unique name for future use as a treatment regimen. Use of this functionality will be an efficient use of time for creation of a subsequent template that differs slightly from another existing template.

5.1.2. Modify Existing Template

Authorized users may modify any existing template within COMS – regardless of the template source (e.g. National, Local, or My Template). Within the Template Authoring Tab, providers select the radio button “Select Existing Template” then identify the template source/select the option to display all templates and specify the template to modify. After COMS loads the template for editing, the provider may review and modify the template. The editing process begins with the template header as shown in **Figure 7**.

Chemotherapy Order Management System (COMS)

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Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

What do you want to do?: Select Existing Template
 Create New Template

Select a Template Source *: My Templates Local Templates National Templates

All templates now available for selection

Select a Template *: Paclitaxel Daily Ver 2

Max Cycles *: 4

Cycle Length *: 2 Weeks

Emetogenic Level *: Minimal Emetic Risk

Febrile Neutropenia Risk: 3 %

PACLTAXEL INJ,CONC has a Minimal Emetic Risk

Figure 7: Header Section for Select Existing Template

Providers may change any information within the template header, pre-therapy/therapy/post-therapy sections, or the template footer. Providers should update the reference or provide a new reference to support the changes in the chemotherapy regimen and provide a different user-friendly template name to distinguish it from the source template. If no name is provided, COMS will automatically provide a numerical suffix to the user-friendly name of the original template (e.g., Paclitaxel Daily Ver 2 would be saved as Paclitaxel Daily Ver 3). Users are prompted to designate the original template as active for future use or inactive for restriction to those patients currently undergoing treatment with the original template regimen.

5.1.3. Apply Template to a Patient and Generate Orders

The Provider role may apply an existing template to a selected patient. This action facilitates regimen-specific parameters (e.g., body surface area formula and patient weight to use), identifies the type of care being provided (i.e., curative or palliative), establishes the initial performance status, sets the treatment regimen, and generates orders as specified in the template.

To apply an existing template to a specific patient, the oncology provider must first select the patient from the database, as presented in [section 3.8](#). After patient selection, oncology providers may review specific patient information through the expandable and collapsible sections of the six Patient Information panels, as shown in **Figure 8** and **Figure 9**, respectively, for a patient currently under treatment with documentation in COMS. Specific actions for the Patient Information panels are detailed in [section 6.2](#).

Chemotherapy Order Management System (COMS)

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Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Patient Selection

Patient Information for - PATIENT FIVEHUNDREDFIVE

Patient Information

Medication Reminders

Adverse Events History - (13 Adverse Events Recorded - 1 flagged to trigger an Alert)

Treatment Regimens & Summaries (2 Records)

Patient Vitals (23 Records)

Laboratory Information (No Records Available)

Figure 8: Collapsed Patient Information Panels

Chemotherapy Order Management System (COMS)

Welcome Programmer, All Roles -- [Help](#) [Switch to High Contrast Mode](#)

[Patient](#) [Orders](#) [Template Authoring](#) [Template List](#) [Template Promotion](#) [Reports](#) [Messages](#) [Site Configuration](#)

Patient Selection

Patient Information for - PATIENT FIVEHUNDREDFIVE

Patient Information

Gender:	M	Age:	79	Add/Edit	Amputee:	None										
BSA Weight Method:	Actual Weight	BSA Formula:	Mosteller	Add/Edit	BSA:	0 Update BSA Show Calculations										
Template:	2015-1-0001-ABCD-CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75-20150126 COMS Testing Ver 2															
Regimen Status:	On-Going - Admin Day	Regimen Start Date:	01/28/2015	Regimen End Date:	05/20/2015											
Add Type(s) of Cancer:	<table border="1"> <thead> <tr> <th>Disease</th> <th>Stage</th> <th>Recorded on</th> <th>User</th> <th>Delete</th> </tr> </thead> <tbody> <tr> <td>Acute Lymphoblastic Leukemia, Adult</td> <td>Stage I</td> <td>02/10/2015</td> <td>Programmer</td> <td>Delete</td> </tr> </tbody> </table>						Disease	Stage	Recorded on	User	Delete	Acute Lymphoblastic Leukemia, Adult	Stage I	02/10/2015	Programmer	Delete
Disease	Stage	Recorded on	User	Delete												
Acute Lymphoblastic Leukemia, Adult	Stage I	02/10/2015	Programmer	Delete												
Allergies:	No Known Allergies															
Clinical Trial:	COMS Testing Clinical Trial															
Medication Cumulative Dose Tracking: Add Medication	Medication / Maximum	Lifetime Total / %	Received / %	Source												
	BLEOMYCIN INJ,SOLN 300 Units	68 Units / 22.67%	33 Units / 11%	VAPSHCS Electronic Health Records												
			35 Units / 11.67%	VAPSHCS Records												

Medication Reminders

When		Title
Before	Cycle	Assess Labs and Order Adjunct Therapy
When *:		
Title *:		
Description:		

Adverse Events History - (13 Adverse Events Recorded - 1 flagged to trigger an Alert)

Assessment - 02/20/2015	
Vomiting - Flagged as an ALERT	
Event:	Vomiting
Grade:	Grade 3 - Significant
Details:	6 or greater episodes (separated by 5 minutes) in 24 hours; tube feeding, TPN, or hospitalization indicated
Comments:	Very sick
Reaction - 02/17/2015	
Event:	Nausea
Section:	Cytokine-Release Syndrome
Comments:	

Patient Vitalis (23 Records)

Date	Temp °F/°C	Temp Taken	Pulse	BP	Resp	Pain	SP O ₂	PS	Height in Inches/cm	Weight in lbs/kg	BSA			
											Weight Form.	Weight in KG	Method	BSA
02/18/2015	98.6/37	Temporal	60	118/80	14	1	99	N/C	65/165.1	162/73.48	Actual Weight	73.48	Mosteller	1.84 m²
02/17/2015	98.6/37	Tympanic	62	120/78	14	1	99	N/C	65/165.1	162/73.48	Actual Weight	73.48	Mosteller	1.84 m²
02/12/2015	98.6/37	Axillary	62	118/76	14	2	98	N/C	65/165.1	162/73.48	Actual Weight	73.48	Mosteller	1.84 m²

Laboratory Information (No Records Available)

Date	Collection Date	Lab Tech	Info	Name	Result	Acceptable Range	OUT of Range	comment	

Figure 9: Expanded Patient Information Panels

After reviewing the various patient information panels, oncology providers may then apply a selected template to the patient and generate an order (Note, Medication Reminders and Adverse Events History panels will not have any records for patients without a template applied. Other panels may contain information from VistA or from COMS, as appropriate).

From the Chemotherapy Template Order Source Tab for a patient with a template currently applied, the provider may choose the currently applied template or select an existing standard template through the process as described below. The options for a patient with a template currently applied are shown in **Figure 10**.

The screenshot shows the 'Chemotherapy Order Management System (COMS)' interface. At the top, there is a navigation bar with tabs: Patient, Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, and Site Configuration. Below the navigation bar is a section titled 'Patient Selection' with a title 'Patient Information for - PATIENT FIVEHUNDREDFIVE'. This section contains several expandable dropdown menus: 'Patient Information', 'Medication Reminders', 'Adverse Events History - (13 Adverse Events Recorded - 1 flagged to trigger an Alert)', 'Treatment Regimens & Summaries (2 Records)', 'Patient Vitals (23 Records)', and 'Laboratory Information (No Records Available)'. At the bottom of this section, there is a message: 'What do you want to do?: Select "COMS Testing Ver 2" template (as currently applied to patient) Select an existing standard template'. Below this message are four tabs: Chemotherapy Template Order Source, Order Entry Management, Treatment Documentation, and Flow Sheet.

Figure 10: Template Selection for Patient Treatment Regimen

For a patient without a template currently applied, the provider may chose the appropriate radio button to identify the template source then select a type of cancer and the desired template, as shown in **Figure 11**. Alternatively, the provider may select the “Show All Templates” button then select the desired template from the list.

The screenshot shows the 'Chemotherapy Order Management System (COMS)' interface. At the top, there is a navigation bar with tabs: Patient, Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, and Site Configuration. Below the navigation bar is a section titled 'Patient Selection' with a title 'Patient Information for - PATIENT FIVEHUNDREDFIFTY'. This section contains several expandable dropdown menus: 'Patient Information', 'Medication Reminders', 'Adverse Events History (No Adverse Events Recorded)', 'Treatment Regimens & Summaries (No Records Available)', 'Patient Vitals (1 Record)', and 'Laboratory Information (No Records Available)'. At the bottom of this section, there is a message: 'Select a Template Source *: My Templates Local Templates National Templates'. Below this message are three dropdown menus: 'Select a type of cancer *:', 'Select a Template *:', and 'Cancer Stage:'. The 'Select a type of cancer *:' dropdown is set to 'Lung Cancer, Non-Small Cell'. The 'Select a Template *:' dropdown is set to 'NSCLC - Single Agent Paclitaxel'. There is also a 'Show All Templates' button next to the 'Select a Template *:' dropdown.

Figure 11: Template Selection for Patient Treatment Regimen

After selecting the template for the patient treatment regimen, the oncology provider may view all template information, including pre-therapy, therapy, and post-therapy medication details. To apply the template to a patient, the prescribing provider will select the “Apply Template to Patient” button. The full template and apply template button are shown in **Figure 12**.

The screenshot shows a web-based chemotherapy order template for NSCLC - Daily Paclitaxel Ver 2. At the top, there are dropdown menus for 'Select a Template Source' (My Templates), 'Select a type of cancer' (Lung Cancer, Non-Small Cell), and 'Cancer Stage' (Stage IIB). Below these are sections for 'Pre Therapy', 'Therapy', and 'Post Therapy', each containing tables for medication administration. A 'Print Template' button is located at the bottom left. A 'Cumulative Medications' section at the bottom indicates 'No Cumulative Dose Tracked Medications in this Regimen'. Buttons for 'Apply Template to Patient' and 'Edit Template' are at the very bottom.

Sequence #	Drug	Dose	Route	Administration Day
1	DEXAMETHASONE INJ,SOLN	20 mg	IVPB	1-3
	Fluid/Volume:	Normal Saline 50 ml	Infusion Time:	0 hrs / 15 min
2	RANITIDINE INJ INJ	50 mg	IVPB	1-3
	Fluid/Volume:	Normal Saline 50 ml	Infusion Time:	0 hrs / 15 min
3	DIPHENHYDRAMINE CAP,ORAL	50 mg	Oral	1-3
	Fluid/Volume:		Infusion Time:	

Patient to ingest prior to chemotherapy

Sequence #	Drug	Dose	Route	Administration Day
1	PACLITAXEL INJ,CONC	67 mg/m ²	IV	1-3
	Fluid/Volume:	Normal Saline 100 ml	Infusion Time:	2 hrs / 0 min

Administer slowly over 2-hour period

Sequence #	Drug	Dose	Route	Administration Day
1	COMPAZINE PROCHLORPERAZINE TAB	10 mg	Oral	1-3
	Fluid/Volume:		Infusion Time:	

Dispense 12 Tablets - Patient to take every 6 hours as needed for nausea/vomiting

Cumulative Medications: No Cumulative Dose Tracked Medications in this Regimen

Patients Currently Undergoing This Regimen: 0

Apply Template to Patient | Edit Template

Figure 12: Regimen Details to Apply Template to Patient

After selecting the “Apply Template to Patient” button, providers will provide treatment regimen information for effective date; weight to use (e.g. actual, ideal); body surface area (BSA) formula to use (e.g. DuBois, Mosteller); regimen goal (i.e. curative or palliative); concurrent radiation therapy (if applicable); clinical trial (if applicable); patient amputation(s); and current performance status of the patient, as shown in **Figure 13**. The action of applying a template to a patient generates the orders for pre-therapy, therapy, and post-therapy medications, as prescribed/associated with the template. For preceptor users, the action of applying a template begins with the “Apply Template to Patient – Requires Cosigner” button; COMS will not generate orders until a fully credentialed provider approves the treatment regimen.

Select a type of cancer *: Lung Cancer, Non-Small Cell
Select a Template *: NSCLC - Single Agent Paclitaxel

[Print Template](#)

CANCER CHEMOTHERAPY IV ORDER SHEET

Max Number of Cycles: 4 Cycle Length: 3 Weeks
Chemotherapy Regimen Name: 2014-1-0001-ABCD-PACLITAXEL INJ,CONC 200-20140605
Description: NSCLC - Single Agent Paclitaxel
Emetogenic level: Low
Febrile Neutropenia risk: 3 %
Reference: Tester WJ et al. Phase II study of patients with metastatic non-small cell carcinoma of the lung treated with paclitaxel by 3-hour infusion. *Cancer* 1997; 79:724
[\(Link to PMID\)](#)

Pre Therapy
Instructions: Provide Pre-Therapy Medications on Chemotherapy Day

Sequence #	Drug
1	DEXAMETHASONE INJ,SOLN Fluid/V
2	RANITIDINE INJ INJ Fluid/V
3	DIPHENHYDRAMINE CAP,ORAL Fluid/V

Administer in Normal Saline
Patient to ingest prior to chemotherapy

Therapy
Instructions: Use non PVC containers for final dilution

Sequence #	Drug
1	PACLITAXEL INJ,CONC Fluid/Volumetric

Administer slowly over 3-hour period

Post Therapy
Instructions: Provide for patient following chemotherapy

Sequence #	Drug
1	COMPAZINE PROCHLORPERAZINE

Dispense 8 Tablets - Patient to take every 6 hours a day

Fields with an * are required fields

Enter a Start Date *:

Weight to use *: BSA Formula *:

Select the goal for this Regimen *:
 Curative Palliative

Patient undergoing concurrent radiation treatment *:
 Yes No

Specify the type of clinical trial *:
 Yes No

Is the Patient an Amputee? *:
 Yes No

Performance Status *

0 - Fully active, able to carry on all pre-disease performance without restriction
 1 - Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g. light house work, office work
 2 - Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours
 3 - Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours
 4 - Completely disabled. Cannot carry on any selfcare. Totally confined to bed or chair

[Apply Template](#) [Cancel](#)

Cumulative Medications: No Cumulative Dose Tracked Medications in this Regimen

Patients Currently Undergoing This Regimen: 3

[Apply Template to Patient](#) [Edit Template](#)

Figure 13: Apply Template to Patient

For templates initiated by preceptor users, a fully credentialed provider (i.e., preceptor) is required to review the treatment regimen and “Approve Regimen” to apply the template to the selected patient. During this process, COMS presents the preceptor user with the Apply Template worksheet as previously completed by the preceptor. Once the regimen is approved, the COMS application generates orders and facilitates progression of the treatment regimen.

5.1.4. Edit Template Currently Applied to a Patient

Providers may modify the template currently applied to their patients; however, patients currently treated with the template being modified will continue treatment under the original template throughout their current regimen. If a change in regimen is required in clinical practice, providers will stop the current treatment, generate an end of treatment summary, and apply a new template to the patient.

To edit a template applied to a patient, the oncology provider must first select a patient with a currently applied template. After patient selection, the oncology provider may then edit the template by selecting the “Edit Template” button, as shown in **Figure 14**.

What do you want to do?: Select "COMS Testing Ver 2" template (as currently applied to patient) Select an existing standard template

[Print Template](#)

CANCER CHEMOTHERAPY IV ORDER SHEET

Max Number of Cycles: 4 Cycle Length: 4 Weeks
Chemotherapy Regimen Name: 2015-1-0001-ABCD-CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75-20150126
Description: COMS Testing Ver 2
Emetogenic level: Moderate Emetic Risk
Febrile Neutropenia risk: 12 %
Reference: No Clinical Reference - COMS Testing

Pre Therapy				
Instructions: Pre-Therapy Medications for COMS Testing				
Sequence #	Drug	Dose	Route	Administration Day
1	RANITIDINE TAB	150 mg	Oral	1-28
		Fluid/Volume:	Infusion Time:	
Take one tablet by mouth prior to chemotherapy				
2	DEXAMETHASONE INJ,SOLN	20 mg	IVPB	1-28
		Fluid/Volume:	Infusion Time: 0 hrs / 30 min	
Administer in dextrose to stabilize blood sugar				
3	DILTAZEM INJ	200 MicroGram	IVP	1-28
		Fluid/Volume:	Infusion Time:	
Provide IV push to control tachycardia				

Therapy				
Instructions: Therapy Medications for COMS Testing				
Sequence #	Drug	Dose	Route	Administration Day
1	CARBOPLATIN INJ	10 AUC	IVPB	1-28
		Fluid/Volume:	Ringer's Lactate 50 ml Infusion Time: 0 hrs / 30 min	
Administer before Cisplatin administration				
2	CISPLATIN INJ,SOLN	50 mg	IV	1-28
		Fluid/Volume:	Ringer's Lactate 100 ml Infusion Time: 1 hrs / 0 min	
Administer slowly following Carboplatin infusion				
3	DIPHENHYDRAMINE CAP,ORAL	75 mg	Oral	1-28
		Fluid/Volume:	Infusion Time:	
Take 75mg by mouth during Cisplatin administration for restless legs				

Post Therapy				
Instructions: Post-Therapy Medications to be used for COMS Testing				
Sequence #	Drug	Dose	Route	Administration Day
1	ONDANSETRON INJ,SOLN	0.5 mg/kg	IVPB	1-28
		Fluid/Volume:	Normal Saline 50 ml Infusion Time: 0 hrs / 30 min	
Administer slowing following chemotherapy				
2	MYLANTA II ALUMINUM HYDROXIDE/MAG HYDROXIDE/SIMETH SUSP,ORAL	120 ml	Oral	1-28
		Fluid/Volume:	Infusion Time:	
Patient to take by mouth, as needed, for nausea				
3	DIGOXIN INJ,SOLN	25 MicroGram	IVP	1-28
		Fluid/Volume:	Infusion Time:	
Provide IV push, as needed, to control tachycardia				

Cumulative Medications: 2 Cumulative Dose Tracked Medications in this Regimen					
Medication Name	Lifetime Max	For This Regimen		For This Patient	
		Total / Cycle	Total / Regimen	Lifetime Total	Exceeds Max
CARBOPLATIN INJ	3,000 mg	280 mg	1,120 mg	N/A	N/A
CISPLATIN INJ,SOLN	4,000 mg	1,400 mg	5,600 mg	N/A	N/A

Patients Currently Undergoing This Regimen: [2](#)

[Apply Template to Patient](#) [Edit Template](#)

Figure 14: Regimen Details to Edit Template Applied to a Patient

During the edit process, the provider may change any information within the template header, pre-therapy/therapy/post-therapy sections, or the template footer. Providers should update the reference or provide a new reference to support the changes in the chemotherapy regimen and enter a different user-friendly template name to distinguish it from the source template. COMS will automatically provide a numerical suffix to any unchanged user-friendly template name. During the save process, users are prompted to designate the original template as active or

inactive. Providers may apply active templates to other patients; however, inactive templates are not available for future patient and restricted to those patients currently undergoing treatment with this regimen.

5.1.5. Print or Save Template Applied to a Patient

Authorized users may print the template currently applied to a selected patient directly from the CTOS Module without navigating to the Template List tab. To view a template applied to a patient, authorized users must first select a patient with a currently applied template. After patient selection, the user may select the “Print” template link near the top of the template, as shown in Figure 14 above. COMS opens a new browser tab and displays the template for saving or printing through existing browser functionality, as shown in **Figure 15**.

Cancer Chemotherapy IV Order Sheet

Max Number of Cycles: 4 Cycle Length: 2 Weeks
Chemotherapy Regimen Name: 2014-3-0001-ABCD-PACLITAXEL INJ,CONC-40-20141106
Description: Paclitaxel Daily Ver 2

Emetogenic level: Minimal Emetic Risk
Febrile Neutropenia risk: 3 %
Reference: Tister WJ et al. Phase II study of patients with metastatic non-small cell carcinoma of the lung treated with paclitaxel by 3-hour infusion. Cancer 1997; 79:724 - [Link to PMID](#)

Pre Therapy

Instructions: Provide Pre-Therapy Medications on Chemotherapy Days

Sequence #	Drug	Dose	Route	Fluid/Volume	Fluid Type	Infusion Time	Administration Day
1	DEXAMETHASONE INJ/SOLN	40 mg	IVPB	50	Normal Saline	0 hrs / 15 min	I-5
	Administer in Normal Saline						
2	RANITIDINE INJ INJ	50 mg	IVPB	50	Normal Saline	0 hrs / 15 min	I-5
	Administer in Normal Saline						
3	DIPHENHYDRAMINE CAP,ORAL	50 mg	Oral	N/A	N/A	N/A	I-5
	Patent to ingest prior to chemotherapy						

Therapy

Instructions: Use non PVC containers for final dilution and 0.2μm filter and tubing sets for administration

Sequence #	Drug	Dose	Route	Fluid/Volume	Fluid Type	Infusion Time	Administration Day
1	PACLITAXEL INJ,CONC-40 mg/mL	40 mg	IVPB	50	Normal Saline	0 hrs / 30 min	I-5
	Administer over 30 minutes						

Post Therapy

Instructions: Provide for patient following chemotherapy

Sequence #	Drug	Dose	Route	Fluid/Volume	Fluid Type	Infusion Time	Administration Day
1	COMPAZINE PROCHLORPERAZINE TAB	10 mg	Oral	N/A	N/A	N/A	I-5
	Dispense 20 Tablets - Patient to take every 6 hours as needed for nausea/vomiting						

Figure 15: Print or Save Template Applied to Patient

5.1.6. Change Template for Patient During On-going Regimen

Providers and other authorized users may change the template for a patient during an on-going regimen. Users may accomplish this by either stopping the current treatment regimen and applying a new template as two deliberate actions or applying a new template to the patient and permitting COMS to stop the current treatment regimen. As noted in [section 5.1.3](#), providers must stop one treatment to begin another. This manual presents the process to stop a treatment regimen in [section 5.5.1](#) and the process to apply a new template to a patient in [section 5.1.2](#). For patients with a template currently applied, both process paths lead to the COMS prompt to generate an end of treatment summary for that treatment regimen, as discussed in [sections 5.5.2 – 5.5.5](#) of the End of Treatment Summary Module.

5.1.7. View Template Previously Applied to a Patient

This action enables users to view current and historical templates for a specific patient before, during, or after any treatment regimen. In clinical practice, this functionality groups treatment regimen information for provider and healthcare team awareness.

Any member of the healthcare team may view a current or previously applied template for any patient. After patient selection, users may view any listed template for that patient by opening the Treatment Regimens & Summaries panel and selecting the “Show Details” link for the desired current template or historical template, as shown in **Figure 16**.

The screenshot shows the Chemotherapy Order Management System (COMS) interface. At the top, there is a navigation bar with tabs for Patient, Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, and Site Configuration. Below the navigation bar, a section titled "Patient Selection" displays "Patient Information for - PATIENT FIVEHUNDREDFIVE". This includes sections for "Patient Information", "Medication Reminders", and "Adverse Events History - (13 Adverse Events Recorded - 1 flagged to trigger an Alert)". Under "Treatment Regimens & Summaries" (2 Records), there is a table:

	Template Name	Start Date	End Date	Action	Action
Current Template:	COMS Testing Ver 2	01/28/2015	05/20/2015	Show Details	Stop Treatment
Historical Template:	Paclitaxel Daily Ver 2	11/17/2014	01/28/2015	Show Details	Generate End of Treatment Summary

Below the table, there are sections for "Patient Vitals" (23 Records) and "Laboratory Information" (No Records Available). At the bottom, there is a "Chemotherapy Template Order Source" section with buttons for "Order Entry Management", "Treatment Documentation", and "Flow Sheet". A message asks "What do you want to do?:" followed by two radio button options: "Select 'COMS Testing Ver 2' template (as currently applied to patient)" (selected) and "Select an existing standard template".

Figure 16: Treatment Regimens & Summaries Panel

[\[Return to TOC\]](#)

5.2. Order Entry Management (OEM)

The OEM Module enables the oncology provider to fully communicate and coordinate the chemotherapy order and subsequent actions 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”. Combined with miscellaneous functionality, the OEM Module provides the communication mechanism and documentation of that communication to 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, users 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 modification and 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 patient-specific oncology orders – and any modifications with associated rationale – to provide chemotherapy throughout the treatment regimen.

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 and VistA interoperability, the following specific conditions are required to support the Order Entry Management Module functionality:

- A template applied to a patient is essential to View Patient's Flow Sheet Information and Modify Patient's Performance Status; 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 Print Medication Orders, Select Administration Day to View, View Dosage Calculations, Change Administration Date(s) or Edit Medication, and Cancel or Hold/Release from Hold Medication.

Figure 17 depicts the seven role-based actions for the Order Entry Management (OEM) Module.

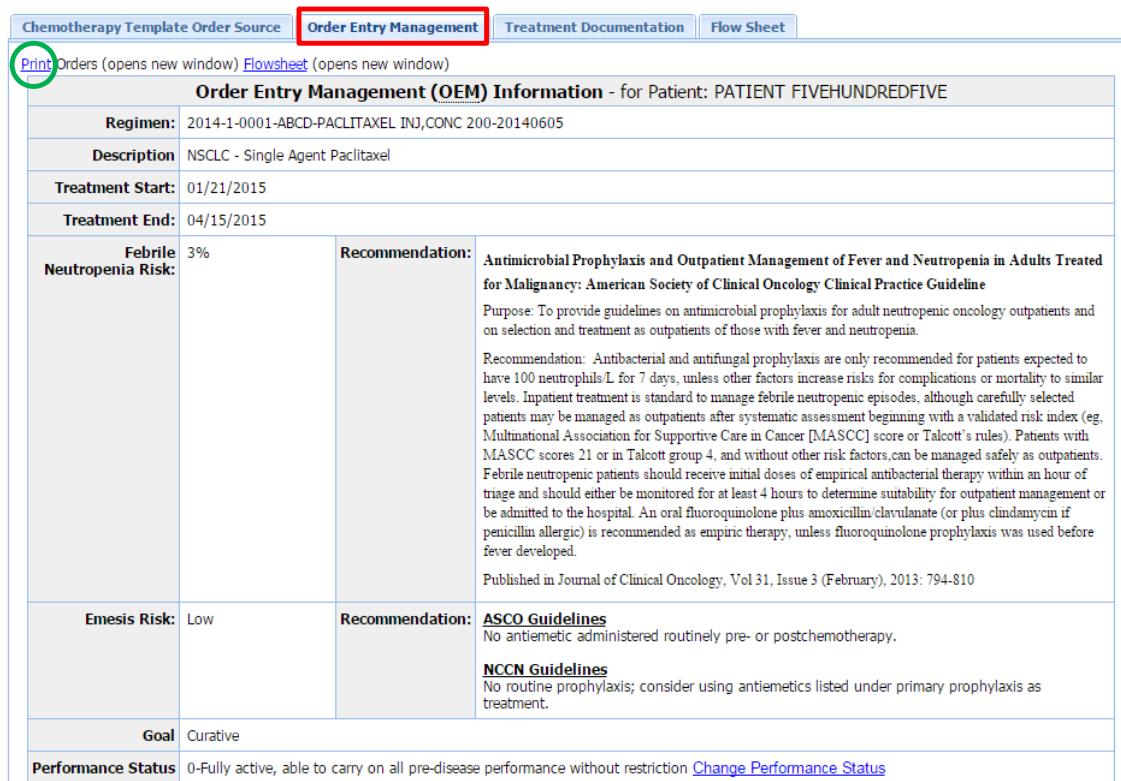
Order Entry Management (OEM) Module	Provider	Nurse	Pharmacist	All Clinical
1. Print Medication Orders				•
2. View Patient's Flow Sheet Information				•
3. Modify Patient's Performance Status	•			
4. Select Administration Day to View				•
5. View Dosage Calculations				•
6. Change Administration Date(s) or Edit Medication	•			
7. Cancel or Hold/Release from Hold Medication	•			

Figure 17: OEM Module Role-Based Actions

The CTOS Module and Miscellaneous Functionality support the OEM Module. CTOS functionality provides the foundation for COMS functionality and supports OEM capabilities. The various clinical and administrative capabilities within Miscellaneous Functionality provide the overall underpinning and support for each of the five clinical modules.

5.2.1. Print Medication Orders

After selection of a specific patient, authorized users may print the current regimen's medication orders for hard copy or other contingent purposes. This functionality is available by navigating to the OEM Module for a patient with a currently applied regimen then selecting the "Print" Orders link, as shown in **Figure 18**.



Chemotherapy Template Order Source				Order Entry Management	Treatment Documentation	Flow Sheet				
Print Orders (opens new window) Flowsheet (opens new window)										
Order Entry Management (OEM) Information - for Patient: PATIENT FIVEHUNDREDFIVE										
Regimen:	2014-1-0001-ABCD-PACLITAXEL INJ,CONC 200-20140605									
Description:	NSCLC - Single Agent Paclitaxel									
Treatment Start:	01/21/2015									
Treatment End:	04/15/2015									
Febrile Neutropenia Risk:	3%	Recommendation:	Antimicrobial Prophylaxis and Outpatient Management of Fever and Neutropenia in Adults Treated for Malignancy: American Society of Clinical Oncology Clinical Practice Guideline Purpose: To provide guidelines on antimicrobial prophylaxis for adult neutropenic oncology outpatients and on selection and treatment as outpatients of those with fever and neutropenia. Recommendation: Antibacterial and antifungal prophylaxis are only recommended for patients expected to have 100 neutrophils/L for 7 days, unless other factors increase risks for complications or mortality to similar levels. Inpatient treatment is standard to manage febrile neutropenic episodes, although carefully selected patients may be managed as outpatients after systematic assessment beginning with a validated risk index (eg, Multinational Association for Supportive Care in Cancer [MASCC] score or Talcott's rules). Patients with MASCC scores 21 or in Talcott group 4, and without other risk factors, can be managed safely as outpatients. Febrile neutropenic patients should receive initial doses of empirical antibacterial therapy within an hour of triage and should either be monitored for at least 4 hours to determine suitability for outpatient management or be admitted to the hospital. An oral fluoroquinolone plus amoxicillin/clavulanate (or plus clindamycin if penicillin allergic) is recommended as empiric therapy, unless fluoroquinolone prophylaxis was used before fever developed. Published in Journal of Clinical Oncology, Vol 31, Issue 3 (February), 2013: 794-810							
Emesis Risk:	Low	Recommendation:	ASCO Guidelines No antiemetic administered routinely pre- or postchemotherapy. NCCN Guidelines No routine prophylaxis; consider using antiemetics listed under primary prophylaxis as treatment.							
Goal:	Curative									
Performance Status:	0-Fully active, able to carry on all pre-disease performance without restriction Change Performance Status									

Figure 18: Print Orders from OEM Display

COMS opens a new browser tab and displays all the orders for the patient's regimen for saving or printing through existing browser functionality similar to capabilities presented in [section 5.1.5](#) for printing or saving a template.

5.2.2. View Patient's Flow Sheet Information

The Order Entry Management Module enables users to view the patient's flow sheet – in a new browser window- without accessing the Flow Sheet Module. By selecting the "Flowsheet" link beside the "Print" Orders link, as shown in Figure 18 above, users may access the patient's flow sheet in a new browser tab. This functionality enables users to review flow sheet information concurrently with the OEM Module without navigating between the two modules. **Figure 19** provides a representation of the external flow sheet.

Flowsheet for Patient PATIENT FIVEHUNDREDFIVE								
	Cycle 1, Day 1	Cycle 1, Day 2	Cycle 1, Day 3	Cycle 1, Day 4	Cycle 1, Day 5	Cycle 1, Day 6	Cycle 1, Day 7	Cycle 1, Day 8
01 General	01 General							
Date	01/28/2015	01/29/2015	01/30/2015	01/31/2015	02/01/2015	02/02/2015	02/03/2015	02/04/2015
Performance Status	View	View	View			View	View	View
Disease Response	View	View	View			View	View	View
Toxicity	View	View	View			View	View	View
Other	View	View	View			View	View	View
02 Pre Therapy	02 Pre Therapy							
RANITIDINE TAB	150 mg Oral From 11:00 am to 11:00 am	150 mg Oral From 08:00 am to 08:00 am	150 mg Oral From 07:05 am to 07:05 am	Hold	Hold	150 mg Oral From 09:00 am to 09:00 am	150 mg Oral From 09:00 am to 09:00 am	150 mg Oral From 09:00 am to 09:00 am
DEXAMETHASONE INJ,SOLN	Hold	20 mg IVPB From 08:15 am to 08:45 am	20 mg IVPB From 07:15 am to 07:45 am	Hold	Hold	20 mg IVPB From 09:10 am to 09:40 am	20 mg IVPB From 09:10 am to 09:40 am	20 mg IVPB From 09:10 am to 09:40 am
DILTIAZEM INJ	Hold	200 MicroGram IVP From 08:55 am to 08:55 am	200 MicroGram IVP From 07:50 am to 07:50 am	Hold	Hold	200 MicroGram IVP From 09:43 am to 09:43 am	200 MicroGram IVP From 09:45 am to 09:45 am	Hold
03 Therapy	03 Therapy							
CARBOPLATIN INJ	Hold	10 AUC IVPB From 09:05 am to 09:36 am	10 AUC IVPB From 08:00 am to 08:30 am	Hold	Hold	10 AUC IVPB From 09:58 am to 10:29 am	10 AUC IVPB From 09:55 am to 10:25 am	Cancel
CISPLATIN INJ,SOLN	50 mg IV From 11:30 am to 12:01 pm	50 mg IV From 09:45 am to 10:15 am	50 mg IV From 08:45 am to 09:15 am	Hold	Hold	50 mg IV From 10:45 am to 11:15 am	50 mg IV From 10:32 am to 11:02 am	50 mg IV From 09:55 am to 10:25 am
DIPHENHYDRAMINE CAP,ORAL	Hold	75 mg Oral From 10:00 am to 10:00 am	75 mg Oral From 09:20 am to 09:20 am	Hold	Hold	75 mg Oral From 11:20 am to 11:20 am	75 mg Oral From 11:10 am to 11:10 am	75 mg Oral From 10:36 am to 10:36 am
04 Post Therapy	04 Post Therapy							
ONDANSETRON INJ,SOLN	Hold	0.50 mg/kg IVPB From 10:30 am to 11:00 am	0.50 mg/kg IVPB From 09:30 am to 10:00 am	Hold	Hold	0.50 mg/kg IVPB From 11:20 am to 12:00 pm	0.50 mg/kg IVPB From 11:20 am to 11:50 am	Cancel
MYLANTA II ALUMINUM HYDROXIDE/...	120 ml Oral From 12:30 pm to 12:30 pm	120 ml Oral From 10:45 am to 11:20 am	120 ml Oral From 10:05 am to 11:00 am	Hold	Hold	120 ml Oral From 12:05 pm to 12:50 pm	120 ml Oral From 12:00 pm to 12:45 pm	120 ml Oral From 10:45 am to 11:25 am
Disease Response								
Disease Response for date - 02/02/2015 Tumor measured at 5.95mm 2/2/15 - laf								
Disease Response for date - 01/30/2015 No discernible response to date; reassess next week								
Disease Response for date - 01/29/2015 No discernible response following 1/29/15 treatment - laf								
Disease Response for date - 01/28/2015 Tumor measured at 6.75 mm at start of regimen on 1/28/15								
Toxicity History								
Assessment - 02/20/2015								
Vomiting - Flagged as an ALERT								
Event:	Vomiting							
Grade:	Grade 3 - Significant							
Details:	6 or greater episodes (separated by 5 minutes) in 24 hours; tube feeding, TPN, or hospitalization indicated							
Comments:	Very sick							
Additional General Information								
Other Information for date - 02/18/2015 Aside from character strings, no other comments provided.								
Other Information for date - 02/17/2015 Continue with prescribed regimen - laf								
Other Information for date - 02/12/2015 Continue with treatment regimen, as prescribed in applied template - 2/12/15								

Figure 19: External Flow Sheet

5.2.3. Modify Patient's Performance Status

Oncology providers may modify the patient's performance status through COMS by assigning a different value from the Eastern Cooperative Oncology Group (ECOG) scale. After patient selection, users access the OEM Module and select the "Change Performance Status" link to view the Regimen Performance Status pop-up screen with the ECOG scale and numeric values, as shown in **Figure 20**.

Chemotherapy Template Order Source | Order Entry Management | Treatment Documentation | Flow Sheet

[Print Orders](#) (opens new window) [Flowsheet](#) (opens new window)

Order Entry Management (OEM) Information - for Patient: PATIENT FIVEHUNDREDSIX			
Regimen:	2014-1-0001-ABCD-B-12 CYANOCOBALAMIN INJ,SOLN200-20140603		
Description:	Test Template - 3 days, 3 drugs		
Treatment Start:	02/20/2015		
Treatment End:	02/23/2015		
Febrile Neutropenia Risk:	5%	Recommendation:	Antimicrobial Prophylaxis and Outpatient Management of Fever and Neutropenia in Adults Oncology Clinical Practice Guideline
		Regimen Performance Status Select the Performance Status: <input type="radio"/> 0 - Fully active, able to carry on all pre-disease performance without restriction <input type="radio"/> 1 - Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g. light house work, office work <input type="radio"/> 2 - Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours <input type="radio"/> 3 - Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours <input type="radio"/> 4 - Completely disabled. Cannot carry on any selfcare. Totally confined to bed or chair	
Emesis Risk:	Minimal Emetic Risk	NCCN Guidelines No routine prophylaxis; consider using antiemetics listed under primary prophylaxis as treatment.	
Goal:	Curative		
Performance Status:	2-Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours Change Performance Status		

Figure 20: Change Performance Status

Authorized users may modify the patient's performance status throughout the regimen by accessing this capability within the OEM Module. After the template is applied, this is the only location for this functionality within the application.

5.2.4. Select Administration Day to View

Authorized users on the healthcare team may select an administration day to view and/or subsequent actions described in the next few sections. Within the OEM Module for a patient with an ongoing regimen, users may select an administration date by two methods. Users may “Show All” administration dates and scroll through to the desired date or select a specific date from the “Select Admin Day to View” pull-down menu, as shown in **Figure 21**. When viewing medications for any administration day, dosages are displayed as ordered. Those medications with calculated dosages (based on BSA or other patient-specific considerations) also display calculated dose values. Selection of the link for the calculated dose value presents the patient-specific calculations for the displayed dose, as presented in the next section.

Chemotherapy Template Order Source Order Entry Management Treatment Documentation Flow Sheet			
Print Orders (opens new window) Flowsheet (opens new window)			
Order Entry Management (OEM) Information - for Patient: PATIENT FIVEHUNDRED SIX			
Regimen:	2014-1-0001-ABCD-B-12 CYANOCOBALAMIN INJ,SOLN200-20140603		
Description:	Test Template - 3 days, 3 drugs		
Treatment Start:	02/20/2015		
Treatment End:	02/23/2015		
Febrile Neutropenia Risk:	5%	Recommendation:	<p>Antimicrobial Prophylaxis and Outpatient Management of Fever and Neutropenia in Adults Treated for Malignancy: American Society of Clinical Oncology Clinical Practice Guideline</p> <p>Purpose: To provide guidelines on antimicrobial prophylaxis for adult neutropenic oncology outpatients and on selection and treatment as outpatients of those with fever and neutropenia.</p> <p>Recommendation: Antibacterial and antifungal prophylaxis are only recommended for patients expected to have 100 neutrophils/L for 7 days, unless other factors increase risks for complications or mortality to similar levels. Inpatient treatment is standard to manage febrile neutropenic episodes, although carefully selected patients may be managed as outpatients after systematic assessment beginning with a validated risk index (eg, Multinational Association for Supportive Care in Cancer [MASCC] score or Talcott's rules). Patients with MASCC scores 21 or in Talcott group 4, and without other risk factors, can be managed safely as outpatients. Febrile neutropenic patients should receive initial doses of empirical antibacterial therapy within an hour of triage and should either be monitored for at least 4 hours to determine suitability for outpatient management or be admitted to the hospital. An oral fluoroquinolone plus amoxicillin/clavulanate (or plus clindamycin if penicillin allergic) is recommended as empiric therapy, unless fluoroquinolone prophylaxis was used before fever developed.</p> <p>Published in Journal of Clinical Oncology, Vol 31, Issue 3 (February), 2013: 794-810</p>
Emesis Risk:	Minimal Emetic Risk	Recommendation:	<p>ASCO Guidelines</p> <p>No antiemetic administered routinely pre- or postchemotherapy.</p> <p>NCCN Guidelines</p> <p>No routine prophylaxis; consider using antiemetics listed under primary prophylaxis as treatment.</p>
Goal	Show All		
Performance Status	0 1 2 3 4	02/20/2015 02/21/2015 02/22/2015	
Select Admin Day to view:	Show All <select> </select>		
Cycle 1 (of 1); Admin Day: 1 Date: 02/20/2015			
Pre Therapy			

Figure 21: Select Administration Day to View

Selection of an administration day within the OEM module enables users to view any administration date for the currently applied template and treatment regimen. Subsequently, users may also change administration days or edit the medication for any specific date.

5.2.5. View Dosage Calculations

For a displayed administration date, users may view the ordered and calculated dosages for any pre-therapy/therapy/post-therapy medication. Medications with calculated dosages (based on BSA or other patient-specific considerations) display the ordered dose and calculated dose values. Selection of the link for the calculated dose value prominently presents the patient-specific calculations for the displayed dose and dims the OEM Module displayed in the background, as depicted in **Figure 22**.

Goal Curative

Performance Status: 0-Fully active, able to carry on all pre-disease performance without restriction [Change Performance Status](#)

Select Admin Day to view: 03/04/2015

Cycle 3 (of 4); Admin Day: 1
Date: 03/04/2015 - [Change Admin Date](#)

Pre Therapy Provide Pre-Therapy Medications on Chemotherapy Days

Drug	Dosing			Administration Time
DEXAMETHASONE INJ,SOLN (20 mg) Administer in Normal Saline	Drug	Dose	Calculated Dose	Administration
Cancel Edit Hold	DEXAMETHASONE INJ,SOLN	20 mg	N/A	IVPB
Order Status : Ordered				
RANITIDINE INJ INJ (50 mg) Administer in Normal Saline	Drug	Dose	Calculated Dose	Administration
Cancel Edit Hold	RANITIDINE INJ INJ	50 mg	N/A	IV
Order Status : Ordered				
DIPHENHYDRAMINE CAP,ORAL (50 mg) Patient to ingest prior to chemotherapy	Drug	Dose	Calculated Dose	Administration
Cancel Edit Hold	DIPHENHYDRAMINE CAP,ORAL	50 mg	N/A	PO
Order Status : Ordered				

Therapy Use non PVC containers for therapy

Drug	Fluid Type	Fluid Volume	Flow Rate	Infusion Time
PACLITAXEL INJ,CONC (200 mg/m ²) Administer slowly over 3-hour period	Normal Saline	500 ml	167 ml/hr	3 hrs / 0 min
Cancel Edit Hold				
Order Status : Ordered				

Dosage Calculations

Height: 71 in = 180.34 cm
 Weight: 192 lbs = 87.09 kg [Select different Height/Weight from Vitals](#)

Gender: M
 Amputations: None Listed
 Weight Method: Lean Weight
 $= (1.1 * \text{WeightInKilos}) - 128 * (\text{WeightInKilos}^2 / (100 * \text{Height in m}^2)) = 65.83 \text{ kg}$
 $= (1.1 * 87.09) - 128 * (87.09^2 / 100 * 4.5722) = 65.83 \text{ kg}$

BSA Method: Haycock
 BSA Formula: $= 0.024265 \times (\text{Height(cm)}^{0.3964}) \times (\text{Weight(kg)}^{0.5378})$
 $= 0.024265 * 180.34^{0.3964} * 65.83^{0.5378} = 1.81 \text{ m}^2$
 BSA: 1.81 m²
 Dose: $= 1.81 \text{ m}^2 * 200 \text{ mg/m}^2 = 362 \text{ mg}$

[OK](#)

Figure 22: View Dosage Calculations

5.2.6. Change Administration Date(s) or Edit Medication

Once a future date of administration is selected and displayed, authorized users may edit the administration date for one or more future administration dates. This functionality permits the changing of a specific date, dates within the cycle, or all remaining dates within the current regimen. If the newly selected administration date falls on another administration date, the change will not be performed. COMS will display the warning “There is another administration day on this date. The requested date change will NOT be performed.” Users must select “OK” to acknowledge the warning and resolve the conflict. Similarly, if the revised administration date(s) overlap the next cycle, the change will not be performed. COMS will display the warning “Changes will overlap the next cycle. The requested date change will NOT be performed.” The user must select “OK” to acknowledge the warning and resolve the conflict.

Authorized users may select a specific administration day to edit the medication order for any pre-therapy, therapy, or post-therapy medication within the prescribed treatment regimen/applied template. The COMS application provides parallel functionality to permit editing, cancelling, and holding medication orders for the selected date or all future administration days within the regimen. While this functionality is discussed in [section 5.2.7](#), **Figure 23** presents the “Change Admin Date” link with pop-up window to effect the change and the “Edit” link with pop-up window to modify a medication order. Any change to a prescribed medications prompts the user to Select Reason from the pull-down menu of options loaded in Site Configuration’s Active Workflow panel. As described in [section 7.5.1](#), each facility may specify the rationale options available for selection and whether they trigger a provider notice or re-signature request.

Cycle 2 (of 4); Admin Day: 4
Date: 03/02/2015 - Change Admin Date

Pre Therapy Pre-Therapy Medications for COMS Testing

Change Administration Date

Fields with an * are required fields

Current Administration Date: 03/02/2015
Enter new Administration Date *: 8
Dates to change *:

Save Cancel

DILTIAZEM INJ (200 MicroGram)
Provide IV push to control tachycardia

Cancel Edit Hold

Order Status : Ordered

Drug	Dose	Calculated Dose	Administration
DILTIAZEM INJ	200 MicroGram	N/A	IVP

Therapy Therapy Medications for COMS Testing

Drug

CARBOPLATIN INJ (10 AUC)
Administer before Cisplatin administration

Cancel Edit Hold

Order Status : Ordered

Drug	Dose	Calculated Dose	Administration
CARBOPLATIN INJ	10 AUC	872.5 mg	IVPB

Fluid Type Fluid Volume Flow Rate Infusion Time

Ringer's Lactate 50 ml 100 ml/hr 0 hrs / 30 min

Edit Therapy Drug

Fields with an * are required fields

Select Drug *: CARBOPLATIN INJ Select Reason *:
Dosage Amount *: 10 Units *: AUC Route *: IVPB
Select Fluid Type *: Ringer's L: Fluid Volume *: 50 ml Flow Rate: 100 ml/hr Infusion Time:
Instructions: Administer before Cisplatin administration

Save Cancel

Figure 23: Change Administration Date or Edit Medication

5.2.7. Cancel or Hold/Release from Hold Medication

Authorized users may select medication(s) for a specific administration date to cancel, hold, or release from hold the order for the selected date or all future administration days. This functionality enables the provider to tailor the treatment regimen to meet individual patient needs on a day-by-day basis. While cancel functionality is non-reversible, hold functionality may be reverse through the release from hold functionality. As local facility policies permit, COMS administrators must establish the local facility preference for enable the hold/release from hold functionality. If disabled, these action buttons will not be visible. Setup for this functionality is available in the Local Facility Preferences panel within Site Configuration, as presented in [section 7.5.3](#).

Cycle 2 (of 4); Admin Day: 4
Date: 03/02/2015 - [Change Admin Date](#)

Pre Therapy Pre-Therapy Medications for COMS Testing

Drug	Dosing				Administration Time
RANITIDINE TAB (150 mg) Take one tablet by mouth prior to chemotherapy	Drug	Dose	Calculated Dose	Administration	
Cancel Edit Hold	RANITIDINE TAB	150 mg	N/A	Oral	
Order Status : Ordered	Cancel Medication - RANITIDINE TAB Cancel medication for this date only or all future Administration dates <input type="button" value="This date Only"/> <input type="button" value="All Future"/> <input type="button" value="Cancel"/>				
DEXAMETHASONE INJ,SOLN (20 mg) Administer in dextrose to stabilize blood sugar	Drug	Dose	Calculated Dose	Administration	
Cancel Edit Hold	DEXAMETHASONE INJ,SOLN	20 mg	N/A	IV	
Order Status : Ordered	Cancel Medication - DEXAMETHASONE INJ,SOLN Cancel medication for this date only or all future Administration dates <input type="button" value="This date Only"/> <input type="button" value="All Future"/> <input type="button" value="Cancel"/>				
DILTIAZEM INJ (200 MicroGram) Provide IV push to control tachycardia	Drug	Dose	Calculated Dose	Administration	
Cancel Edit Hold	DILTIAZEM INJ	200 MicroGram	N/A	IV	
Order Status : Ordered	Hold Medication - DILTIAZEM INJ Hold medication for this date only or all future Administration dates <input type="button" value="This date Only"/> <input type="button" value="All Future"/> <input type="button" value="Cancel"/>				

Therapy Therapy Medications for COMS Testing

Drug	Dosing				Administration Time
CARBOPLATIN INJ (10 AUC) Administer before Cisplatin administration	Drug	Dose	Calculated Dose	Administration	
Cancel Edit Release from Hold	CARBOPLATIN INJ	10 AUC	N/A	IV	
Order Status : Ordered	Release Medication Hold - CARBOPLATIN INJ Release medication hold for this date only or all future Administration dates <input type="button" value="This date Only"/> <input type="button" value="All Future"/> <input type="button" value="Cancel"/>				

Figure 24: Cancel or Hold/Release from Hold Medication

[\[Return to TOC\]](#)

5.3. Treatment Documentation (TD)

Within the COMS application, the TD Module facilitates oncology nurse awareness of historic relevant clinical information and nurse documentation of medication administration actions with assessment of the patient's corresponding response before, during, and after treatment provided on a specific day. Central to the provision of oncology services, administration of prescribed regimen medications and its documentation in the TD Module serves as the foundation for the Flow Sheet snapshot of care and the regimen's End of Treatment Summary. The TD Module captures the specifics of the tangible provision of oncology services to provide detailed insight for members of the healthcare team and fulfills legal/professional requirements. Overall, this functionality fosters Joint Commission compliance and enhances patient safety with documentation ultimately stored in VA's electronic health record.

Using drop-down menus with browse and search functionality, the oncology nurse may select and retrieve a patient's entire treatment regimen, administration requirements, and relevant clinical data. Along with VistA and CPRS, the oncology nurse may use the COMS TD Module to gain a deep understanding of patient history, insight into the prescribed individualized treatment and goal, and ability to record all relevant aspects of the administration of oncology medications and the patient's reaction/response to the treatment, including the use of Common Toxicity Criteria (CTC) terminology, as loaded in Site Configuration.

As the provision of oncology services proceeds through the point of administration, the TD Module supports documentation for patient receipt of the regimen's medications and any immediate infusion reactions and adverse effect symptoms since the previous treatment with the

ability to record adverse events and identify those to trigger alerts. Through the TD Module, COMS enhances and standardizes documentation for oncology nursing activities. It supports oncology services through a specialty-focused application and interoperability with VA legacy healthcare systems of VistA and CPRS. The TD Module serves as the regulatory record for the administration of chemotherapy.

The TD Module requires VistA interoperability and several precursor actions and conditions within the CTOS Module, OEM Module, and miscellaneous functionality. Accordingly, the TD Module builds upon the patient activities provided through CTOS and OEM Modules and the capabilities within the application's Miscellaneous Functionality. In addition, the following specific preconditions are required to support the functionality within the TD Module:

- Availability of relevant patient information (e.g. laboratory results, future treatment dates) is essential to Review Laboratory Information.
- A regimen order, by virtue of the applied template and order sheet, is required to Document and View General Information Panel, Document Administration Panel and Make Addendum, and Annotate Discharge Instructions Panel and Print Instructions/Reminders. A current regimen order is also required to View Chemotherapy/Biotherapy Header and Patient's Flow Sheet.
- In practice, a patient is required for the healthcare team to examine the patient to Annotate IV Site Panel, Record Toxicities on Assessment Panel, and Record Infusion Reactions Panel.

Figure 25 depicts the eight role-based actions for the Treatment Documentation (TD) Module.

Treatment Documentation (TD) Module	Provider	Nurse	Pharmacist	All Clinical
1. View Chemotherapy/Biotherapy Header and Patient's Flow Sheet				•
2. Review Laboratory Information				•
3. Document and View General Information Panel		•		
4. Record Toxicities on Assessment Panel		•		
5. Annotate IV Site Panel		•		
6. Document Administration Panel and Make Addendum		•		
7. Record Infusion Reactions Panel		•		
8. Annotate Discharge Instructions Panel and Print Instructions/Reminders		•		

Figure 25: TD Module Role-Based Actions

The capabilities within Miscellaneous Functionality and the CTOS and OEM Modules all support TD Module functionality. As the overall underpinning support for each of the five clinical modules, several aspects of miscellaneous functionality enable TD Module

documentation. The CTOS and OEM Modules set the stage and support TD Module capabilities. The actions performed within the CTOS Module provide the foundation for COMS functionality and support ordering. Subsequent actions within the OEM Module tailor the order process and support nursing activities performed in the TD Module.

5.3.1. View Chemotherapy/Biotherapy Header and Patient's Flow Sheet

Oncology nurses may access the TD Module for any specific patient. After patient selection as detailed in [section 3.8](#), nurses access TD functionality by selecting the Treatment Documentation Module. At the top of the TD Module is the Chemotherapy/Biotherapy header. This header lists the current Regimen name, link to an external Flow Sheet for ready review of information for the patient's treatment regimen, Febrile Neutropenia Level and Emetogenic Level (both with expandable views for recommendations), and Cycle, Day, and Date information. For selected patients with a current template applied but not scheduled for an administration day, this header displays a message to note this is not a scheduled Administration Day for this Regimen, lists the Last Administration Date, and indicates the Next Administration Date. COMS defaults to display the General Information panel with a chemotherapy/biotherapy information header of regimen name, cycle, day, and date, as shown in **Figure 26**.

The screenshot shows the Treatment Documentation (TD) module interface. At the top, there are tabs: 'Chemotherapy Template Order Source', 'Order Entry Management', 'Treatment Documentation' (which is currently selected), and 'Flow Sheet'. Below the tabs, the 'Chemotherapy / Biotherapy' header is visible, showing 'Regimen: COMS Testing Ver 2'. Underneath the header, two expandable sections are shown: 'Febrile Neutropenia Level = 12% (Intermediate Risk)' and 'Emetogenic Level = Moderate Emetic Risk'. Both sections contain detailed guidelines from ASCO and NCCN. At the bottom of the main content area, there are fields for 'Cycle: 1', 'Day: 24', and 'Date: 02/22/2015'. Below these fields, a horizontal navigation bar includes links for 'General Information', 'Assessment', 'IV Site', 'Administration', 'Infusion Reactions', and 'Discharge Instructions'. A small link for 'Laboratory Information' is also present. The overall layout is clean and organized, designed for easy access to critical treatment information.

Figure 26: TD Module Chemotherapy/Biotherapy Information

The Order Entry Management Module enables users to view the patient's flow sheet – in a new browser window- without accessing the Flow Sheet Module. By selecting the “Flowsheet” link, as shown in Figure 26 above, users may access the patient's flow sheet in a new browser tab, as represented in **Figure 27**.

Flowsheet for Patient PATIENT FIVEHUNDREDFIVE								
	Cycle 1, Day 1	Cycle 1, Day 2	Cycle 1, Day 3	Cycle 1, Day 4	Cycle 1, Day 5	Cycle 1, Day 6	Cycle 1, Day 7	Cycle 1, Day 8
01 General	01 General							
Date	01/28/2015	01/29/2015	01/30/2015	01/31/2015	02/01/2015	02/02/2015	02/03/2015	02/04/2015
Performance Status	View	View	View			View	View	View
Disease Response								
Toxicity								
Other	View	View	View		View	View	View	
02 Pre Therapy	02 Pre Therapy							
RANITIDINE TAB	150 mg Oral From 11:00 am to 11:00 am	150 mg Oral From 08:00 am to 08:00 am	150 mg Oral From 07:05 am to 07:05 am	Hold	Hold	150 mg Oral From 09:00 am to 09:00 am	150 mg Oral From 09:00 am to 09:00 am	150 mg Oral From 09:00 am to 09:00 am
DEXAMETHASONE INJ,SOLN	Hold	20 mg IVPB From 08:15 am to 08:45 am	20 mg IVPB From 07:15 am to 07:45 am	Hold	Hold	20 mg IVPB From 09:10 am to 09:40 am	20 mg IVPB From 09:10 am to 09:40 am	20 mg IVPB From 09:10 am to 09:40 am
DILTIAZEM INJ	Hold	200 MicroGram IVP From 08:55 am to 08:55 am	200 MicroGram IVP From 07:50 am to 07:50 am	Hold	Hold	200 MicroGram IVP From 09:43 am to 09:43 am	200 MicroGram IVP From 09:45 am to 09:45 am	Hold
03 Therapy	03 Therapy							
CARBOPLATIN INJ	Hold	10 AUC IVPB From 09:05 am to 09:36 am	10 AUC IVPB From 08:00 am to 08:30 am	Hold	Hold	10 AUC IVPB From 09:58 am to 10:29 am	10 AUC IVPB From 09:55 am to 10:25 am	Cancel
CISPLATIN INJ,SOLN	50 mg IV From 11:30 am to 12:01 pm	50 mg IV From 09:45 am to 10:15 am	50 mg IV From 08:45 am to 09:15 am	Hold	Hold	50 mg IV From 10:45 am to 11:15 am	50 mg IV From 10:32 am to 11:02 am	50 mg IV From 09:55 am to 10:25 am
DIPHENHYDRAMINE CAP,ORAL	Hold	75 mg Oral From 10:00 am to 10:00 am	75 mg Oral From 09:20 am to 09:20 am	Hold	Hold	75 mg Oral From 11:20 am to 11:20 am	75 mg Oral From 11:10 am to 11:10 am	75 mg Oral From 10:36 am to 10:36 am
04 Post Therapy	04 Post Therapy							
ONDANSETRON INJ,SOLN	Hold	0.50 mg/kg IVPB From 10:30 am to 11:00 am	0.50 mg/kg IVPB From 09:30 am to 10:00 am	Hold	Hold	0.50 mg/kg IVPB From 11:20 am to 12:00 pm	0.50 mg/kg IVPB From 11:20 am to 11:50 am	Cancel
MYLANTA II ALUMINUM HYDROXIDE/...	120 ml Oral From 12:30 pm to 12:30 pm	120 ml Oral From 10:45 am to 11:20 am	120 ml Oral From 10:05 am to 11:00 am	Hold	Hold	120 ml Oral From 12:05 pm to 12:50 pm	120 ml Oral From 12:00 pm to 12:45 pm	120 ml Oral From 10:45 am to 11:25 am
Disease Response								
Disease Response for date - 02/02/2015 Tumor measured at 5.95mm 2/2/15 - laf								
Disease Response for date - 01/30/2015 No discernible response to date; reassess next week								
Disease Response for date - 01/29/2015 No discernible response following 1/29/15 treatment - laf								
Disease Response for date - 01/28/2015 Tumor measured at 6.75 mm at start of regimen on 1/28/15								
Toxicity History								
Assessment - 02/20/2015								
Vomiting - Flagged as an ALERT								
Event:	Vomiting							
Grade:	Grade 3 - Significant							
Details:	6 or greater episodes (separated by 5 minutes) in 24 hours; tube feeding, TPN, or hospitalization indicated							
Comments:	Very sick							
Additional General Information								
Other Information for date - 02/18/2015 Aside from character strings, no other comments provided.								
Other Information for date - 02/17/2015 Continue with prescribed regimen - laf								
Other Information for date - 02/12/2015 Continue with treatment regimen, as prescribed in applied template - 2/12/15								

Figure 27: External Flow Sheet

This functionality enables users to review flow sheet information concurrently with the TD Module without navigating between the two modules.

5.3.2. Review Laboratory Information

The General Information panel of the TD Module contains a collapsible section for displaying laboratory information, as shown collapsed in the bottom left corner of Figure 26 above. Similar to the laboratory information section of the Patient Information panel (see Miscellaneous Functionality [section 6.6](#)) with laboratory information imported from VistA, COMS presents this functionality in the Treatment Documentation Module for the ease of view by oncology nurses.

5.3.3. Document and View General Information Panel

The General Information panel enables authorized users, predominantly nurses, to document patient identification, annotate confirmation of consent documentation on file, and record pre-treatment patient teaching. Users may verify the medication dosing – as ordered by the provider and received from pharmacy – within this General Information panel. The panel contains a patient identification section to confirm the nurse verified the patient's identity from two sources and confirm informed consent is on file in accordance with local policies. It presents a brief patient teaching section for documentation of educational assessment and review of the pre-procedure plan then permits nurses to verify medication dosing with one or two authorized healthcare professionals, as specified in site configuration to support local facility preferences.

Figure 28 presents the General Information panel with the TD Module.

The screenshot displays the General Information panel within the TD Module. The top navigation bar includes tabs for General Information, Assessment, IV Site, Administration, Infusion Reactions, and Discharge Instructions. The General Information tab is active. The panel is divided into several sections:

- Laboratory Information:** Includes fields for Patient identification verified with 2 information sources? (Yes: No:) and Consent Documentation on File? (Yes: No:).
- Patient Identification:** A large text area labeled Comment: for notes.
- Patient Teaching:** Fields for Education assessment complete? (Yes: No:) and Pre-procedure plan reviewed with patient/significant other, questions answered? (Yes: No:).
- Dual Verification of Dosing:** Buttons for Sign to Verify and Sign to Verify.
- Vital Signs:** A table for entering vital sign data:

Temp.: <input type="text"/>	°F	Taken: <input type="text"/>	Pulse: <input type="text"/>	BP: <input type="text"/> / <input type="text"/>	Patient Gender: Male
Height: <input type="text"/>	inches (cm)	Resp: <input type="text"/>	SP O ₂ %: <input type="text"/>	Age: 79	
Weight: <input type="text"/>	lbs (kg)	Pain: <input type="text"/>	BSA: Calculations		
- Buttons:** Save and Cancel.
- Vital Signs - Historical:** A table showing historical vital sign data:

Date	Temp °F/°C	Temp Taken	Pulse	BP	Resp	Pain	SP O ₂	PS	Height in Inches/cm	Weight in lbs/kg	Weight Form.	Weight in KG	Method	BSA
02/04/2015	98.6/37	Temporal	66	120/80	14	1	99	N/C	71.75/182.25	173/78.47	Actual Weight	78.47	Boyd	1.73 m ²
02/03/2015	98.6/37	Tympanic	68	122/78	14	1	99	N/C	71.75/182.25	174/78.93	Actual Weight	78.93	Boyd	1.74 m ²
01/30/2015	98.6/37	Rectal	70	128/80	16	1	99	N/C	71.75/182.25	176/79.83	Actual Weight	79.83	Boyd	1.75 m ²

Figure 28: TD Module General Information Panel

The General Information panel further facilitates documentation of the patient's vital signs, including temperature, body location taken, height, weight, pulse, respirations, patient-assessed pain on the standardized 1 thru 10 scale, blood pressure, and peripheral oxygen saturation percentage. Upon entry of the patient's height/weight, COMS automatically calculates the BSA in accordance with the weight and BSA calculation methodologies selected by the prescribing

provider with application of the template. In addition to selecting the “Calculations” link to view the BSA calculations performed for the displayed BSA value, users may view the patient’s displayed gender and age in this section of the General Information panel. When entering vital signs entries, if Intelligent Data Element (IDE) parameters are loaded in Site Configuration (*section 7.4.2*), the displayed entry will also have a red underline with IDE message indicating the value exceeds the parameters. Users may proceed with the save action for vital signs exceeding specified parameters by selecting “Yes” in the dialogue message. If IDE parameters are not loaded in Site Configuration, COMS will neither detect errant entries nor provide an error message. When nurses save the vital signs entries, the COMS application adds the entries to the Vital Signs – Historical table in reverse chronological order, as shown in Figure 28 above. Within this table, nurses may select any displayed BSA value to view the associated calculations.

5.3.4. Record Toxicities on Assessment Panel

The TD Module’s Assessment panel enables oncology nurses to document chemotherapy symptoms and provide clinical grading of those side effects plus any other concerns the patient has encountered since the previous administration. This panel contains a collapsible section for displaying Notes on Assessment Events as a block of static text explaining the source for toxicity information presented in the panel.

Following the Notes on Assessment Events section, COMS provides a worksheet for completing the nurse’s assessment of adverse events the patient experienced since the last treatment. This section consists of an interactive table to document toxicities, as loaded in Site Configuration, and identify those to trigger an Adverse Event alert.

Users select the “Add” button to add assessment toxicities within the worksheet. The first pull-down menu enables selection of Common Toxicity Criteria (CTC) terms, as loaded in Site Configuration (*see section 7.1.5*). As a required field, the second pull-down menu permits selection of grade for the selected toxicity. The third field displays toxicity/grade “details”, as loaded in Site Configuration. A fourth field facilitates free-text comments for the toxicity entry. If the desired toxicity is not loaded in Site Configuration and displayed within the worksheet, users may select the “Other” toxicity via the pull-down menu. COMS then presents a secondary required field to specify the toxicity, identify the grade, provide details for the “Other” toxicity, and add free-text comments. Users may also specify “No Toxicities”.

Users may designate whether the documented toxicity should trigger an Adverse Event (AE) alert by selecting the “Adverse Event (AE) Alert” box. At any time, users may also uncheck the box to remove the alert. Upon completing the toxicity worksheet, users must select Save for the data to be posted back to the server as part of the patient’s oncology record.

Documentation of toxicities is listed in the Toxicities table within the panel and on the Adverse Events History Panel ([section 6.4](#)), by date of assessment. Each entry displays the toxicity, grade, details, date, and designation as an alert, if applicable. **Figure 29** depicts the Assessment panel within the TD Module and the toxicities worksheet available to document adverse events as reported or observed.

The screenshot shows the TD Module Assessment Panel. At the top, there are tabs for Chemotherapy Template Order Source, Order Entry Management, Treatment Documentation, and Flow Sheet. Below these, a header displays Chemotherapy / Biotherapy, Flowsheet (opens new window), Regimen: Paclitaxel Daily Ver 2, Febrile Neutropenia Level = 3% (Low Risk), and Emetogenic Level = Minimal Emetic Risk. It also shows Cycle: 1, Day: 5, and Date: 11/21/2014. Below the header are tabs for General Information, Assessment, IV Site, Administration, Infusion Reactions, and Discharge Instructions.

The main area is titled "Pretreatment Assessment". It contains a section for "Pretreatment Assessment of Adverse Events since last treatment" with a dropdown for Notes on Assessment Events. A note states "Fields with an * are required fields". It includes dropdowns for Toxicity (Fatigue) and Grade (Grade 2 - Moderate), and a text input for Details (Fatigue not relieved by rest; limiting instrumental Activity of Daily Living). There is also a Comments text area.

Below this is an "Adverse Event (AE) Alert" section with a checkbox. To the right are Save and Cancel buttons.

The "Toxicities" section lists historical toxicities with columns for Toxicity, Grade, Detail, and AE Alert status. The entries are:

Toxicity	Grade	Detail	AE Alert
Fatigue	Grade 2 - Moderate	Fatigue not relieved by rest; limiting instrumental Activity of Daily Living	<input checked="" type="checkbox"/>
Fatigue	Grade 2 - Moderate	Fatigue not relieved by rest; limiting instrumental Activity of Daily Living	<input type="checkbox"/>
No Toxicities		No toxicities reported or observed	<input type="checkbox"/>
Fatigue	Grade 1 - Mild	Fatigue relieved by rest	<input type="checkbox"/>

At the bottom of the panel are Add, Delete, and Refresh buttons.

Figure 29: TD Module Assessment Panel

When combined with miscellaneous functionality to load CTC terminology into the local COMS instance, the toxicity worksheet with the Assessment panel standardizes terms for toxicity/grade assessments within the application and patient record.

5.3.5. Annotate IV Site Panel

Authorized users may annotate an assessment of the intravenous site prior to the administration of the regimen's medications. The IV Site panel facilitates documentation of the intravenous (IV) site access, including the date accessed, IV device (e.g., peripheral, port), gauge, location (e.g., left ventral proximal forearm, right side of chest), and delivery mechanism (e.g., pumps, infusion devices). Nurse role users may also document site appearance as being absent of symptoms or the presence of pain, swelling, or redness/Erythema, provide annotation for line disconnection or port de-accessing the site, and add free text comments for site appearance.

Users may document the brisk blood return before/during/after treatment and provide free text narrative to elaborate on these observations. The panel also permits users to enter comments not specific to any category, but descriptive of the overall IV site. **Figure 30** provides a static view of the IV Site panel within the TD Module.

The figure shows a screenshot of the TD Module IV Site Panel. At the top, there is a horizontal navigation bar with tabs: General Information, Assessment, IV Site (which is the active tab), Administration, Infusion Reactions, and Discharge Instructions. Below the navigation bar, the main content area is divided into several sections:

- IV Access:** This section contains five dropdown menus:
 - Date Accessed
 - Device
 - Gauge
 - Location
 - Delivery Mechanism
- Site Appearance:** This section includes a list of symptoms with checkboxes:
 - Absence of symptoms
 - Pain
 - Swelling
 - Erythema
 - Line Disconnected/Port De AccessedBelow this is a text input field labeled "Comments".
- Brisk blood return verified:** This section contains three sets of radio buttons for "Pre treatment", "During treatment", and "Post treatment", each with "Yes" and "No" options. It also includes a text input field labeled "Comments".
- Comments:** This section has a large text input field for additional comments.

At the bottom left of the panel are two buttons: "Save" and "Cancel".

Figure 30: TD Module IV Site Panel

COMS administrators may manage values for the five pull-down menus for IV Access via the Lookups functionality within the Site Configuration Tab, as described in [section 7.1.3](#). Specifically, a variety of options may be displayed in any desired sequence within the respective pull-down menus.

5.3.6. Document Administration Panel and Make Addendum

The Administration panel enables nurses to annotate the administration of the regimen's medications. COMS displays medications in respective categories of pre-therapy, therapy, and post-therapy medications with ordinal sequence, as specified in the treatment template. COMS pre-populates the Administration Panel for medications dispensed by the pharmacy or medications held/cancelled through OEM Module functionality. **Figure 31** depicts the Administration panel following actions to hold, cancel, or dispense various medications prescribed by the provider applying a template to the patient.

Treatment Administered							
Medication	Dose	Units	Route	Start Time	End Time	Comments	Signature
: Pre Therapy							
1. RANITIDINE TAB	150	mg	Oral			Cancel	
2. DEXAMETHASON...	20	mg	IVPB				Sign to Verify
3. DILTIAZEM INJ	400	MicroGram	IVP			Hold	
: Therapy							
1. CARBOPLATIN INJ	250	AUC	IVPB			Hold	
2. CISPLATIN INJ,S...	300	mg	IV				Sign to Verify
3. DIPHENHYDRAMI...	75	mg	Oral				Sign to Verify
: Post Therapy							
1. ONDANSETRON I...	99.80	mg	IVPB				Sign to Verify
2. MYLANTA II ALU...	400	ml	Oral				Sign to Verify
3. DIGOXIN INJ,SOLN	25	MicroGram	IVP				Sign to Verify
4. IBUPROFEN TAB	800	mg	Oral			Cancel	

Administration Complete

Figure 31: TD Module Administration Panel

Within the Administration Panel, users may change the Dose value to reflect the accurate dosage administered/received by the patient. However, users may not alter entries for Units and Route (of Administration) as these are pre-populated based on the dispensed action of pharmacy processed through VistA and unlikely to change at the point of administration. Authorized users may select an exact minute Start Time and End Time by using the scroll functionality in the respective time field or through manual entry of the numeric value (e.g., 08:10) and selection of a.m. or p.m. The Start time must be equal to or before the current time; COMS will display an error message and deny documentation of future time. Similarly, the End time must be equal to or after the Start Time and must also be equal to or before the current time; COMS will display an error message and deny documentation of conflicting Start/End times or future times.

In support of clinical practices and guidelines, positive action by the nurse is required for proper documentation of medication administration. Nurse users are required to record the start/end times and may provide any free text comments for each medication detail. Using VistA access and verify codes, nurses verify the medication administration and associated documentation for the medication detail by signing the record. If the correct Access Code and Verify Code for the user is not entered, COMS will display the following message: *“Authentication failed! Please click the ‘Sign to Verify’ button again and enter your proper Access and Verify Codes”*. Users are required to acknowledge the message and re-enter the correct codes to continue.

Figure 32 shows the authentication process for signing to verify medication administrations.

The screenshot shows the 'Administration' tab selected in the top navigation bar. Below it is a table titled 'Treatment Administered' listing various medications with their details like dose, route, and start/end times. A modal dialog box is overlaid on the screen, titled 'Authenticate'. It contains fields for 'Access Code *' and 'Verify Code *', both of which have asterisks indicating they are required. The 'Sign Record' and 'Cancel' buttons are at the bottom of the dialog.

Figure 32: Authentication for Sign to Verify Medication Administration

After documentation of all medication details, users select the Administration Complete button and must confirm administrations are complete, as shown in **Figure 33**. Upon confirmation, the documentation is saved and becomes part of the patient's oncology record.

This screenshot shows the same interface as Figure 32, but the 'Administration Complete' button has been clicked. A confirmation dialog box appears in the center, asking 'Are you finished documenting administration of medications for this patient?'. It includes 'Yes' and 'No' buttons. The background table remains the same, showing the list of treatments.

Figure 33: Confirmation for Completing Treatment Documentation

As administrations within COMS are documented for medications tracked for cumulative lifetime dosing maximums, an individual record of the administration is created and immediately displayed in the Medication Cumulative Dose Tracking section within the Patient Information Panel. Once the cumulative lifetime dosage reaches 75% by either COMS administrations or

historical dose entries (see [section 6.2.5](#)), COMS provides a warning that the patient has regimen medication(s) approaching or exceeding recommended maximum doses. COMS displays this warning directly above the Patient Information Panel and includes regimen medication(s), recommended dosage maximum(s), patient lifetime total to date, and percentage(s) received to date. Presented in **Figure 34**, this warning presents for the patient when any current regimen contains medications with cumulative lifetime dosages at 75% or greater.

The screenshot shows the COMS interface with a 'Warning!' message: 'Regimen Medications Approaching or Exceeding Recommended Maximum Doses'. A green arrow points to the 'Cumulative Dose Warning' link in the Patient Selection dropdown. The warning table shows:

Medication	Recommended Max	Patient Lifetime Total	Percentage
CISPLATIN INJ,SOLN	4,000 mg	4,150 mg	103.75%

The Patient Information panel below includes fields for Gender (M), Age (79), BSA Formula (Mosteller), and a table of regimen details. A green box highlights the 'CISPLATIN INJ,SOLN' row in the medication history table, which shows a cumulative total of 4,150 mg (103.75% of the recommended max).

Figure 34: Cumulative Dose Warning

Users may also make addendums to documentation recorded earlier through the Administration panel. Parallel to the manual processes of single line strike-through, Make Addendum actions may be performed at any time throughout the administration day after the original entry has been documented. COMS provides clinical entry correction capabilities by presenting a pencil icon to permit users to make an addendum to the documentation, as shown in **Figure 35**.

The screenshot shows the Administration tab of the COMS interface. A red box highlights the 'Administration' tab. Below it, the 'Treatment Administered' section lists medications with their details and a 'Comments' column. A green box highlights the 'Comments' column for the third item, 'DILTIAZEM INJ', which contains the word 'Hold'. To the right of this column, a vertical green box encloses a series of small pencil icons, one for each row, allowing users to edit the addendum.

Figure 35: Initiate Addendum to Administration Record

When the user selects the Make Addendum icon, COMS displays a “Make Addendum” pop-up window to facilitate revision of the medication’s dosage, start time, and end time. Users are required to enter comments and their access code/verify code to complete the addendum and close the window, as shown in **Figure 36**.

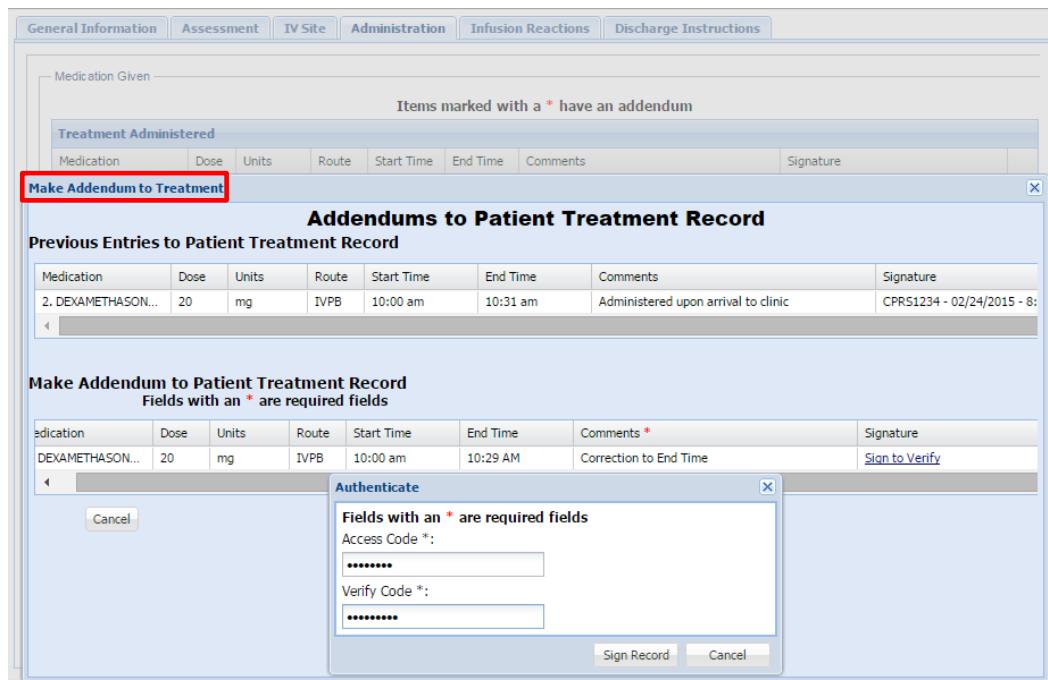


Figure 36: Make Addendum to Administration Record

Once an addendum is created, both the original and revised entries are displayed on the TD Module’s Administration panel with original entries denoted with a red asterisk.

5.3.7. Record Infusion Reactions Panel

The Infusion Reactions panel of the TD Module facilitates documentation of nursing assessment of reactions presented, reported, or observed during today’s administration(s). The panel facilitates documentation of three common chemotherapy infusion reactions – Extravasation, Cytokine-Release Syndrome, and Hypersensitivity/Anaphylaxis – or Other. Nurse role users may check the appropriate box(es) to indicate the symptom and also enter numeric values for highest value of certain quantifiable reactions (e.g., fever, tachycardia) or the lowest values for others (e.g., hypotension). Alternatively, users may indicate no adverse reactions.

Users may designate whether the documented infusion reaction should trigger an Adverse Event (AE) alert, as shown in **Figure 37**. Upon completing the toxicity worksheet, users must select Save for the data to be posted back to the server as part of the patient’s oncology record.

The screenshot shows a software interface for managing infusion reactions. At the top, there is a horizontal navigation bar with tabs: General Information, Assessment, IV Site, Administration, Infusion Reactions, and Discharge Instructions. The 'Infusion Reactions' tab is currently selected.

The main content area displays a list of adverse reactions under several categories:

- Extravasation:**
 - Topical heating applied
 - Topical cooling applied
 - Interventions
 - Antidotes
 - Measurements
 - Edema
 - Erythema
 - Discomfort with movement
 - Other
- Cytokine-Release Syndrome:**
 - Fever
 - Chills
 - Rigors
 - Nausea
 - Hypotension
 - Tachycardia
 - Asthenia
 - Headache
 - Rash
 - Tongue and Laryngeal Edema
 - Dyspnea
 - Other
- Hypersensitivity or Anaphylaxis:**
 - Uneasiness or Agitation
 - Chest Tightness
 - Hypotension
 - Dyspnea
 - Wheezing
 - Urticaria
 - Periorbital or facial edema
 - Abdominal
 - Cramping
 - Diarrhea
 - Nausea
 - Other
- Other:**
 - Other
 - No Adverse Reaction

At the bottom right of the main panel, there are 'Save' and 'Cancel' buttons.

A modal dialog box titled 'Select Adverse Reaction Alerts' is displayed over the main panel. It contains a label 'Select Adverse Reaction(s) which would trigger an alert:' followed by a dropdown menu. The dropdown menu shows 'Hypersensitivity or Anaphylaxis - Chest Tightness' as the selected item. There are also 'Save' and 'Cancel' buttons at the bottom of the dialog.

Figure 37: TD Module Infusion Reactions Panel

Once the record is saved, documentation of infusion reactions are recorded and presented on the Adverse Events History Panel ([section 6.4](#)), by date of assessment. Each entry displays the infusion reaction, details, date, and designation as an alert, if applicable.

5.3.8. Annotate Discharge Instructions Panel and Print Instructions/Reminders

At the conclusion of treatment for any administration day, users may annotate discharge instructions and print instructions and appointment reminders for the patient. The Discharge Instructions panel facilitates patient communication as users may document clinic contact information, the provision of discharge instructions, and upcoming follow-up appointments and/or laboratory tests scheduled. **Figure 38** presents the Discharge Instructions panel.

General Information Assessment IV Site Administration Infusion Reactions Discharge Instructions

Fields with an * are required fields

Select Date of Discharge Instructions to view: Select Date Print Discharge Instructions Print Followup Appointment

Clinic Information

Select Clinic Information: Durham VA Medical Center

Clinic --- Information:

Durham VA Medical Center
Provider: Dr. Michael Kelley
Address: 508 Fulton Street, Durham NC 27705
Phone: 919.286.0411 ext. 2199

Patient Education

Patient Education: Yes: No:

Follow up

Followup Needed: Yes: No:
Follow up type: Inpatient: Outpatient:

Clinic Info

Next Chemotherapy Appt.: 03/30/2015

Next Clinic Appt.: 03/27/2015

Laboratory Test(s) Scheduled

03/26/2015

Save Cancel

Figure 38: TD Module Discharge Instructions Panel

The Discharge Instructions panel contains an expandable/collapsible form for the user to enter information related to the patient's discharge. Modeled from a CPRS template, this form includes detailed information for Who Was Taught, Pre-Education Needs, Barriers to Learning, Patient's Learning Style Preference, Teaching Methods, Chemotherapy Discharge Instructions/Materials, and Patient/Caregiver Response through a series of check boxes and free text fields for clarification(s).

Various components for Chemotherapy Discharge Instructions/Materials for specific instructions and medication information (linked to the applied template) are available for selection when setup within Site Configuration, as discussed in [section 7.1.2](#) and [section 7.1.4](#), respectively. If medication-specific information is not loaded, COMS displays the message "No additional information provided for this medication". **Figure 39** depicts the expanded section for Patient Education when the "Yes" radio button, shown in Figure 38 above, is selected.

Patient Education

Patient Education: Yes: No:

Who Was Taught

Patient:
 Spouse:
 Significant Other:
 Other (Please designate):

Pre Education Needs

Already knows well:
 Needs review:
 New material:

Barriers to Learning

None:
 Desire/motivation:
 Physical:
 Hearing:
 Vision:
 Cognition:
 Religious/Cultural:
 Emotional:
 Language Barriers:
 Communication:
 Financial:
 Other:

Patient's Learning Style Preference

Verbal:
 Written:
 Demonstration:
 Audio-Visual:
 Other:

Teaching Methods

Verbal:
 One to One:
 Group:
 Telephone:
 Demonstration/ Return Demonstration:

Chemotherapy Discharge Instructions/Materials

Patient was given Chemotherapy discharge instructions.: Yes: No:

Patient/Caregiver Response

Verbalizes understanding:
 Demonstrates accurately:
 Needs additional instruction/practice:
 Needs assistance:
 Unable to learn:
 Does not participate:

Additional Comments:

Follow up

Followup Needed: Yes: No:
 Follow up type: Inpatient: Outpatient:

Clinic Info

Next Chemotherapy Apt.: 03/30/2015
 Next Clinic Apt.: 03/27/2015
 Laboratory Test(s) Scheduled
 03/26/2015

Save Cancel

Figure 39: TD Module Discharge Instructions Panel

Once saved, users may select the “Print Discharge Instructions” link or “Print Follow-up Appointment” link for the respective actions. When users select either link, as shown in Figure 38 above, COMS opens a new browser tab and displays the selected item for printing through existing browser functionality.

[\[Return to TOC\]](#)

5.4. Flow Sheet (FS)

Within the COMS application, the FS Module provides an efficient, tailorabile display of patient-centered documentation of chemotherapy administration for central viewing by the healthcare team. Using a grid format with text entry and automatically populated fields, the FS Module serves as the oncology services communication centerpiece for relevant information regarding the provision of chemotherapy, disease response, and the patient's reaction to an active treatment regimen. Through FS Module functionality, the healthcare team may view information for administration or rest days throughout the regimen and provide and/or view disease response, toxicity/side effects, and other comments for any calendar day within the treatment regimen.

The FS Module retrieves, organizes, and displays information from CPRS and various COMS modules for insight into relevant clinical data, disease response and patient reaction to the chemotherapy, an overview of held/cancelled/administered medications, and pertinent laboratory results. Altogether, this functionality fosters efficient communication throughout the treatment regimen to enhance patient safety and VA's electronic health record. The Flow Sheet Module complements VistA/CPRS for the healthcare team to obtain a deep understanding of patient treatment, insight into the progression of the prescribed individualized regimen, and up-to-date snapshot of the status of the disease response and patient reactions to treatment.

Leveraging information within other COMS modules and CPRS, the FS Module enables the healthcare team to view a tailored display for relevant clinical information and patient response to administration of the regimen's chemotherapy agents and supporting medications. Through the FS Module, COMS automates and enhances documentation and communication for oncology care activities. It supports oncology services through a collaborative, patient-focused application and interoperability with VA legacy healthcare systems of VistA and CPRS. The FS Module specifically provides a communication medium with a snapshot of care that also progressively builds towards the regimen's End of Treatment Summary for the current and gaining healthcare team.

The FS Module serves as a reflective snapshot repository for patient care actions taken within the CTOS, OEM, and TD Modules. Flow Sheet actions leverage VistA interoperability and build upon those activities performed in the CTOS, OEM, and TD Modules. In addition, the following are required to support the FS functionality:

- An on-going regimen from an applied template is required to View Chemotherapy/Biotherapy Header and Patient's Flow Sheet; Review Performance Status and Weight for Specific Dates, and Tailor Flow Sheet View
- An active regimen is also required to Annotate Disease Response, Toxicity Side Effects, and Other Comments and similarly to View Disease Response, Toxicity History, and Other Comments
- Availability of relevant laboratory test results is essential to View Laboratory Information
- Availability of documentation for prescribed pre-therapy/therapy/post-therapy medications disposition (i.e., held, cancelled, or administered) is essential to Review Medication Administration Details for those respective treatment activities.

Figure 40 depicts the seven role-based actions for the Flow Sheet (FS) Module.

Flow Sheet (FS) Module	Provider	Nurse	Pharmacist	All Clinical
1. View Chemotherapy/Biotherapy Header and Patient's Flow Sheet				•
2. Review Performance Status and Weight for Specific Dates				•
3. Annotate Disease Response, Toxicity Side Effects, and Other Comments	•			
4. Tailor Flow Sheet View				•
5. Review Medication Administration Details				•
6. View Disease Response, Toxicity History, and Other Comments				•
7. View Laboratory Information				•

Figure 40: FS Module Role-Based Actions

The capabilities within miscellaneous functionality and the CTOS, OEM, and TD Modules all combine to support FS Module functionality. Various aspects of the miscellaneous functionality support Flow Sheet documentation as the overall underpinning support for each of the five clinical modules. The actions performed within the CTOS Module provide the foundation for COMS functionality and support ordering. Subsequent actions within the OEM Module permit further tailoring of the individualized patient care plan. Documentation of medication administration and other nursing assessments and activities provide information within the FS Module. Altogether, these supporting modules are preconditions as iterative building blocks and supportive foundation for FS Module functionality.

5.4.1. View Chemotherapy/Biotherapy Header and Patient's Flow Sheet

The oncology healthcare team may access the FS Module for any specific patient with an ongoing regimen/currently applied template. After patient selection as detailed in [section 3.8](#), users access FS functionality by selecting the Flow Sheet Module. At the top of the FS Module is the Chemotherapy/Biotherapy header, as shown in **Figure 41**.

The screenshot shows the Chemotherapy/Biotherapy header section of the FS Module. At the top, there are tabs for Chemotherapy Template Order Source, Order Entry Management, Treatment Documentation, and Flow Sheet. Below the tabs, the Chemotherapy / Biotherapy section is displayed. It includes a 'Flowsheet' link (which opens in a new window), a 'Regimen' field set to 'COMS Testing Ver 2', and two dropdown menus for 'Febrile Neutropenia Level' (set to '12% (Intermediate Risk)') and 'Emetogenic Level' (set to 'Moderate Emetic Risk'). At the bottom of the header, there are fields for 'Cycle: 1', 'Day: 25', and 'Date: 02/23/2015'.

Figure 41: FS Module Chemotherapy/Biotherapy Information

The Chemotherapy/Biotherapy header lists the current Regimen name, link to an external Flow Sheet for ready review of information for the patient's treatment regimen, Febrile Neutropenia Level and Emetogenic Level (both with expandable views for recommendations), and Cycle, Day, and Date information. For selected patients with a current template applied but not

scheduled for an administration day, this header displays a message to note this is not a scheduled Administration Day for this Regimen, lists the Last Administration Date, and indicates the Next Administration Date.

The Flow Sheet Module enables users to view the patient's flow sheet – in a new browser window – as for external viewing in concert with actions within the Flow Sheet Module. By selecting the “Flowsheet” link (shown in Figure 41 above) users may access the patient's flow sheet in a new browser tab, as depicted in **Figure 42**.

Flowsheet for Patient PATIENT FIVEHUNDREDFIVE													
	Cycle 1, Day 1	Cycle 1, Day 2	Cycle 1, Day 3	Cycle 1, Day 4	Cycle 1, Day 5	Cycle 1, Day 6	Cycle 1, Day 7						
☐ 01 General	☐ 01 General												
Date	01/28/2015	01/29/2015	01/30/2015	01/31/2015	02/01/2015	02/02/2015	02/03/2015						
Performance Status													
Disease Response	View	View	View		View	View	View						
Toxicity													
Other	View	View	View		View	View	View						
☐ 02 Pre Therapy	☐ 02 Pre Therapy												
RANITIDINE TAB	150 mg Oral From 11:00 am to 11:00 am	150 mg Oral From 08:00 am to 08:00 am	150 mg Oral From 07:05 am to 07:05 am	Hold	Hold	150 mg Oral From 09:00 am to 09:00 am	150 mg Oral From 09:00 am to 09:00 am						
DEXAMETHASONE INO,SOLN	Hold	20 mg IVPB From 08:15 am to 08:15 am	20 mg IVPB From 07:15 am to 07:45 am	Hold	Hold	20 mg IVPB From 09:10 am to 09:40 am	20 mg IVPB From 09:10 am to 09:40 am						
DILTAZEM INI	Hold	200 MicroGram IVP From 08:55 am to 08:55 am	200 MicroGram IVP From 07:50 am to 07:50 am	Hold	Hold	200 MicroGram IVP From 09:43 am to 09:43 am	200 MicroGram IVP From 09:45 am to 09:45 am						
☐ 03 Therapy	☐ 03 Therapy												
CARBOPLATIN INO	Hold	10 AUC IVPB From 09:05 am to 09:36 am	10 AUC IVPB From 08:00 am to 08:30 am	Hold	Hold	10 AUC IVPB From 09:58 am to 10:29 am	10 AUC IVPB From 09:55 am to 10:25 am						
CISPLATIN INJ,SOLN	50 mg IV From 11:30 am to 12:01 pm	50 mg IV From 09:45 am to 10:15 am	50 mg IV From 08:45 am to 09:15 am	Hold	Hold	50 mg IV From 10:45 am to 11:15 am	50 mg IV From 10:32 am to 11:02 am						
DIPHENHYDRAMINE CAP,ORAL	Hold	75 mg Oral From 10:00 am to 10:00 am	75 mg Oral From 09:20 am to 09:20 am	Hold	Hold	75 mg Oral From 11:20 am to 11:20 am	75 mg Oral From 11:10 am to 11:10 am						
☐ 04 Post Therapy	☐ 04 Post Therapy												
ONDANSETRON INO,SOLN	Hold	0.50 mg/kg IVPB From 10:30 am to 11:00 am	0.50 mg/kg IVPB From 09:30 am to 10:00 am	Hold	Hold	0.50 mg/kg IVPB From 11:30 am to 12:00 pm	0.50 mg/kg IVPB From 11:20 am to 11:50 am						
MYLANTA II ALUMINUM HYDROXIDE/...	120 ml Oral From 12:30 pm to 12:30 pm	120 ml Oral From 10:45 am to 11:20 am	120 ml Oral From 10:05 am to 11:00 am	Hold	Hold	120 ml Oral From 12:05 pm to 12:50 pm	120 ml Oral From 12:00 pm to 12:45 pm						
Disease Response													
Disease Response for date - 02/02/2015 Tumor measured at 5.95mm 2/2/15 - laf													
Disease Response for date - 01/30/2015 No discernible response to date; reassess next week													
Disease Response for date - 01/29/2015 No discernible response following 1/29/15 treatment - laf													
Disease Response for date - 01/28/2015 Tumor measured at 6.75 mm at start of regimen on 1/28/15													
Toxicity History													
Assessment - 02/20/2015 Vomiting - Flagged as an ALERT													
Event:	Vomiting												
Grade:	Grade 3 - Significant												
Details:	6 or greater episodes (separated by 5 minutes) in 24 hours; tube feeding, TPN, or hospitalization indicated												
Comments:	Very sick												
Additional General Information													
Other Information for date - 02/18/2015 Aside from character strings, no other comments provided.													
Other Information for date - 02/17/2015 Continue with prescribed regimen - laf													
Other Information for date - 02/12/2015 Continue with treatment regimen, as prescribed in applied template - 2/12/15													

Figure 42: External Flow Sheet

This functionality enables users to review flow sheet information concurrently with the various FS Module sections without navigating within the module to review information and correlate data points.

5.4.2. Review Performance Status and Weight for Specific Dates

After patient selection, members of the healthcare team may view Flow Sheet information for performance status and patient weight. COMS automatically imports these values from the OEM Module and TD Module, respectively, for each administration day. The Flow Sheet displays information in administration day columns, as shown in **Figure 43**.

The screenshot shows the FS Module General Information screen. At the top, there are tabs: Chemotherapy Template Order Source, Order Entry Management, Treatment Documentation, and Flow Sheet. The Flow Sheet tab is active. Below the tabs, there's a header section with 'Chemotherapy / Biotherapy' and a 'Flowsheet' link. It shows a 'Regimen: COMS Testing Ver 2'. Underneath, two dropdown menus are visible: 'Febrile Neutropenia Level = 12% (Intermediate Risk)' and 'Emetogenic Level = Moderate Emetic Risk'. Below these are fields for 'Cycle: 1', 'Day: 25', and 'Date: 02/23/2015'. A large table titled 'Flowsheet' follows, with a sub-section 'Add General Information'. This table has columns for Cycle 1, Day 1 through Day 5. The first row shows a section titled '01 General' with five sub-sections. The second row contains data for 'Date' (01/28/2015) across all five days. Subsequent rows show 'Performance Status', 'Disease Response' (with three 'View' links), 'Toxicity' (with three 'View' links), and 'Other' (with three 'View' links). The entire table is contained within a scrollable area.

Figure 43: FS Module General Information

This display enables the healthcare team to assess the patient's performance status and weight against the on-going administration of the treatment regimen's medications.

5.4.3. Annotate Disease Response, Toxicity Side Effects, and Other Comments

Within the FS Module, oncology providers may provide Disease Response, Toxicity Side Effects, and Other comments for the current administration day. Authorized users may specify disease responses, toxicities, and additional information through the Add General Information functionality. When the user selects the "Add General Information" link or the proximal pencil icon, COMS presents a worksheet to record Disease Response, Toxicity Side Effects, and Other narrative assessments.

While the Disease Response section provides a free-text field, the Toxicity Side Effects section contains a pull-down menu and free-text field to enter narratives. This section consists of an interactive table to document toxicities, as loaded in Site Configuration, and identify those to trigger an Adverse Event alert. Users select the "Add" button to add assessment toxicities within the worksheet. The first pull-down menu enables selection of Common Toxicity Criteria (CTC) terms, as loaded in Site Configuration (see *section 7.1.5*). As a required field, the second pull-down menu permits selection of grade for the selected toxicity. The third field displays toxicity/grade "details", as loaded in Site Configuration. A fourth field facilitates free-text comments for the toxicity entry. If the desired toxicity is not loaded in Site Configuration and displayed within the worksheet, users may select the "Other" toxicity via the pull-down menu. COMS then presents a secondary required field to specify the toxicity, identify the grade, provide details for the "Other" toxicity, and add free-text comments. Users may also specify

“No Toxicities”. Users may designate whether the documented toxicity should trigger an Adverse Event (AE) alert by selecting the “Adverse Event (AE) Alert” box. At any time, users may also uncheck the box to remove the alert. Upon completing the toxicity worksheet, users must select Save within this Toxicity section to save entries. The final section of the worksheet enables free text narrative entry for Other comments. **Figure 44** depicts the FS Add General Information selection and its associated worksheet.

Toxicity	Grade	Detail	AE Alert
Vomiting	Grade 3 - Significant	6 or greater episodes (separated by 5 minutes) in 24 hours; tube feeding, TPN, or hospitalization	<input checked="" type="checkbox"/>
No Toxicities		No toxicities reported or observed	<input type="checkbox"/>
No Toxicities		No toxicities reported or observed	<input type="checkbox"/>

Figure 44: Annotate Disease Response, Toxicity Side Effects, and Other Comments

Authorized users may provide multiple General Information entries on any administration day or rest day throughout the regimen. When the General Information worksheet is saved, COMS adds authored narratives to the Disease Response, Toxicity Side Effect, and Other panel, as appropriate, and displays a “View” link in the cell for the category row and date column, as depicted in Figure 43 above.

Documentation of toxicities is listed in the Toxicities table within the worksheet toxicities panel and on the Adverse Events History Panel ([section 6.4](#)), by date of assessment. Each entry displays the toxicity, grade, details, date, and designation as an alert, if applicable.

5.4.4. Tailor Flow Sheet View

To accommodate user preferences, the COMS application provides the capability for users to modify the FS Module view for expanded/collapsed information displays. Users may select from various options for horizontal tailoring to collapse/expand categories (i.e., rows) for General Information and Pre-Therapy/Therapy/Post-Therapy Medication fields. Further, COMS enables users to vertically tailor the Flow Sheet view by cycles/dates via Select Cycle(s) to Show functionality. Options include All Cycles, Current Cycle Only, Current plus All Past Cycles, Current plus All Future Cycles, and Specific Cycle (with cycle number and regimen dates), as displayed in **Figure 45**.

Flowsheet					
Add General Information					
	Cycle 1, Day 1	Cycle 1, Day 2	Cycle 1, Day 3	Cycle 1, Day 4	Cycle 1, Day 5
+ 01 General	+ 01 General				
+ 02 Pre Therapy	+ 02 Pre Therapy				
+ 03 Therapy	+ 03 Therapy				
+ 04 Post Therapy	+ 04 Post Therapy				
ONDANSETRON INJ,SOLN	Hold	0.50 mg/kg IVPB From 10:30 am to 11:00 am	0.50 mg/kg IVPB From 09:30 am to 10:00 am	Hold	Hold
MYLANTA II ALUMINUM HYDROXIDE/...	120 ml Oral From 12:30 pm to 12:30 pm	120 ml Oral From 10:45 am to 11:20 am	120 ml Oral From 10:05 am to 11:00 am	Hold	Hold
DIGOXIN INJ,SOLN	Hold	25 MicroGram IVP From 11:25 am to 11:25 am	25 MicroGram IVP From 10:25 am to 10:25 am	Hold	Hold
Select Cycle(s) to show: List of Cycles					
Disease Response	Show All Cycles				
Toxicity History	Show Current plus All Past Cycles				
Additional General Information	Show Current plus All Future Cycles				
Laboratory Information	Show Current Cycle Only				
	Show Cycle 1 01/28/2015 - 02/26/2015				
	Show Cycle 2 02/27/2015 - 03/26/2015				
	Show Cycle 3 03/27/2015 - 04/23/2015				
	Show Cycle 4 04/24/2015 - 05/21/2015				

Figure 45: Tailor Flow Sheet View

While the Show All Cycles option is the default view for Flow Sheet, selection of any option tailors the view to appropriately display the desired amount of information. Users may also use the pull-down arrow for any cycle/day displayed to further tailor the Flow Sheet to specific selected administration date(s) such as the first administration day of each cycle. To optimize screen real estate on any computer or device, users may tailor column widths for display of selected cycles/days.

5.4.5. Review Medication Administration Details

After patient selection, members of the healthcare team may view Flow Sheet documentation of pre-therapy, therapy, and post-therapy medication administration details. COMS automatically imports these values from the TD Module, Administration panel once the nurse role user verifies administration of the medication and indicates administration is complete. The FS Module displays pre-therapy, therapy, and post-therapy medication details in administration day columns to enable a concise, historical display of administered, held, and cancelled medications throughout the patient's regimen, as shown in **Figure 46**.

Flowsheet					
Add General Information					
	Cycle 1, Day 1	Cycle 1, Day 2	Cycle 1, Day 3	Cycle 1, Day 4	Cycle 1, Day 5
01 General	01 General				
02 Pre Therapy	02 Pre Therapy				
RANITIDINE TAB	150 mg Oral From 11:00 am to 11:00 am	150 mg Oral From 08:00 am to 08:00 am	150 mg Oral From 07:05 am to 07:05 am	Hold	Hold
DEXAMETHASONE INJ,SOLN	Hold	20 mg IVPB From 08:15 am to 08:45 am	20 mg IVPB From 07:15 am to 07:45 am	Hold	Hold
DILTIAZEM INJ	Hold	200 MicroGram IVP From 08:55 am to 08:55 am	200 MicroGram IVP From 07:50 am to 07:50 am	Hold	Hold
03 Therapy	03 Therapy				
CARBOPLATIN INJ	Hold	10 AUC IVPB From 09:05 am to 09:35 am	10 AUC IVPB From 08:00 am to 08:30 am	Hold	Hold
CISPLATIN INJ,SOLN	50 mg IV From 11:30 am to 12:01 pm	50 mg IV From 09:45 am to 10:15 am	50 mg IV From 08:45 am to 09:15 am	Hold	Hold
DIPHENHYDRAMINE CAP,ORAL	Hold	75 mg Oral From 10:00 am to 10:00 am	75 mg Oral From 09:20 am to 09:20 am	Hold	Hold
04 Post Therapy	04 Post Therapy				
ONDANSETRON INJ,SOLN	Hold	0.50 mg/kg IVPB From 10:30 am to 11:00 am	0.50 mg/kg IVPB From 09:30 am to 10:00 am	Hold	Hold
MYLANTA II ALUMINUM HYDROXIDE/...	120 ml Oral From 12:30 pm to 12:30 pm	120 ml Oral From 10:45 am to 11:20 am	120 ml Oral From 10:05 am to 11:00 am	Hold	Hold
DIGOXIN INJ,SOLN	Hold	25 MicroGram IVP From 11:25 am to 11:25 am	25 MicroGram IVP From 10:25 am to 10:25 am	Hold	Hold

Figure 46: Flow Sheet Medication Administration Details

Medication details for administrations include the medication, dosage administered, route of administration, start time, and end time, as recorded through the Administration panel of the Treatment Documentation Module.

5.4.6. View Disease Response, Toxicity History, and Other Comments

After oncology providers complete the Add General Information worksheet and select save, the annotation is available for viewing by all members of the healthcare team. Authorized users may view Disease Response, Toxicity Side Effects, and Other comments by selecting the “View” link for the appropriate category and administration date to open the expandable/collapsible panels for Disease Response, Toxicity History, and Additional General Information, respectively.

Figure 47 presents the Flow Sheet with the first four sections collapsed and the Disease Response, Toxicity History, and Additional General Information panels expanded.

Flowsheet

Add General Information

	Cycle 1, Day 1	Cycle 1, Day 2	Cycle 1, Day 3	Cycle 1, Day 4	Cycle 1, Day 5
01 General	01 General				
02 Pre Therapy	02 Pre Therapy				
03 Therapy	03 Therapy				
04 Post Therapy	04 Post Therapy				
		◀ ▶			
Select Cycle(s) to show:	List of Cycles				

Disease Response

Disease Response for date - 02/17/2015
Tumor measured at 3.25mm on 2/17/15 - laf

Disease Response for date - 02/12/2015
No discernible response - 2/12/15

Disease Response for date - 02/11/2015
No discernible tumor or disease response - 2/11/15

Disease Response for date - 02/10/2015
Tumor measured at 4.25mm on 2/10/15 - laf

Toxicity History

Assessment - 02/20/2015
Vomiting - Flagged as an ALERT

Event: Vomiting
Grade: Grade 3 - Significant
Details: 6 or greater episodes (separated by 5 minutes) in 24 hours; tube feeding, TPN, or hospitalization indicated
Comments: Very sick

Assessment - 02/17/2015

Event: No Toxicities
Grade:
Details: No toxicities reported or observed
Comments:

Assessment - 02/12/2015

Event: No Toxicities
Grade:
Details: No toxicities reported or observed
Comments:

Assessment - 02/11/2015

Event: Fatigue
Grade: Grade 1 - Mild
Details: Fatigue relieved by rest
Comments: Patient reported increased lethargy with continued treatment

Additional General Information

Other Information for date - 02/11/2015
Continue treatment regimen, as prescribed - 2/11/15

Other Information for date - 02/10/2015
No other comments for 2/10/15

Other Information for date - 02/06/2015
Maintain contact with patient throughout weekend - 2/6/15

Figure 47: View Disease Response, Toxicity Side Effects, and Other Comments

Users may expand or collapse the three separate panels within the FS Module for optimal use of the display screen and viewing of previously entered documentation for disease response, toxicity history, and other comments. Both the Toxicity History panel and the Adverse Events History panel ([section 6.4](#)) contain toxicities entered throughout the regimen via the TD Module Assessment panel, TD Module Infusion Reactions panel, and the FS Add General Information worksheet.

5.4.7. View Laboratory Information

Similar to the Patient Information panel (Miscellaneous Functionality [section 6.6](#)), the Flow Sheet Module contains an expandable/collapsible section for displaying laboratory information as imported from VistA. The COMS application presents this functionality in the FS Module for the ease of view by the oncology healthcare team, as shown in **Figure 48**.

Flowsheet					
<input type="button"/> Add General Information					
	Cycle 1, Day 1	Cycle 1, Day 2	Cycle 1, Day 3	Cycle 1, Day 4	Cycle 1, Day 5
<input type="button"/> 01 General	<input type="button"/> 01 General				
<input type="button"/> 02 Pre Therapy	<input type="button"/> 02 Pre Therapy				
<input type="button"/> 03 Therapy	<input type="button"/> 03 Therapy				
<input type="button"/> 04 Post Therapy	<input type="button"/> 04 Post Therapy				
<input type="button"/> Select Cycle(s) to show: List of Cycles <input type="button"/>					
<input type="button"/> Disease Response <input type="button"/>					
<input type="button"/> Toxicity History <input type="button"/>					
<input type="button"/> Additional General Information <input type="button"/>					
<input type="button"/> Laboratory Information <input type="button"/>					
Date	Collection Date	Lab Tech	Info	Name	Result
					Acceptable Range OUT of Range
					comment

Figure 48: View Laboratory Information within Flow Sheet

[\(Return to TOC\)](#)

5.5. End of Treatment Summary (EoTS)

Within the COMS application, the EoTS Module supports stopping a treatment regimen and creating an End of Treatment Summary as an essential communication medium for current and future healthcare teams. Through EoTS Module functionality, the authoring provider reviews relevant patient information and prepares narratives for the Disease Response, Toxicity Side Effects, and Provider Report sections. The EoTS Module displays pre-populated, patient-centric information and permits the provider to view healthcare team entries from the Flow Sheet for creating narratives. In this manner, the EoTS Module aids the provider in efficiently generating an End of Treatment Summary for the treatment regimen. This treatment summary remains available within COMS and the patient's electronic health record upon completion.

The EoTS Module retrieves, organizes, and displays information from multiple COMS modules for efficient display of relevant clinical data, disease response, and patient reaction to the chemotherapy. Collectively, this functionality fosters creation of the End of Treatment Summary as an efficient communication mechanism within and among healthcare teams to enhance patient safety and VA's electronic health record. Leveraging information within other COMS modules and patient-specific panels of Miscellaneous Functionality, the EoTS Module enables the provider to consider and communicate the regimen's overall effectiveness as an historical recapitulation of the treatment. Through the EoTS Module, COMS automates and enhances

documentation and communication within oncology services and with other healthcare disciplines. It serves as the capstone module for the COMS application, facilitating the generation and viewing of oncology treatment summaries for the current healthcare team, referring/primary care providers, and other clinical and support staff.

The EoTS Module provides an executive summary of patient care actions taken throughout the treatment regimen and documented within the CTOS, OEM, TD, and FS Modules.

Subsequently, EoTS Module actions require VistA interoperability and the preconditions expressed for the previous four clinical modules. Further, the following specific preconditions are also required to support the EoTS Module functionality:

- An active regimen from an applied template is required to Stop Treatment Regimen
- A discontinued regimen from an applied template is required to Initiate an End of Treatment Summary; View Pre-Populated Components of an End of Treatment Summary; Review Patient Disease Response, Toxicity History, and Other Comments; Compose Provider Report and Specify Follow-Up Appointments
- A previously-created EoTS report is required to View a Completed End of Treatment Summary.

Figure 49 depicts the six role-based actions for the End of Treatment Summary (EoTS) Module.

End of Treatment Summary (EoTS) Module	Provider	Nurse	Pharmacist	All Clinical
1. Stop Treatment Regimen	●			
2. Initiate an End of Treatment Summary	●			
3. View Pre-Populated Components of an End of Treatment Summary	●			
4. Review Patient Disease Response, Toxicity History, and Other Comments	●			
5. Compose Provider Report and Specify Follow-Up Appointments	●			
6. View a Completed End of Treatment Summary				●

Figure 49: EoTS Module Role-Based Actions

The capabilities for miscellaneous functionality and the CTOS, OEM, TD, and FS Modules all support EoTS functionalities. The various clinical and administrative capabilities provided by miscellaneous functionality serve as the overall underpinning and support for each of the five clinical modules. The actions performed within the CTOS Module provide the foundation for COMS template management and computerized provider order entry. Ensuing actions within the OEM Module permit further tailoring of the individualized patient care plan. Documentation of medication administration and other activities within the TD Module serve as iterative building blocks for the FS Module to chronicle the treatment regimen and its direct/indirect impact on the patient. As the capstone module – for the treatment regimen and the COMS application – the EoTS Module requires other COMS capabilities to necessitate the generation and subsequent viewing of an End of Treatment Summary as a product of the EoTS Module functionality.

5.5.1. Stop Treatment Regimen

Oncology providers may stop the treatment regimen for their patient through EoTS Module functionality within the Treatment Regimens & Summaries panel. The provider must first select a patient from the database, as detailed in [section 3.8](#). After patient selection, the provider expands the Treatment Regimens & Summaries panel to view the current and any historical templates. To stop the treatment regimen, the provider may then select the “Stop Treatment” link for the current template, as shown in **Figure 50**.

The screenshot shows the COMS interface with the following details:

- Header:** Chemotherapy Order Management System (COMS)
- Navigation Bar:** Patient, Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, Site Configuration
- Patient Selection:** Patient Information for - PATIENT FIVEHUNDREDFIVE
- Patient Information:** (Collapsible section)
- Medication Reminders:** (Collapsible section)
- Adverse Events History:** (13 Adverse Events Recorded - 1 flagged to trigger an Alert)
- Treatment Regimens & Summaries:** (2 Records)

	Template Name	Start Date	End Date	Action
Current Template:	COMS Testing Ver 2	01/28/2015	05/20/2015	Show Details Stop Treatment
Historical Template:	Paclitaxel Daily Ver 2	11/17/2014	01/28/2015	Show Details Generate End of Treatment Summary
- Patient Vitals:** (23 Records)

Figure 50: Stop Treatment Regimen

Selection of the “Stop Treatment” link begins the process to create the treatment summary for the specified template/treatment regimen. The summary may be completed immediately upon stopping the treatment or thereafter.

5.5.2. Initiate an End of Treatment Summary

After patient selection and stopping a treatment regimen, oncology providers may initiate an end of treatment summary. Within the Treatment Regimens & Summaries panel, the oncology provider will select the “Stop Treatment” link or the “Generate End of Treatment Summary” link to initiate the EoTS report immediately or after the fact, respectively. The latter link is only available when a treatment has ended without creation of the treatment summary. With selection of either link, the COMS application displays radio buttons to prompt the provider to identify the reason for generating the treatment summary via radio button options as follows: Completed Prescribed Course, Treatment Change (with sub-options of Toxicity, Progression of the Disease, Patient Refusal, and Other (with free text field)), Patient Discontinuation (with sub-options of Patient Terminated Regimen, Patient Left VA System, and Other (with free text field)), and Other (for free text reason). **Figure 51** shows the four primary reasons for generating the EoTS.

Chemotherapy Order Management System (COMS)

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Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Patient Selection

Patient Information for - PATIENT FIVEHUNDREDFIVE

Patient Information

Medication Reminders

Adverse Events History - (13 Adverse Events Recorded - 1 flagged to trigger an Alert)

Treatment Regimens & Summaries (2 Records)

	Template Name	Start Date	End Date	Show Details	Stop Treatment
Current Template:	COMS Testing Ver 2	01/28/2015	05/20/2015	Show Details	Stop Treatment (circled in red)
Historical Template:	Paclitaxel Daily Ver 2	11/17/2014	01/28/2015	Show Details	Generate End of Treatment Summary

Patient Vitals (23 Records)

End of Treatment Summary

End of Treatment Summary

Reason for generating End of Treatment Summary

- Completed Prescribed Course
- Treatment Change
- Patient Discontinuation
- Other

Figure 51: Reason Options for Generating an End of Treatment Summary

During the process of initiating the treatment summary, COMS enables providers to change the reason initially selected prior to finalizing the treatment summary. To change the reason, oncology providers may select the “Change” link located immediately after the displayed reason originally identified for generating the EoTS report. When providers select the “Change” link, as shown in **Figure 52**, COMS returns the pop-up form for re-selection of the reason.

Chemotherapy Order Management System (COMS)

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Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Patient Selection

Patient Information for - PATIENT FIVEHUNDREDFIVE

Patient Information

Medication Reminders

Adverse Events History - (13 Adverse Events Recorded - 1 flagged to trigger an Alert)

Treatment Regimens & Summaries (2 Records)

	Template Name	Start Date	End Date	Show Details	Stop Treatment
Current Template:	COMS Testing Ver 2	01/28/2015	05/20/2015	Show Details	Stop Treatment
Historical Template:	Paclitaxel Daily Ver 2	11/17/2014	01/28/2015	Show Details	Generate End of Treatment Summary

Patient Vitals (23 Records)

End of Treatment Summary

End of Treatment Summary

Reason for generating End of Treatment Summary - Completed Prescribed Course [Change](#) (circled in red)

Patient Information for - PATIENT FIVEHUNDREDFIVE

Gender: M	Age: 79	Amputee: None
Template: 2015-1-0001-ABCD-CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75-20150126 -		
Regimen Status: Ended	Regimen Start Date: 01/28/2015	Regimen End Date: 02/23/2015 (Original Scheduled End Date - 05/20/2015)

Figure 52: Change Reason for Generating an End of Treatment Summary

After determining the reason for generating the treatment summary, authorized users may proceed with the End of Treatment Summary worksheet for subsequent actions to view pre-populated areas, compose the provider report, and specify follow-up appointments.

5.5.3. View Pre-Populated Components of an End of Treatment Summary

Oncology providers creating a treatment summary may view pre-populated components within the EoTS Module. Specifically, COMS presents pre-populated data for patient and regimen details, type(s) of cancer, amputation(s), initial and final vital signs information for the regimen, body surface area factors and values, clinical trial information, allergy, performance status, and medications administered to the patient throughout the regimen. Pre-populated components of the End of Treatment Summary are shown in **Figure 53**.

The screenshot shows the 'End of Treatment Summary' window within the COMS application. At the top, there's a navigation bar with links for Patient, Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, and Site Configuration. Below the navigation bar, the main title is 'End of Treatment Summary'. A sub-section titled 'Reason for generating End of Treatment Summary' indicates 'Completed Prescribed Course' with a 'Change' link. The 'Patient Information for - PATIENT FIVEHUNDREDFIVE' section includes fields for Gender (M), Age (79), Amputee (None), Template (2015-1-0001-ABCD-CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75-20150126 -), and Regimen Status (Ended). The 'Regimen Start Date' is 01/28/2015 and the 'Regimen End Date' is 02/23/2015 (Original Scheduled End Date - 05/20/2015). Below this, there are tables for 'Type(s) of Cancer' (listing '-'), 'Allergies' (Name, Type, Comment), and 'Clinical Trial' (COMS Testing Clinical Trial). The 'Initial Vital Signs' table shows data for 01/28/2015: Height 65, Weight 165, Blood Pressure 118/76, Temperature 98.6, Pain 0, Pulse 62, Respiration 13, SPO2 100, BSA Weight Method Actual Weight, BSA Weight 74.84, BSA Formula Mosteller, and BSA 1.85. The 'Performance Status' is noted as N/C - No Change. The 'Final Vital Signs' table shows data for 02/20/2015: Height, Weight, Blood Pressure, Temperature, Pain, Pulse, Respiration, SPO2, BSA Weight Method Actual Weight, BSA Weight 0, BSA Formula Boyd, and BSA. The 'Performance Status' is noted as 2 - Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours.

Figure 53: Pre-populated Components of an End of Treatment Summary

The EoTS Module imports pre-populated information from other clinical modules and miscellaneous functionality within the COMS application.

5.5.4. Review Disease Response, Toxicity History, and Other Comments

After viewing pre-populated components of the treatment summary worksheet, the provider may review patient response, toxicity history, and other comments for consideration in categorizing the disease response and creating the provider narrative. **Figure 54** depicts this section of the treatment summary worksheet.

Chemotherapy Order Management System (COMS)

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Patient Information for - PATIENT FIVEHUNDRED SIXTY

Gender:	M	Age:	77	Amputee:	None
Template:		NSCLC - Single Agent Paclitaxel -			
Regimen Status:	Ended	Regimen Start Date:	09/23/2012	Regimen End Date:	09/25/2012 (Original Scheduled End Date - 12/16/2012)

Patient Disease Response

Disease Response	
Cycle 1, Day 1 09/23/2012	Disease Response comments for 9/23/2012

Toxicity Side Effects

Toxicity Side Effects	
Cycle 1, Day 1 09/23/2012	COMS User Guide - Flow Sheet Toxicity Side Effects Free Text Field

Other Comments

Other
No Other Comments Recorded

Figure 54: Review of Flow Sheet Annotations for an End of Treatment Summary

5.5.5. Compose Provider Report and Specify Follow-up Appointments

As the final section for the end of treatment summary worksheet, providers may compose an overall provider report for the regimen and specify follow-up appointments for the patient. The EOTS Module provides free text comment fields with formatting and expanding capability to accommodate lengthy narratives for these two sections, as shown in **Figure 55**.

Patient Information for - PATIENT FIVEHUNDRED FIVE

Gender:	M	Age:	79	Amputee:	None
Template:		2015-1-0001-ABCD-CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75-20150126 -			
Regimen Status:	Ended	Regimen Start Date:	01/28/2015	Regimen End Date:	02/23/2015 (Original Scheduled End Date - 05/20/2015)

Provider Report

Follow-Up Appointments

Figure 55: Compose Narratives for End of Treatment Summary

A completed treatment summary is available for the oncology care team to review within COMS and is transmitted to the electronic health record as a Progress Note for viewing by users without COMS access.

5.5.6. View a Completed End of Treatment Summary

Once the provider has completed the treatment summary, COMS transmits the report to the electronic health record as a Progress Note. COMS users may also view the completed treatment summary through the Treatment Regimens & Summaries panel. After patient selection as detailed in [section 3.8](#), team members access treatment summaries by expanding the Treatment Regimens & Summaries panel and selecting the “Show End of Treatment Summary” link for an historical template, as shown in **Figure 56**.

Chemotherapy Order Management System (COMS)

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Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Patient Selection

Patient Information for - PATIENT FIVEHUNDREDFIVE -

Patient Information
Medication Reminders
Adverse Events History (No Adverse Events Recorded)

Treatment Regimens & Summaries (3 Records)

	Template Name	Start Date	End Date	Show Details	Stop Treatment
Current Template:	NSCLC - Paclitaxel for UAT	08/10/2012	11/02/2012	Show Details	Show End of Treatment Summary
Historical Template:	NSCLC - Paclitaxel for UAT	07/31/2012	08/03/2012	Show Details	Show End of Treatment Summary
Historical Template:	NSCLC - Paclitaxel for UAT	08/06/2012		Show Details	Generate End of Treatment Summary

Figure 56: Select an End of Treatment Summary to View

After the authorized healthcare team member selects the “Show End of Treatment Summary” link for the desired historical template, COMS will open a new screen to display the completed, read-only EoTS report. **Figure 57** depicts a completed End of Treatment Summary.

Chemotherapy Order Management System (COMS)

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[Patient](#) [Orders](#) [Template Authoring](#) [Template List](#) [Template Promotion](#) [Reports](#) [Messages](#) [Site Configuration](#)

End of Treatment Summary

End of Treatment Summary

Reason for generating End of Treatment Summary Completed Prescribed Course

Patient Information for - PATIENT FOURHUNDRED

Gender:	M	Age:	77	Amputee:	Left Foot				
Template: NSCLC - Paclitaxel for UAT -									
Regimen Status:	Ended	Regimen Start Date:	07/31/2012	Regimen End Date:	08/03/2012				
Type(s) of Cancer:									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Allergies:</td> <td>Name</td> <td>Type</td> <td>Comment</td> </tr> </table>						Allergies:	Name	Type	Comment
Allergies:	Name	Type	Comment						
Clinical Trial:									

Initial Vital Signs

Date Vitals Taken	Height	Weight	Blood Pressure	Temperature	Pain	Pulse	Respiration	SPO2	BSA Weight Method	BSA Weight	BSA Method	BSA
[object Object]	70	172	146/84	98.4	4	76	12		Actual Weight	78	DuBois	
Performance Status: 3 - Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours												

Final Vital Signs

Date Vitals Taken	Height	Weight	Blood Pressure	Temperature	Pain	Pulse	Respiration	SPO2	BSA Weight Method	BSA Weight	BSA Method	BSA
[object Object]	70	172	146/84	98.4	4	76	12		Actual Weight	78	DuBois	1.96
Performance Status: 1 - Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g. light house work, office work												

Medications

DEXAMETHASONE INJ,SOLN												
Cycle 1, Day 4	08/03/2012		20 mg									
DIPHENHYDRAMINE CAP,ORAL												
Cycle 1, Day 4	08/03/2012		50 mg									
RANITIDINE TAB												
Cycle 1, Day 4	08/03/2012		50 mg									
PACLITAXEL INJ,CONC												
Cycle 1, Day 4	08/03/2012		392 mg									
PROCHLORPERAZINE TAB												
Cycle 1, Day 4	08/03/2012		10 mg									

Disease Response

Cycle 1, Day 4	08/03/2012	Qualitatively, the tumor appears to have decreased in size. Will obtain quantitative assessment after second full cycle of Paclitaxel therapy.
----------------	------------	--

Toxicity Response

Cycle 1, Day 4	08/03/2012	Patient erythema is decreasing in severity with Paclitaxel therapy. Please continue to monitor and report, as needed.
----------------	------------	---

Other Comments

Cycle 1, Day 4	08/03/2012	No Other Comments Recorded
----------------	------------	----------------------------

Provider Report

No Provider Report listed

Follow-Up Appointments

No Follow-Up Appointments listed

Close

Figure 57: Completed End of Treatment Summary

[\(Return to TOC\)](#)

6. Miscellaneous Functionality – Non-Administrative

Within the COMS application, miscellaneous functionality through 11 non-module sections provides broad support for the overall effectiveness of the CTOS, OEM, TD, FS, and EoTS Modules individually and collectively. Through patient specific functionality, users are provided general and historic information from VistA and various COMS modules. Users may access treatment regimen, vital signs, medication reminders, laboratory results, and adverse events information for a particular patient as well as clinical references relevant to the prescribed regimen and/or medications. Users may also view, enter, or modify relevant patient information for patient amputations, Body Surface Area (BSA) calculations (including formula, weight methodology, and patient height/weight values), type(s) of cancer, and medication cumulative dose tracking.

General functionality enables coordination and monitoring of provider orders from the point of order; through clearing of the order; through finalizing, cancelling, holding or releasing from hold; and dispensing medications; to administration documentation of the prescribed medications. Further, miscellaneous functionality provides essential resources and tools to establish and sustain the application's general operation within local facility specific parameters.

Miscellaneous functionality enables the oncology provider to use the CTOS Module to construct and apply templates for an automated chemotherapy order and further customize, print, and otherwise communicate the individualized treatment plan via the OEM Module for coordination with the healthcare team's pharmacists and nurses. Through the TD Module, miscellaneous functionality facilitates the application providing the oncology nurse with a deep understanding of patient history and toxicities; insight into the prescribed treatment, Febrile Neutropenia risk, Emetogenic level, and goal; ability to document all relevant aspects of the administration of oncology medications and the assessment of the patient's reaction to the treatment; and discharge instructions for the patient. Combined with TD Module capabilities, miscellaneous functionality provides oncology team alerts for adverse reactions and cumulative lifetime dosages, as appropriate, throughout the treatment regimen. Further, miscellaneous functionality aids the application to retrieve, organize, and provide an efficient display within the FS Module and fosters creation of a treatment summary through the EoTS Module as an efficient communication mechanism for the current healthcare team, referring/primary care providers, and other clinical and support staff.

Altogether, COMS miscellaneous functionality is the underpinning that supports the five clinical modules, ultimately promoting standardization and efficiencies for oncology services. Through the application's automation and enhanced communication throughout the treatment regimen, COMS enhances patient safety and bolsters Joint Commission compliance with documentation ultimately stored in VA's electronic health record comprised of VistA and CPRS.

COMS miscellaneous functionality provides support and facilitates actions throughout the COMS application. Subsequently, miscellaneous functionality actions and preconditions build upon and support those expressed in the CTOS, OEM, TD, FS, and EoTS Modules. Further, the following specific preconditions – in addition to VistA interoperability – are required to support miscellaneous functionality for the COMS application:

- A patient must be available within VistA to View Patient Specific Information; Add or Edit Patient Amputation Designation(s); Add or Delete Patients Type(s) of Cancer; Enter Historical Dosing of Cumulative Lifetime Tracked Medications; Review and Record Patient Vital Signs; and Review Laboratory Results
- Chemotherapy template information must reside within the application to Review Patients Undergoing Treatment on an Existing Template; View, Print, or Save Existing Template; and View and Designate Templates for Promotion
- A template must be applied to a patient to Update Body Surface Area Formula and Calculations; View Medication Reminders for the Treatment Regimen; View Patient's Adverse Events History and Alerts
- A template must be applied to a patient with dispensing and administration activity to Create and View Inventory Reports; Generate and View Patterns of Care Determination Reports; and Configure Lab Reports Functionality
- An active order, by virtue of the applied template, is required to View Active Orders; Clear Medication Orders; Finalize and Dispense Medication Orders; and Read and Respond to COMS Messages

Figure 58 depicts the 20 role-based actions for (Non-Administrative) Miscellaneous Functionality.

Miscellaneous Functionality (Non-Administrative)	Provider	Nurse	Pharmacist	All Clinical
1. Switch to High Contrast Mode				●
2. View Patient Specific Information				●
3. Add or Edit Patient Amputation Designation(s)				●
4. Update Body Surface Area Formula and Calculations				●
5. Add or Delete Patient Type(s) of Cancer				●
6. Enter Historical Dosing of Cumulative Lifetime Tracked Medications				●
7. View Medication Reminders and				●
8. View Patient's Adverse Events History and Alerts				●
9. Review and Record Patient Vital Signs				●
10. Review Laboratory Information				●
11. View Active Orders				●
12. Clear Medication Orders				●
13. Finalize and Dispense Medication Orders			●	

Miscellaneous Functionality (Non-Administrative)	Provider	Nurse	Pharmacist	All Clinical
14. Review Patients Undergoing Treatment on an Existing Template				•
15. View, Print, or Save Existing Templates				•
16. View and Designate Templates for Promotion*				•
17. Create and View Inventory Reports				•
18. Generate and View Patterns of Care Determination Reports				•
19. Configure Laboratory Reports				•
20. Read and Respond to COMS Messages				•

*Template promotion for Super User/Local Template Manager/Central Template Authoring Group

Figure 58: Miscellaneous Functionality (Non-Admin) Role-Based Actions

The capabilities within the CTOS, OEM, TD, FS, and EoTS Modules provide and receive support from miscellaneous functionality within the application. The actions performed within the CTOS Module provide the foundation for COMS computerized provider order entry functionality, template management, and ordering. Ensuing actions within the OEM Module permit further tailoring of the individualized patient care plan. Documentation of medication administration and other nursing/treatment activities within the TD Module serve as iterative building blocks for both the FS and EoTS Modules to chronicle the treatment regimen and its direct/indirect impact on the patient. Through a symbiotic relationship with module specific capabilities, miscellaneous functionality is interdependent and bilaterally supportive with other COMS modules.

As the underpinning of capabilities within the five clinical modules, COMS utilizes complementary functionality throughout the application. Collectively known as “Miscellaneous Functionality”, these capabilities combine to enable successful interoperability among the clinical modules within COMS and with VA’s electronic health record applications of VistA and CPRS. This section presents non-administrative or “clinical facing” miscellaneous functionality.

6.1. Normal or High Contrast Mode

To accommodate display preferences, users may select to view the COMS application in normal mode or high contrast mode. COMS provides functionality on the landing page for users to designate normal contrast mode (the application’s default) or high contrast mode. Normal contrast mode displays a white background, black text, blue tab highlighting, and blue text hyperlinks. To switch to high contrast mode with black background, white text, orange highlights for tab selection, and white text hyperlinks, users select the “Switch to High Contrast Mode” link immediately beneath the COMS application banner and on the applications’

welcome line. COMS then presents users with a pop-up window to confirm the navigation away from the current page, as shown in **Figure 59**.

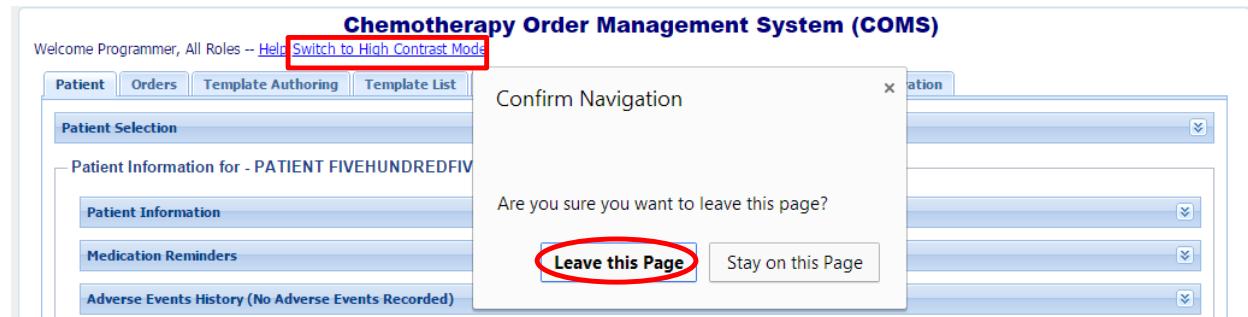


Figure 59: Switch to High Contrast Mode

It is important users save any work in progress prior to confirming navigation and leaving the current page. With confirmation to leave the existing page, COMS reloads in high contrast mode with black background, white text, orange highlights for tab selection, and white text hyperlinks. **Figure 60** depicts COMS in high contrast mode.

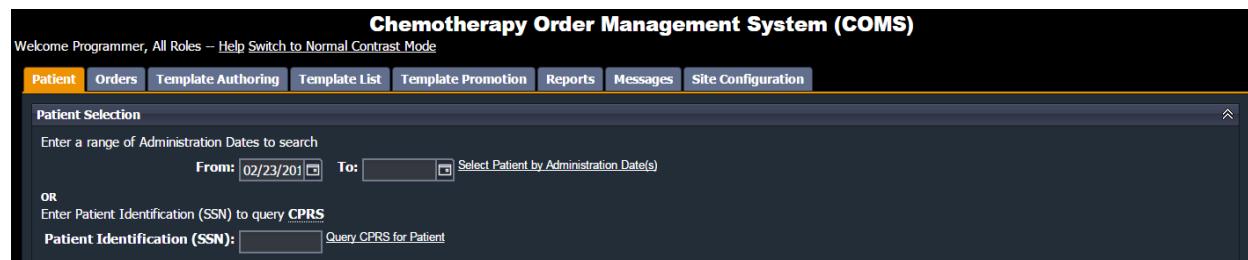


Figure 60: High Contrast Mode

Users may return to normal contrast mode by selecting the new link “Switch to Normal Contrast Mode” beneath the COMS application banner. As noted, it is important users save any work in progress prior to confirming navigation and leaving the current page to change contrast modes. After the user selects this link and confirms browser navigation, COMS reloads the application in normal contrast mode with white background, black text, blue tab highlighting, and blue text hyperlinks.

6.2. Patient Information Panel

As the initial panel within the Patient Tab of COMS, Patient Information contains numerous relevant data points regarding the patient and applied template/treatment regimen. It provides several opportunities to add or edit patient data either relevant to the regimen (e.g., body surface area formula/calculations) or specific to the patient (e.g., amputation designations). If another user has accessed and locked any add/edit section, COMS presents subsequent users with a pop-up message to indicate the section is locked by <the identified> user. The section will remain locked until no longer accessed by the first user or unlocked by a COMS Administrator.

6.2.1. View Patient Specific Information

Following patient selection ([section 3.8](#)), users may select the patient information panel to expand the display for viewing. The first row of information includes the patient's gender, age,

and amputation designation(s) with ability to add/edit. For patients with an applied template, the second row includes the Body Surface Area (BSA) weight methodology (e.g., actual weight, lean weight) and BSA formula (e.g., Dubois, Boyd), calculated BSA, and links to view or add/edit the calculations. On the third row, the panel lists the COMS-generated name and user-friendly name. Regimen Status (e.g., On-going – Admin Day, On-going – Rest Day), Regimen Start Date as the first day of administration, and the Regimen End Date as projected in the applied template. **Figure 61** depicts the expanded Patient Information panel.

Chemotherapy Order Management System (COMS)

Welcome Programmer, All Roles -- [Help](#) [Switch to High Contrast Mode](#)

Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Patient Selection

Patient Information for - PATIENT FIVEHUNDRED

Patient Information					
Gender:	M	Age:	79	Add/Edit	Amputee: Upper Left Arm Left Hand and Fingers Lower Left Arm
BSA Weight Method:	Actual Weight	BSA Formula:	Boyd	Add/Edit	BSA: 1.73 Update BSA Show Calculations
Template:	2015-1-0001-ABCD-CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75-20150126 COMS Testing Ver 2				
Regimen Status:	On-Going - Admin Day	Regimen Start Date:	01/26/2015	Regimen End Date:	05/18/2015
Add Type(s) of Cancer:	Disease		Stage	Recorded on	User
	Acute Lymphoblastic Leukemia, Adult		Stage I	02/06/2015	Programmer
Allergies:	No Known Allergies				
Clinical Trial:	Clinical Trial for COMS Testing				
Medication Cumulative Dose Tracking: Add Medication	Medication / Maximum	Lifetime Total / %	Received / %	Source	
	BLEOMYCIN INJ,SOLN 300 Units	135 Units / 45%	75 Units / 25%	Durham VAMC Records	
			25 Units / 8.33%	Durham VAMC Records	
			35 Units / 11.67%	Durham VAMC Records	
	MITOMYCIN INJ 50 mg/m²	25 mg/m ² / 50%	18 mg/m ² / 36%	VAPSHCS Pre-COMS Records	
			7 mg/m ² / 14.0%	Durham VAMC Records	

Figure 61: Patient Information Panel

The fourth row of the panel lists the Type(s) of Cancer, Stage, Recorded On (i.e., date recorded), User (i.e. COMS user who entered the type of cancer), and links to “add” or “delete” the entry. The next two rows present allergies, as imported from VistA, then Clinical Trial information as specified when the template was applied to the patient; if no clinical trial was indicated, COMS displays a message indicating the treatment regimen is not a clinical trial. The last section of the Patient Information panel displays information for medication cumulative dose tracking, including a link to add historical dosages previously received; patient’s lifetime administrations with tracked medication name and recommended maximum lifetime dosage; cumulative lifetime dosing received to date and percentage of maximum dosage; and one or more entries of individual records for previously added historical dosages or administrations and the source of the recorded information.

6.2.2. Add or Edit Patient Amputation Designation(s)

Providers initially annotate amputations when applying the template to the patient to create the treatment regimen. These designations are factored in body surface area calculations and subsequently impact dosage calculations for BSA-dependent medication dosages. Authorized users may add or edit patient amputation designation(s) through the Patient Information panel, as shown in **Figure 62**.

Chemotherapy Order Management System (COMS)

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

Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Patient Selection

Patient Information for - PATIENT FIVEHUNDRED

Gender:	M	Age:	79	Add/Edit Imputee:	Upper Left Arm Left Hand and Fingers Lower Left Arm
BSA Weight Method:	Actual Weight	BSA Formula:	Boyd	Add/Edit BSA:	1.73 Update BSA Show Calculations
Template:	2015-1-0001-ABCD-CARBOPLATIN INJ 10CIS COMS Testing Ver 2				Patient Amputation
Regimen Status:	On-Going - Admin Day	Regimen Start:			
Add Type(s) of Cancer:	Disease Acute Lymphoblastic Leukemia, Adult				
Allergies:	No Known Allergies				
Clinical Trial:	Clinical Trial for COMS Testing				
Medication Cumulative Dose Tracking: Add Medication	Medication / Maximum	Life	<input checked="" type="checkbox"/> Upper Left Arm <input checked="" type="checkbox"/> Lower Left Arm <input checked="" type="checkbox"/> Left Hand and Fingers <input type="checkbox"/> Left Thigh <input type="checkbox"/> Lower Left Leg <input type="checkbox"/> Left Foot <input type="checkbox"/> Upper Right Arm <input type="checkbox"/> Lower Right Arm <input checked="" type="checkbox"/> Right Hand and Fingers <input type="checkbox"/> Right Thigh <input type="checkbox"/> Lower Right Leg <input type="checkbox"/> Right Foot		
	BLEOMYCIN INJ, SOLN 300 Units				
	MITOMYCIN INJ 50 mg/m ²				

Patient Amputation

Upper Left Arm
 Lower Left Arm
 Left Hand and Fingers
 Left Thigh
 Lower Left Leg
 Left Foot

 Upper Right Arm
 Lower Right Arm
 Right Hand and Fingers
 Right Thigh
 Lower Right Leg
 Right Foot

Save Cancel

Figure 62: Add or Edit Patient Amputation Designations

This functionality enables users to specify patient amputations and auto-checks logically related amputations associated with the distal designations. For example, when users select an amputation of Upper Left Arm, COMS automatically indicates amputations for the Lower Left Arm and Left Hand and Fingers.

6.2.3. Update Body Surface Area Formula and Calculations

Members of the healthcare team may select various links with the Patient Information panel to view or modify BSA calculations. Selection of the “Update BSA” link enables users to specify a different height and/or weight value to use in calculating the BSA. Users may select the Show “Calculations” link to view all details, factors, formula, and calculations used to determine the displayed BSA value. Further, users may select the “Add/Edit” link to specify a different weight methodology and/or BSA formula to use for BSA calculations. **Figure 63** depicts the Patient Information panel with pop-up window to add/edit the patient’s BSA.

Chemotherapy Order Management System (COMS)

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

Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Patient Selection

Patient Information for - PATIENT FIVEHUNDRED

Gender:	M	Age:	79	Add/Edit Amputee:	Upper Left Arm Left Hand and Fingers Lower Left Arm
BSA Weight Method:	Actual Weight	BSA Formula:	Boyd	Add/Edit BSA	1.73 Update BSA ShowCalculations
Template:	2015-1-0001-ABCD-CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75-20150126 COMS Testing Ver 2				
Regimen Status:	On-Going - Admin Day	Regimen Start Date:	01/26/2015	Regimen End Date:	05/18/2015
Add Type(s) of Cancer:	Disease: Acute Lymphoblastic Leukemia, Adult Allergies: No Known Allergies Clinical Trial: Clinical Trial for COMS Testing Medication Cumulative Dose Tracking: Add Medication				
	Medication / Maximum: BLEOMYCIN INJ,SOLN 300 Units MITOMYCIN INJ 50 mg/m ²				

Body Surface Area (BSA) Method Selection

Weight to use *:
 Actual Weight

BSA Formula *:

- DuBois
- Mosteller
- Haycock
- Gehan and George
- Boyd
- Capped

Figure 63: Update Body Surface Area Formula and Calculations

COMS applies the most current BSA calculation during the medication dosage calculation process for BSA-dependent dosing.

6.2.4. Add or Delete Patient's Type(s) of Cancer

Users may add or delete patient type(s) of cancer through the Patient Information panel. Selection of the “Add” Type(s) of Cancer link results in display of the Patient Type of Cancer pop-up window with pull-down menus to specify the cancer type and stage in a clinically contextual manner, as loaded in Site Configuration. **Figure 64** represents the Patient Information panel for adding a type of cancer.

Chemotherapy Order Management System (COMS)

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

Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Patient Selection

Patient Information for - PATIENT FIVEHUNDRED

Gender:	M	Age:	79	Add/Edit Amputee:	Upper Left Arm Left Hand and Fingers Lower Left Arm
BSA Weight Method:	Actual Weight	BSA Formula:	Boyd	Add/Edit BSA	1.73 Update BSA ShowCalculations
Template:	2015-1-0001-ABCD-CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75-20150126 COMS Testing Ver 2				
Regimen Status:	On-Going - Admin Day	Regimen Start Date:	01/26/2015	Regimen End Date:	05/18/2015
Add Type(s) of Cancer:	Disease: Acute Lymphoblastic Leukemia, Adult Allergies: No Known Allergies				
Clinical Trial:	Clinical Trial for COMS Testing				
Medication Cumulative Dose Tracking:	Add Medication				

Patient Type of Cancer

Select a type of cancer * : Lung Cancer, Small Cell

Cancer Stage: Select a Cancer Stage

Extensive Stage

Limited Stage

Figure 64: Add Patient Type(s) of Cancer

Authorized users may enter an unlimited number cancer types for the selected patient. The Patient Information panel also permits users to delete a listed type of cancer by selecting the “Delete” link in the same row as the cancer type for removal. Users must acknowledge the confirmation to remove the cancer type entry, as shown in **Figure 65**.

Patient Selection																				
Patient Information for - PATIENT FIVEHUNDRED																				
Patient Information																				
Gender:	M	Age:	79	Add/Edit Amputee: Upper Left Arm Left Hand and Fingers Lower Left Arm																
BSA Weight Method:	Actual Weight	BSA Formula:	Boyd	Add/Edit BSA: 1.73 Update BSA Show Calculations																
Template:	2015-1-0001-ABCD-CARBOPLATIN INJ 10 CISPLATIN INJ,SOLN 50 DIPHENHYDRAMINE CAP,ORAL 75-20150126 COMS Testing Ver 2																			
Regimen Status:	On-Going - Admin Day	Regimen Start Date:	01/26/2015	Regimen End Date: 05/18/2015																
Add Type(s) of Cancer:	<table border="1"> <thead> <tr> <th>Disease</th> <th>Stage</th> <th>Recorded on</th> <th>User</th> <th>Delete</th> </tr> </thead> <tbody> <tr> <td>Acute Lymphoblastic Leukemia, Adult</td> <td>Stage I</td> <td>02/06/2015</td> <td>Programmer</td> <td>Delete</td> </tr> </tbody> </table>				Disease	Stage	Recorded on	User	Delete	Acute Lymphoblastic Leukemia, Adult	Stage I	02/06/2015	Programmer	Delete						
Disease	Stage	Recorded on	User	Delete																
Acute Lymphoblastic Leukemia, Adult	Stage I	02/06/2015	Programmer	Delete																
Allergies:	No Known Allergies																			
Clinical Trial:	Clinical Trial for COMS Testing																			
Medication Cumulative Dose Tracking: Add Medication	<table border="1"> <thead> <tr> <th>Medication / Maximum</th> <th colspan="3">Source</th> </tr> </thead> <tbody> <tr> <td>BLEOMYCIN INJ,SOLN 300 Units</td> <td colspan="3">AMC Records</td> </tr> <tr> <td>MITOMYCIN INJ 50 mg/m2</td> <td>25 mg/m2 / 50%</td> <td>18 mg/m2 / 36%</td> <td>VAPSHCS Pre-COMS Records</td> </tr> <tr> <td></td> <td>7 mg/m2 / 14.0%</td> <td>7 mg/m2 / 14.0%</td> <td>Durham VAMC Records</td> </tr> </tbody> </table>				Medication / Maximum	Source			BLEOMYCIN INJ,SOLN 300 Units	AMC Records			MITOMYCIN INJ 50 mg/m2	25 mg/m2 / 50%	18 mg/m2 / 36%	VAPSHCS Pre-COMS Records		7 mg/m2 / 14.0%	7 mg/m2 / 14.0%	Durham VAMC Records
Medication / Maximum	Source																			
BLEOMYCIN INJ,SOLN 300 Units	AMC Records																			
MITOMYCIN INJ 50 mg/m2	25 mg/m2 / 50%	18 mg/m2 / 36%	VAPSHCS Pre-COMS Records																	
	7 mg/m2 / 14.0%	7 mg/m2 / 14.0%	Durham VAMC Records																	

Figure 65: Delete Patient Type of Cancer

6.2.5. Enter Historical Dosing of Cumulative Lifetime Tracked Medications

To bolster tracking of cumulative lifetime dose medications, users may add historical dosing for those administrations received external to the COMS application. When users select the “Add Medication” link for Medication Cumulative Dose Tracking, COMS displays the Historical Cumulative Medication Dose Entry pop-up. Users will select the medication from the pull-down menu of medications loaded in Site Configuration (see [section 7.4.1](#)); selection also enables COMS to list the (recommended) maximum allowable dosage, as specified in Site Configuration. After entering the numeric value for historical dose in the required units and identifying the source of information, users must select Save the record for it to be listed in the panel. **Figure 66** depicts the process for historical cumulative medication dose entry.

Medication Cumulative Dose Tracking: Add Medication	Medication / Maximum	Lifetime Total / %	Received / %	Source
	BLEOMYCIN INJ,SOLN 300 Units	135 Units / 45%	75 Units / 25% 25 Units / 8.33% 35 Units / 11.67%	Durham VAMC Records Durham VAMC Records Durham VAMC Records
	MITOMYCIN INJ 50 mg/m2	25 mg/m2 / 50%	18 mg/m2 / 36% 7 mg/m2 / 14.0%	VAPSHCS Pre-COMS Records Durham VAMC Records

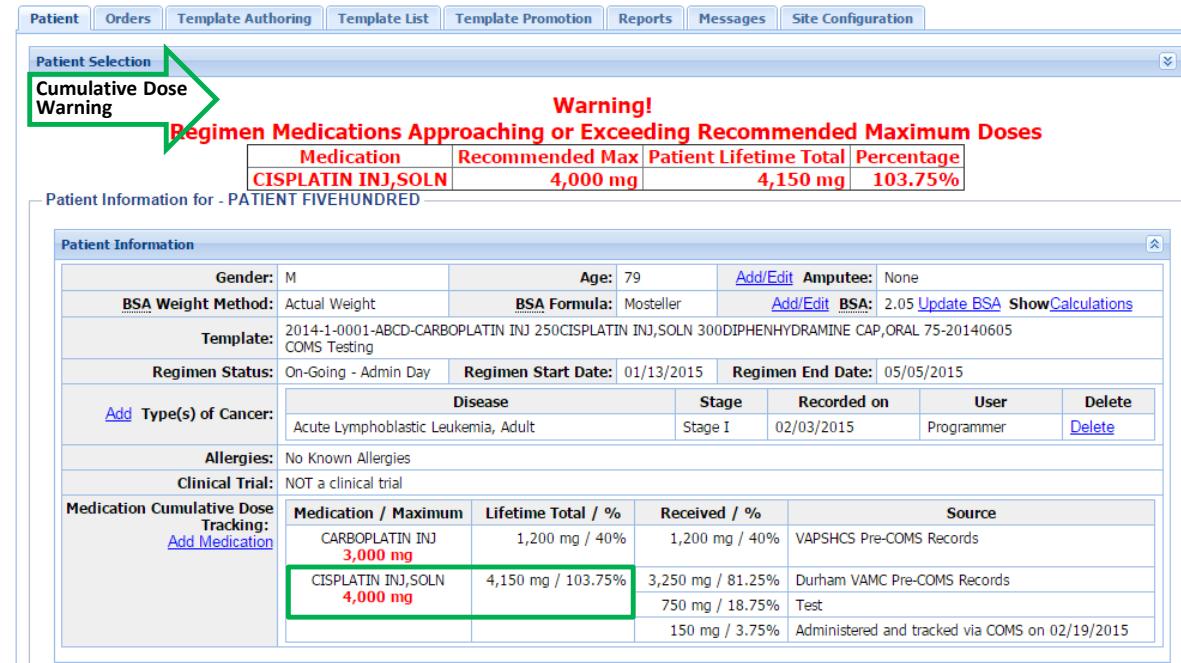
Figure 66: Enter Historical Dosing of Tracked Medications

Users should leverage this functionality to enter dosages administered external to VA or prior to COMS implementation, enabling the application to serve as a repository of cumulative dosing medications received over the patient's lifetime. The application monitors lifetime accumulations for tracked medications to include adding the dosages for those entered through this functionality and administered through COMS. As administrations within COMS are recorded or other historical medication dosages are documented, the entries will be displayed and lifetime total will be the sum of all individual records for the same tracked medication.

Regardless of source for cumulative sum individual records – COMS administrations or historical dose entries – the Medication Cumulative Dose Tracking display is immediately updated. Once the cumulative sum reaches 75% for any medication within the currently applied template, COMS displays a warning that the patient has regimen medication(s) approaching or exceeding recommended maximum doses. This warning is provided directly above the Patient Information panel and includes regimen medication, recommended dosage maximum, patient lifetime total to date, and percentage received to date for each regimen medication, as required. This warning presents for the patient when any current regimen contains medications with cumulative lifetime dosages at 75% or greater. **Figure 67** depicts the cumulative dose warning for a patient who has exceed the recommended lifetime maximum dosage.

Chemotherapy Order Management System (COMS)

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The screenshot shows the COMS interface with a 'Cumulative Dose Warning' message highlighted by a green arrow pointing to the 'Patient Selection' header. Below the message, a table displays 'Regimen Medications Approaching or Exceeding Recommended Maximum Doses' for CISPLATIN INJ,SOLN, showing a recommended maximum of 4,000 mg, a patient lifetime total of 4,150 mg, and a percentage of 103.75%. The 'Patient Information' panel below includes fields for gender (M), age (79), BSA weight method (Actual Weight), BSA formula (Mosteller), and various clinical details like disease, stage, and allergies. A 'Medication Cumulative Dose Tracking' table at the bottom lists CISPLATIN INJ,SOLN with a maximum of 4,000 mg and a received amount of 4,150 mg, which is 103.75% of the maximum.

Medication	Recommended Max	Patient Lifetime Total	Percentage
CISPLATIN INJ,SOLN	4,000 mg	4,150 mg	103.75%

Patient Information					
Gender:	M	Age:	79	Add/Edit	Amputee: None
BSA Weight Method:	Actual Weight	BSA Formula:	Mosteller	Add/Edit	BSA: 2.05 Update BSA Show Calculations
Template:	2014-1-0001-ABCD-CARBOPLATIN INJ 250CISPLATIN INJ,SOLN 300DIPHENHYDRAMINE CAP,ORAL 75-20140605 COMS Testing				
Regimen Status:	On-Going - Admin Day	Regimen Start Date:	01/13/2015	Regimen End Date:	05/05/2015
Add Type(s) of Cancer:	Disease		Stage	Recorded on	User Delete
	Acute Lymphoblastic Leukemia, Adult		Stage I	02/03/2015	Programmer Delete
Allergies:	No Known Allergies				
Clinical Trial:	NOT a clinical trial				
Medication Cumulative Dose Tracking: Add Medication	Medication / Maximum	Lifetime Total / %	Received / %	Source	
	CARBOPLATIN INJ 3,000 mg	1,200 mg / 40%	1,200 mg / 40%	VAPSHCS Pre-COMS Records	
	CISPLATIN INJ,SOLN 4,000 mg	4,150 mg / 103.75%	3,250 mg / 81.25%	Durham VAMC Pre-COMS Records	
			750 mg / 18.75%	Test	
			150 mg / 3.75%	Administered and tracked via COMS on 02/19/2015	

Figure 67: Cumulative Dose Warning

6.3. Medication Reminders Panel

The Medication Reminders panel conveys information for the provider and healthcare team to consider throughout the patient's treatment regimen. Reminders are specific to the template applied to the patient when initiating treatment.

6.3.1. View Medication Reminders for the Treatment Regimen

Users may view medication reminders for the treatment regimen through the Medication Reminders panel by expanding the panel. The Medication Reminders panel contains information for timing (e.g., before cycle, after administration), Title of the reminder, and Description, as created during the template authoring process, as detailed in [section 5.1.1](#). Medication reminders become applicable when providers apply the template containing medication reminders to a specific patient. **Figure 68** presents the expanded Medication Reminders panel.

The screenshot shows the COMS interface with the title "Chemotherapy Order Management System (COMS)" at the top. Below it is a navigation bar with tabs: Patient, Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, and Site Configuration. The "Patient" tab is selected. A sub-menu titled "Patient Selection" is open, showing "Patient Information for - PATIENT FIVEHUNDRED". Under this, there are sections for "Patient Information" and "Medication Reminders". The "Medication Reminders" section is highlighted with a red box. It contains a table with columns "When", "Title", and "Description". One row in the table shows "Before" in the "When" column and "Cycle" in the "Title" column. The "Description" field below the table contains the text "Assess Labs and Order Adjunct Therapy". There are also input fields for "When" (set to "Before") and "Title" (set to "Assess Labs and Order Adjunct Therapy").

Figure 68: Medication Reminders

The functionality of the Medication Reminders panel may be used to communicate the need for periodic assessment and/or addition of adjunct therapy at pre-determined points throughout the patient's treatment regimen.

6.3.2. Add Medication Reminders to Regimen Template

Medication reminders are specific to the chemotherapy template applied to the patient and users may not add reminders to the treatment regimen once the provider has applied the template to the patient. Specifically, providers may only add medication reminders to the treatment regimen at the time of template authoring, as detailed in [section 5.1.1](#).

6.4. Adverse Events History Panel

The Adverse Events History (AE) panel serves as a repository of the patient's toxicities and/or infusion reactions recorded in the TD Module Assessment panel, TD Module Infusion Reactions panel, and the FS Module's Add General Information functionality. Users may access the AE History panel to view the patient's oncologic history of toxicities documented within the COMS application.

6.4.1 View Adverse Events History

The AE History panel provides ready access to the patient's adverse events throughout oncologic treatment with a numeric display on the panel bar of the total number of adverse events recorded and red text indication for the number of those flagged to trigger an alert. Users may expand the

panel to view adverse events listed in reverse chronological order with most current designations on top of list. The AE History panel displays the section within COMS where the entry was provided (e.g., Assessment, Reaction) and date recorded. For Assessment records, the entry displays the event/toxicity, grade, details, and comments. Reaction records include event, section, and comments. **Figure 69** presents the AE History panel

The screenshot shows the 'Chemotherapy Order Management System (COMS)' interface. At the top, there is a navigation bar with links for Patient, Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, and Site Configuration. Below the navigation bar, a 'Patient Selection' dropdown is open, showing 'Patient Information for - PATIENT FIVEHUNDRED'. Under this, there are sections for 'Patient Information' and 'Medication Reminders'. The main content area is titled 'Adverse Events History - (5 Adverse Events Recorded - 1 flagged to trigger an Alert)'. It lists two entries:

Reaction - 02/23/2015	
Event:	Tachycardia
Section:	Cytokine-Release Syndrome
Comments:	

Tachycardia - Flagged as an ALERT

Assessment - 02/04/2015	
Event:	No Toxicities
Grade:	
Details:	No toxicities reported or observed
Comments:	

Figure 69: Adverse Events History Panel

6.4.2 View Adverse Events Alerts

Within the AE History panel, COMS presents events identified to trigger an alert via red text display of the event or toxicity and phrase indicating it is flagged as an alert (e.g., Tachycardia – Flagged as an Alert). Similar to the total number of AE history records listed in the panel bar, COMS lists the total number of records flagged to trigger an alert in red text. As shown in Figure 69 above, the selected patient has five total adverse events recorded in the panel with one of those flagged to trigger an alert.

6.5. Patient Vitals Panel

The functionality for the Patient Vitals panel is very similar to that within the vital signs section of the TD Module's General Information panel. However, users may access the Patient Vitals panel without a template applied to the selected patient.

6.5.1. Review Patient Vital Signs

Users may access the vital signs information for a selected patient by expanding the Patient Vitals panel. The panel displays an historical repository of vital sign entries imported from VistA regardless of the source of origination (i.e., VistA, CPRS, COMS). Listed in reverse chronological order, entries include date, temperature in standard and metric values, body location taken, pulse, blood pressure, respirations, peripheral oxygen saturation percentage, patient-assessed pain on the standardized 1 thru 10 scale, performance status, height in standard and metric values, weight in standard and metric values, and BSA section. Performance status is

obtained at the time the template is applied or modified in the OEM Module, as presented in [section 5.2.3](#); if there is no change in performance status since the last recorded vital signs, COMS displays “N/C” for performance status. The BSA section includes the BSA weight methodology (e.g., actual weight, ideal weight), weight in KG as used in BSA calculations, the BSA formula (e.g., Mosteller, Boyd), and the calculated BSA for that vital signs record. Users may select the BSA value link to view full BSA calculations, as shown in **Figure 70**.

Chemotherapy Order Management System (COMS)

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Patient Orders Template Authoring Tel

Dosage Calculations

Patient Selection

Patient Information for - PATIENT FIVEHU

Patient Information

Medication Reminders

Adverse Events History - (5 Adverse Events R

Treatment Regimens & Summaries (5 Rec

Patient Vitals (29 Records)

Add Vitals

Date	Temp °F/°C	Temp Taken	Pu
02/04/2015	98.6/37	Temporal	66
02/03/2015	98.6/37	Tympanic	68
01/30/2015	98.6/37	Rectal	70

Height: 71.75 in = 182.25 cm
Weight: 173 lbs = 78.47 kg
[Select different Height/Weight from Vitals](#)

Gender: M
Amputations: Upper Left Arm - Reduce BSA by 6 %
Left Hand and Fingers - Reduce BSA by 3 %
Lower Left Arm - Reduce BSA by 4 %

Weight Method: Actual Weight
= Weight in KG = 78.47 kg
= 78.47 kg

BSA Method: Boyd
BSA Formula: $= 0.0003207 * (\text{Height(cm)}^{0.3}) * \text{Weight(g)} (0.7285-0.0188 \log \text{Weight(g)})$
 $= 0.0003207 * 182.25^{0.3} * 78470(0.7285-0.0188 \log 78470) = 1.99 - 13\% \text{ (due to Amputations)} = 1.73 \text{ m}^2$

BSA: 1.73 m²

OK

BSA

1.73

1.74 m²

1.75 m²

Figure 70: Review Patient Vital Signs

To close the calculation window and return to the COMS display, users select the OK button within the pop-up window.

6.5.2. Record Patient Vital Signs

Users may select the Add Vitals button within the Patient Vitals panel to enter patient vital signs without accessing the TD Module. When the Add Vitals button is selected, COMS displays the vital signs entry grid similar to that within the TD Module. When entering vital signs entries, if Intelligent Data Element (IDE) parameters are loaded in Site Configuration ([section 7.4.2](#)), the displayed entry will also have a red underline with IDE message indicating the value exceeds the parameters. Users may proceed with the save action for vital signs exceeding specified parameters by selecting “Yes” in the dialogue message. If IDE parameters are not loaded in Site Configuration, COMS will neither detect errant entries nor provide an error message. When users save the vital signs entries, the COMS application writes the entries to VistA and adds the record to the Patient Vitals panel historical display and the TD Module’s Vital Signs – Historical table in reverse chronological order. **Figure 71** depicts the ability to record vital signs from the Patient Vitals panel.

Chemotherapy Order Management System (COMS)

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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration
-------------------------	------------------------	------------------------------------	-------------------------------	------------------------------------	-------------------------	--------------------------	------------------------------------

Patient Selection

Patient Information for - PATIENT FIVEHUNDRED

Patient Information

Medication Reminders

Adverse Events History - (5 Adverse Events Recorded - 1 flagged to trigger an Alert)

Treatment Regimens & Summaries (5 Records)

Patient Vitals (29 Records)

Temp.: °F (°C) Taken: **Pulse:** **BP: /** **Patient Gender:**

Height: inches (cm) **Resp:** **SP O₂%:** **Age:**

Weight: lbs (kg) **Pain:** **BSA: [Calculations](#)**

Save Cancel

Date	Temp °F/°C	Temp Taken	Pulse	BP	Resp	Pain	SP O ₂	PS	Height in Inches/cm	Weight in lbs/kg	BSA			
02/04/2015	98.6/37	Temporal	66	120/80	14	1	99	N/C	71.75/182.25	173/78.47	Actual Weight	78.47	Boyd	1.73 m²
02/03/2015	98.6/37	Tympanic	68	122/78	14	1	99	N/C	71.75/182.25	174/78.93	Actual Weight	78.93	Boyd	1.74 m²
01/30/2015	98.6/37	Rectal	70	128/80	16	1	99	N/C	71.75/182.25	176/79.83	Actual Weight	79.83	Boyd	1.75 m²

Figure 71: Record Vital Signs from Patient Vitals Panel

Upon entry of the patient's height/weight, COMS automatically calculates the BSA in accordance with the weight and BSA calculation methodologies selected by the prescribing provider with application of the template. In addition to selecting the "Calculations" link to view the BSA calculations performed for the displayed BSA value, users may view the patient's displayed gender and age in this section of the Patient Vitals panel.

6.6. Laboratory Information Panel

COMS enables review of relevant laboratory information from various points within the application. Users may access laboratory results through the Treatment Documentation and Flow Sheet Modules or directly from the patient section, as provided here.

6.6.1. Review Laboratory Results

Similar to the laboratory information sections within the clinical modules of Flow Sheet and Treatment Documentation, the Laboratory Information panel presents laboratory information imported from VistA. Users select the panel to view the display of all relevant laboratory results for the selected patient, as shown in **Figure 72**.

Chemotherapy Order Management System (COMS)

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Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Patient Selection

Patient Information for - PATIENT FIVEHUNDRED

Patient Information
Medication Reminders
Adverse Events History - (5 Adverse Events Recorded - 1 flagged to trigger an Alert)
Treatment Regimens & Summaries (5 Records)
Patient Vitals (29 Records)
Laboratory Information (No Records Available)

Date	Collection Date	Lab Tech	Info	Name	Result	Acceptable Range	OUT of Range	comment
------	-----------------	----------	------	------	--------	------------------	--------------	---------

Figure 72: Laboratory Information Panel

COMS presents this miscellaneous functionality for laboratory information in the patient-specific panel areas for the ease of view by the oncology team.

6.6.2. Configure Display of Laboratory Results

Users may control the overall configuration of laboratory report results through the Reports Tab, as presented in [section 6.11.3](#).

6.7. Orders Tab

The COMS application utilizes the Orders Tab to display all medication orders for ‘today’ and the following two calendar days (i.e., three days total). Throughout the continuum of treatment, these orders will have an order status of ordered, cleared, hold, cancel, finalized, in-coordination, dispensed, or administered for each medication prescribed by the oncology provider for the specified patient.

6.7.1. View Active Orders

Authorized users may view all active orders within the COMS instance through the Orders Tab. COMS groups the Orders Tab by collapsible/expandable patient fields then administration dates within the respective patient grouping. The Orders Tab displays a default view with various columns for Admin Date, Type (pre-therapy, therapy, or post-therapy), Drug, Dosage, Units, Route, Fluid/Volume (in ml), Flow Rate (in ml/hr), Fluid Type, Instructions, and Order Status. Users may remove any of these columns and/or add others by using the pull-down menu for any column, selecting “columns”, and unchecking/checking any available column option.

User actions within COMS and VistA update the order status within the Orders Tab. For example, medications ordered, cleared, held, cancelled, and finalized in COMS will have the appropriate order status. Once the pharmacy dispenses the medication in VistA and the nurse role subsequently documents administration within the TD Module, the order status will be updated to dispensed and administered, respectively. **Figure 73** depicts the Orders Tab with active orders for viewing.

Chemotherapy Order Management System (COMS)

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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration			
Admin Date	Type	Drug	Dosage	Units	Route	Fluid/Volume ml	Flow Rate ml/hr	Fluid Type	Instructions	Order Status
☐ Name: FIVEHUNDRED PATIENT										
☐ Name: FOURHUNDRED PATIENT										
02/23/2015	Pre Therapy	RANITIDINE TAB	150	mg	Oral	0			Patient to ingest prior to chemotherapy	Ordered
02/23/2015	Pre Therapy	DEXAMETHASONE INJ,SOLN	20	mg	IVPB	50	100	D5W	Administer in dextrose to stabilize blood su...	Ordered
02/23/2015	Pre Therapy	DILTIAZEM INJ	400	Micro...	IVP	0			Provide IV push to control tachycardia	Ordered
02/23/2015	Post Therapy	ONDANSETRON INJ,SOLN	1	mg/kg	IVPB	250	125	Nor...	Administer slowing following chemotherapy	Ordered
02/23/2015	Post Therapy	MYLANTA II ALUMINUM HYDROXIDE...	400	ml	Oral	0			Patient to ingest, as needed, for nausea	Ordered
02/23/2015	Post Therapy	DIGOXIN INJ,SOLN	25	Micro...	IVP	0			Provide IV push, as needed, to control tachy...	Ordered
02/23/2015	Post Therapy	IBUPROFEN TAB	800	mg	Oral	0			Patient to ingest to reduce IV site swelling	Cancel
02/23/2015	Therapy	CARBOPLATIN INJ	250	AUC	IVPB	50	100	Rin...	Administer before Cisplatin administration	Ordered
02/23/2015	Therapy	CISPLATIN INJ,SOLN	300	mg	IV	500	167	Rin...	Administer slowly following Carboplatin inf...	Ordered
02/23/2015	Therapy	DIPHENHYDRAMINE CAP,ORAL	75	mg	Oral				Patient to ingest during Cisplatin administ...	Hold
02/24/2015	Pre Therapy	RANITIDINE TAB	150	mg	Oral	0			Patient to ingest prior to chemotherapy	Ordered
02/24/2015	Pre Therapy	DEXAMETHASONE INJ,SOLN	20	mg	IVPB	50	100	D5W	Administer in dextrose to stabilize blood su...	Ordered
02/24/2015	Pre Therapy	DILTIAZEM INJ	400	Micro...	IVP	0			Provide IV push to control tachycardia	Ordered

Figure 73: Orders Tab with Active Orders

6.7.2. Clear Medication Orders

Following orders generation, the clearing of a patient to receive chemotherapy and subsequent clearing of the order is required for advancing the order. As local facility policies and procedures permit, any member of the healthcare team may clear an order through the Orders Tab. Authorized users may select the medication(s) for a specific patient and set the order status from Ordered to Cleared via the pull-down menu, as shown in **Figure 74**, then selecting the Update button in the bottom left side of the Orders Tab.

Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration			
Admin Date	Type	Drug	Dosage	Units	Route	Fluid/Volume ml	Flow Rate ml/hr	Fluid Type	Instructions	Order Status
☐ Name: FIVEHUNDRED PATIENT										
☐ Name: FOURHUNDRED PATIENT										
02/23/2015	Pre Therapy	RANITIDINE TAB	150	mg	Oral	0			Patient to ingest prior to chemotherapy	Cleared
02/23/2015	Pre Therapy	DEXAMETHASONE INJ,SOLN	20	mg	IVPB	50	100	D5W	Administer in dextrose to stabilize blood su...	Cleared
02/23/2015	Pre Therapy	DILTIAZEM INJ	400	Micro...	IVP	0			Provide IV push to control tachycardia	Cleared
02/23/2015	Post Therapy	ONDANSETRON INJ,SOLN	82.55	mg	IVPB	250	125	Nor...	Administer slowing following chemotherapy	Cleared
02/23/2015	Post Therapy	MYLANTA II ALUMINUM HYDROXID...	400	ml	Oral	0			Patient to ingest, as needed, for nausea	Cleared
02/23/2015	Post Therapy	DIGOXIN INJ,SOLN	25	Micro...	IVP	0			Provide IV push, as needed, to control tach...	Cleared
02/23/2015	Post Therapy	IBUPROFEN TAB	800	mg	Oral	0			Patient to ingest to reduce IV site swelling	Cancel
02/23/2015	Therapy	CARBOPLATIN INJ	23	mg	IVPB	50	100	Rin...	Administer before Cisplatin administration	Cleared
02/23/2015	Therapy	CISPLATIN INJ,SOLN	300	mg	IV	500	167	Rin...	Administer slowly following Carboplatin inf...	Cleared
02/23/2015	Therapy	DIPHENHYDRAMINE CAP,ORAL	75	mg	Oral				Patient to ingest during Cisplatin administr...	Cleared
02/24/2015	Pre Therapy	RANITIDINE TAB	150	mg	Oral	0			Patient to ingest prior to chemotherapy	Cleared
02/24/2015	Pre Therapy	DEXAMETHASONE INJ,SOLN	20	mg	IVPB	50	100	D5W	Administer in dextrose to stabilize blood su...	Cleared
02/24/2015	Pre Therapy	DILTIAZEM INJ	400	Micro...	IVP	0			Provide IV push to control tachycardia	Cleared
02/24/2015	Post Therapy	ONDANSETRON INJ,SOLN	1	mg/kg	IVPB	250	125	Nor...	Administer slowing following chemotherapy	Cleared
02/24/2015	Post Therapy	MYLANTA II ALUMINUM HYDROXID...	400	ml	Oral	0			Patient to ingest, as needed, for nausea	Ordered

Figure 74: Orders Tab – Clearing Medication Orders

During the clearing process, COMS provides final medication dosage calculations with the most current BSA information and displays the calculated dose in the Dosage column of the Orders Tab. In this manner, Orders Tab functionality facilitates the action of clearing a patient/order for pharmacy consideration to finalize and dispense.

6.7.3. Finalize and Dispense Medication Orders

After a member of the healthcare team clears an order, a pharmacist may review the order for further processing. Similar to the process to clear an order, pharmacist users may finalize an order by selecting the medication(s) for the specific patient from the Orders Tab and consider the facility's rounding rules, as defined in Site Configuration ([section 7.5.4](#) and [section 7.5.5](#)). Pharmacist users review the calculated dosage, consider dose rounding, advance the order status from Cleared to Finalized via the pull-down menu, and select the Update button in the bottom left side of the Orders Tab.

Once the pharmacist advances the order to Finalized, COMS automatically transmits it to Vista for pharmacy action and dispensing. When the pharmacy dispenses the medication in Vista, the order returns to COMS with a Dispensed order status and is available for documentation of administration through the Treatment Documentation Module. **Figure 75** presents the Orders Tab with various stages of order status.

Chemotherapy Order Management System (COMS)											
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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration				
min Date	Type	Drug	Dosage	Units	Route	Fluid/ Volume ml	Flow Rate ml/hr	Fluid Type	Instructions	Order Status	
Name: FIVEHUNDRED PATIENT											
Name: FOURHUNDRED PATIENT											
23/2015	Pre Therapy	RANITIDINE TAB	150	mg	Oral	0			Patient to ingest prior to chemotherapy	Dispensed	
23/2015	Pre Therapy	DEXAMETHASONE INJ,SOLN	20	mg	IVPB	50	100	D5W	Administer in dextrose to stabilize blood su...	Dispensed	
23/2015	Pre Therapy	DILTIAZEM INJ	400	Micro...	IVP	0			Provide IV push to control tachycardia	Dispensed	
23/2015	Post Therapy	ONDANSETRON INJ,SOLN	82.55	mg	IVPB	250	125	Nor...	Administer slowing following chemotherapy	Finalized	▼
23/2015	Post Therapy	MYLANTA II ALUMINUM HYDROXIDE...	400	ml	Oral	0			Patient to ingest, as needed, for nausea	Ordered	
23/2015	Post Therapy	DIGOXIN INJ,SOLN	25	Micro...	IVP	0			Provide IV push, as needed, to control tachy...	Cleared	
23/2015	Post Therapy	IBUPROFEN TAB	800	mg	Oral	0			Patient to ingest to reduce IV site swelling	Finalized	
23/2015	Therapy	CARBOPLATIN INJ	23	mg	IVPB	50	100	Rin...	Administer before Cisplatin administration	Dispensed	
23/2015	Therapy	CISPLATIN INJ,SOLN	300	mg	IV	500	167	Rin...	Administer slowly following Carboplatin inf...	Cancelled	
23/2015	Therapy	DIPHENHYDRAMINE CAP,ORAL	75	mg	Oral				Patient to ingest during Cisplatin administr...	Hold	
24/2015	Pre Therapy	RANITIDINE TAB	150	mg	Oral	0			Patient to ingest prior to chemotherapy	Ordered	

Figure 75: Orders Tab – Finalizing and Dispensing Medication Orders

Dispensed medication orders pre-populate the Administration panel within the Treatment Documentation Module and, once administered, display with the order status of Administered within the OEM Module and on the Orders Tab. Administered medications are listed in the Flow Sheet Module and external Flow Sheet.

6.8. Template Authoring Tab

The COMS application provides the Template Authoring Tab for authorized users. Typically providers, these users may create an original Chemotherapy Order Template or modify and existing one.

6.8.1. Create New Template

This manual presents functionality to create a new template in the Chemotherapy Template Order Source Module [section 5.1.1](#).

6.8.2. Modify Existing Standard Template

This manual presents functionality to modify an existing standard template in the Chemotherapy Template Order Source Module [section 5.1.2](#).

6.9. Template List Tab

The Template List Tab enables authorized users to view/print all templates available within the COMS application. Grouped by type of cancer, the Template List Tab displays both the COMS-generated and user-friendly name established during template authoring, number of patients currently undergoing treatment with the template regimen, and view/print options. **Figure 76** presents the Template List Tab.

Chemotherapy Order Management System (COMS)				
Welcome Programmer, All Roles -- Help Switch to High Contrast Mode				
Patient	Orders	Template Authoring	Template List	Template Promotion
Fields with an * are required fields				
Select a Template Source *:	<input checked="" type="radio"/> My Templates	<input type="radio"/> Local Templates	<input type="radio"/> National Templates	
Generated Template Name	User-Friendly Name	# of Patients		
Disease Type: Acute Lymphoblastic Leukemia, Adult				
CARBOPLATIN INJ 250CISPLATIN INJ,SOLN 300DIPHENHYDRAMINE CAP,ORAL...	COMS Testing	0	View/Print	
CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75	COMS Testing Ver 2	1	View/Print	
CARBOPLATIN INJ 250CISPLATIN INJ,SOLN 300DIPHENHYDRAMINE CAP,ORAL...	COMS Testing, 3 days	0	View/Print	
CARBOPLATIN INJ 250CISPLATIN INJ,SOLN 300DIPHENHYDRAMINE CAP,ORAL...	COMS Testing, 3 days 2w	0	View/Print	
Disease Type: Anal Cancer				
B-12 CYANOCOBALAMIN INJ,SOLN200	Test Template - 3 days, 3 drugs	2	View/Print	
Disease Type: Bladder Cancer				
CISPLATIN INJ,SOLN 250	Prototype COMS Bladder Cancer	0	View/Print	
Disease Type: Colorectal Cancer				
ETOPOSIDE INJ,SOLN 1	Etoposide Only Ver 2	1	View/Print	
Disease Type: Lung Cancer, Non-Small Cell				
PACLITAXEL INJ,CONC 67	NSCLC - Daily Paclitaxel Ver 2	0	View/Print	
PACLITAXEL INJ,CONC 40	Paclitaxel Daily Ver 2	0	View/Print	
Disease Type: Lung Cancer, Small Cell				
ETOPOSIDE INJ,SOLN 1.5	Etoposide Only	0	View/Print	

Figure 76: Template List Tab Display

For extended lists of templates within any COMS instance, users may filter the display by selecting the Template Source radio button and selecting a cancer type from the pull-down menu.

6.9.1. Review Patients Undergoing Treatment on an Existing Template

Authorized users may review the number of patient undergoing treatment on an existing standard template through the Template List Tab. Functionality displays the total number of patients currently undergoing treatment for each listed template. COMS presents this number as a link to enable users to select it to review a pop-up window with each patient name and identifier, regimen start date, and projected end date. **Figure 77** depicts the Template List Tab with pop-up window for Patients Currently Undergoing Treatment on a specific template.

Chemotherapy Order Management System (COMS)

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Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Fields with an * are required fields

Select a Template Source *: My Templates Local Templates National Templates

Generated Template Name	User-Friendly Name	# of Patients													
Disease Type: Acute Lymphoblastic Leukemia, Adult															
CARBOPLATIN INJ 250CISPLATIN INJ,SOLN 300DIPHENHYDRAMINE CAP,ORAL...	COMS Testing	0	View/Print												
CARBOPLATIN INJ 10CISPLATIN INJ,SOLN 50DIPHENHYDRAMINE CAP,ORAL 75	COMS Testing Ver 2	1	View/Print												
CARBOPLATIN INJ 250CISPLATIN INJ,SOLN 300DIPHENHYDRAMINE CAP,ORAL...	COMS Testing, 3 days	0	View/Print												
CARBOPLATIN INJ 250CISPLATIN INJ,SOLN 300DIPHENHYDRAMINE CAP,ORAL...	COMS Testing, 3 days 2w	0	View/Print												
Disease Type: Anal Cancer															
B-12 CYANOCOBALAMIN INJ,SOLN200	Test Template - 3 days, 3 drugs	View/Print	<input type="button" value=""/>												
Patients Currently Undergoing Treatment - Test Template - 3 days, 3 drugs <table border="1"> <thead> <tr> <th>Name</th> <th>Regimen Start Date</th> <th>Projected End Date</th> <th>SSID</th> </tr> </thead> <tbody> <tr> <td>PATIENT FIVEHUNDREDONE</td> <td>01/26/2015</td> <td>01/29/2015</td> <td>f0501</td> </tr> <tr> <td>PATIENT FIVEHUNDREDSIX</td> <td>02/20/2015</td> <td>02/23/2015</td> <td>f0506</td> </tr> </tbody> </table>				Name	Regimen Start Date	Projected End Date	SSID	PATIENT FIVEHUNDREDONE	01/26/2015	01/29/2015	f0501	PATIENT FIVEHUNDREDSIX	02/20/2015	02/23/2015	f0506
Name	Regimen Start Date	Projected End Date	SSID												
PATIENT FIVEHUNDREDONE	01/26/2015	01/29/2015	f0501												
PATIENT FIVEHUNDREDSIX	02/20/2015	02/23/2015	f0506												

Figure 77: Review Patients Undergoing Treatment on Specific Template

6.9.2. View, Print, or Save Existing Template

Users may select a template to view, print, or save from the Template List Tab. When user select the “View/Print” link for any template within the Template List Tab, COMS opens a new browser tab and displays the template. Users may view the template in the new tab and utilize existing browser functionality to print or save the displayed template, as shown in **Figure 78**.

Cancer Chemotherapy IV Order Sheet

Max Number of Cycles: 4 Cycle Length: 2 Weeks
Chemotherapy Regimen Name: 2014-3-0001-ABCD-PACLITAXEL INJ,CONC 40-20141106
Description: Paclitaxel Daily Ver 2

Emetogenic level: Minimal Emetic Risk
Febrile Neutropenia risk: 3 %
Reference: Tister WJ et al. Phase II study of patients with metastatic non-small cell carcinoma of the lung treated with paclitaxel by 3-hour infusion. Cancer 1997; 79:724. [Link to PMID](#)

Pre Therapy

Instructions: Provide Pre-Therapy Medications on Chemotherapy Days

Sequence #	Drug	Dose	Route	Fluid/Volume	Fluid Type	Infusion Time	Administration Day
1	DEXAMETHASONE INJ,SOLN	20 mg	IVPB	50	Normal Saline	0 hrs / 15 min	I-5
2	RANITIDINE INJ INJ	50 mg	IVPB	50	Normal Saline	0 hrs / 15 min	I-5
3	DIPHENHYDRAMINE CAP ORAL	50 mg	Oral	N/A	N/A	N/A	I-5

Patient to ingest prior to chemotherapy

Therapy

Instructions: Use non PVC containers for final dilution and 0.22μm filter and tubing sets for administration

Sequence #	Drug	Dose	Route	Fluid/Volume	Fluid Type	Infusion Time	Administration Day
1	PACLITAXEL INJ,CONC	40 mg/m ²	IVPB	50	Normal Saline	0 hrs / 30 min	I-5

Administer over 30 minutes

Post Therapy

Instructions: Provide for patient following chemotherapy

Sequence #	Drug	Dose	Route	Fluid/Volume	Fluid Type	Infusion Time	Administration Day
1	COMPAZINE PROCHLORPERAZINE TAB	10 mg	Oral	N/A	N/A	N/A	I-5

Dispense 20 Tablets - Patient to take every 6 hours as needed for nausea/vomiting

Figure 78: View, Print, or Save Existing Template

6.10. Template Promotion Tab

Super users serving as local template managers at each facility have access to the Template Promotion Tab to advance templates from single provider use to local use and local use to national consideration following the local and national vetting processes, respectively.

6.10.1. View Templates for Promotion

The Template Promotion Tab lists templates similarly to the Template List Tab. Displayed information is grouped by type of cancer with the COMS-generated and user-friendly name, location/template source (i.e. My Templates, Local Templates, or National Templates), number of patients currently undergoing treatment with the template, and view/print options, as shown in **Figure 79**.

The screenshot shows the 'Template Promotion Management' section of the COMS interface. At the top, there's a navigation bar with tabs: Patient, Orders, Template Authoring, Template List, Template Promotion (which is selected and highlighted in blue), Reports, Messages, and Site Configuration. Below the navigation bar, a sub-header reads 'Template Promotion Management'. A table displays a list of templates, grouped by disease type. The columns are: Generated Template Name, User-Friendly Name, Location, # of Patients, and View/Print link. A dropdown menu on the right side of the table allows users to filter templates by source: National Templates, Local Templates, and My Templates. The table rows show various chemotherapy regimens for different diseases like Acute Lymphoblastic Leukemia, Adult; Anal Cancer; Bladder Cancer; Colorectal Cancer; Lung Cancer, Non-Small Cell; and Lung Cancer, Small Cell. Each row includes a 'View/Print' link. At the bottom of the table area are 'Refresh' and 'Update Records' buttons.

Figure 79: Template Promotion Tab

This manual presents functionality and user processes to view, save, or print individual templates in [section 6.9.2](#).

6.10.2. Designate Templates for Promotion

The Template Promotion Tab enables local template managers to designate locally created templates for review and consideration for inclusion in the central library. In this capacity, users may access this functionality in conjunction with Import/Export Templates ([section 7.2.5](#)). Functionality to designate templates for promotion is reserved for further development.

6.11. Reports Tab

The Reports Tab presents three subordinate panels for authorized users to generate, view, and/or configure reporting functionalities within the application. **Figure 80** shows the Reports Tab and the Inventory, Patterns of Care Determination, and Lab Reports panels.

Chemotherapy Order Management System (COMS)

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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration
Inventory Patterns of Care Determination Lab Reports							
Select an Inventory Date *: <input style="border: 1px solid #ccc; padding: 2px; width: 150px; height: 20px;" type="button" value="Select Date/Time of report"/>							
<input style="border: 1px solid #ccc; padding: 2px; width: 150px; height: 20px;" type="button" value="Generate New Report"/>							
Inventory Consumption							
Drug							Total Units

Figure 80: Reports Tab

6.11.1. Create and View Inventory Reports

As the default panel for the Reports Tab, the Inventory panel enables users to specify date ranges for retrospective and prospective inventory reports for regimen medications. This functionality facilitates authorized users to generate inventory reports and/or view previously created reports to aid in replenishment or advance stocking decisions for chemotherapy agents and related items from a retrospective or prospective view, respectively. **Figure 81** presents the Inventory panel within the Reports Tab and shows various inventory dates for selection with the most recent report displayed with inventory consumption by medication/drug and total units within the specified date/time period.

Chemotherapy Order Management System (COMS)

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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration
Inventory Patterns of Care Determination Lab Reports							
Select an Inventory Date *: <input style="border: 1px solid #ccc; padding: 2px; width: 150px; height: 20px;" type="button" value="02/06/2015 12:28PM"/>							
<div style="border: 1px solid #ccc; padding: 2px; width: 150px; height: 20px; display: inline-block;"> 02/06/2015 12:28PM 12/08/2014 3:13PM </div>							
<input style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; width: 150px; height: 30px;" type="button" value="Generate New Report"/>							
Inventory Report from 12/08/2014 3:13PM - 02/06/2015 12:28PM							
Inventory Consumption							
Drug							Total Units
CARBOPLATIN INJ							10 AUC
CISPLATIN INJ,SOLN							150 mg
COMPAZINE PROCHLORPERAZINE TAB							10 mg
DEXAMETHASONE INJ,SOLN							80 mg
DIPHENHYDRAMINE CAP,ORAL							125 mg
IBUPROFEN TAB							800 mg
MYLANTA II ALUMINUM HYDROXIDE/MAG HYDROXIDE/SIMETH SUSP,ORAL							760 ml
ONDANSETRON INJ,SOLN							1 mg/kg
PACITAXEL INJ,CONC							67 mg/m ²
RANITIDINE INJ INJ							50 mg
RANITIDINE TAB							750 mg

Figure 81: Inventory Reports

If users generate a new report and the list of items/units has not changed since the previous report, COMS displays the message “No drugs have been dispensed since the last inventory report” and another report is not generated.

6.11.2. Generate and View Patterns of Care Determination Reports

As the second panel within the Reports Tab, the Patterns of Care Determination panel provides the capability for authorized users to select reports tabulating various aspects of oncology care within the COMS application. **Figure 82** presents an example of a report cross-tabulated by gender and cancer type with columns for Disease Type/Stage listed on separate rows for different stages, Gender for patients with the specified cancer/stage, and the Count for patients of that gender with the specified cancer/stage.

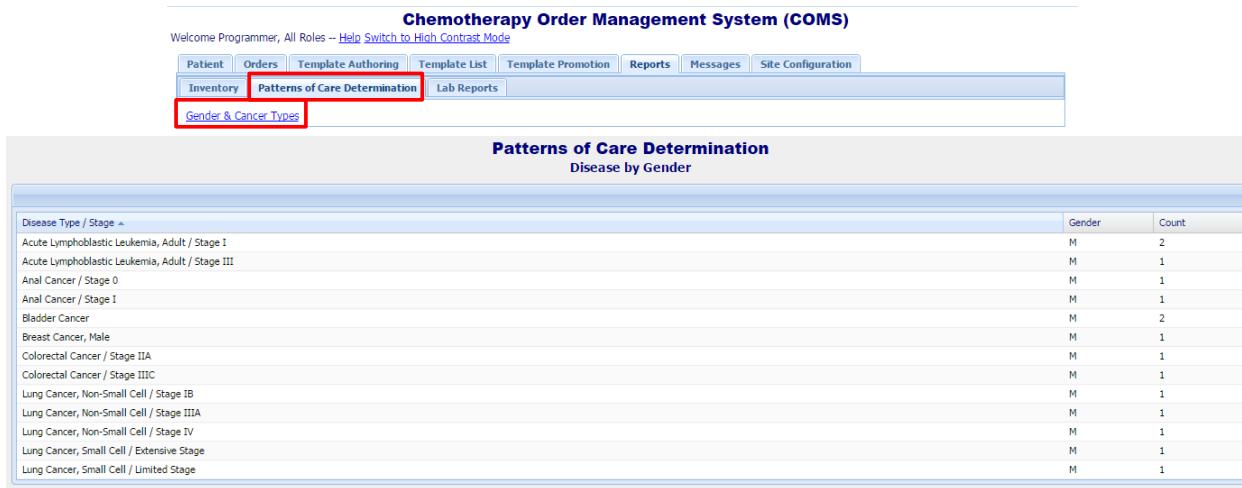


Figure 82: Patterns of Care Determination Reports

The Patterns of Care Determination panel fosters overview of the provision of oncology services by provider, patient attributes, type of cancer, chemotherapy agent, and other considerations as specified in the various reports.

6.11.3. Configure Lab Reports Functionality

Functionality for Lab Reports enables users to configure laboratory report lists at the local facility that are relevant to the provision of oncology services. Specifically, authorized users will be able to identify the universe of laboratory reports within the local VistA instance and enable availability of the reports for selection as relevant to specific treatment regimens during the template authority process. Functionality for the Lab Reports panel is reserved for further development.

6.12. Messages Tab

The Messages Tab within COMS serves as the communication hub for application messaging associated with medication changes that require provider notification or re-signature. Complementing automation of COMS, the application's communication throughout the treatment regimen enhances patient safety and bolsters Joint Commission compliance with documentation ultimately stored in VA's electronic health record.

Consistent with local facility policies for workflow notifications, the actions by a non-provider to cancel, edit, or hold medication orders may generate various messages within the COMS application. Other actions may also trigger messaging activity. This functionality enables users

to read and respond to messages as a component of overall coordination of the treatment regimen among the healthcare team.

6.12.1. Read COMS Messages

The COMS application facilitates communication among the oncology healthcare team throughout the treatment regimen. Messages for team members are categorized as either informational or for action with the message prefix of INFO or ACTION, respectively. When users open the Messages Tab, relevant messages are listed and may be opened for reading by selecting the Open link similar to any web-based mail application, as shown in **Figure 83**.

Chemotherapy Order Management System (COMS)
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Patient Orders Template Authoring Template List Template Promotion Reports **Messages** Site Configuration

My Messages

Date Sent	Time	To	From	CC	Subject	Action
September 23, 2012	1900	pharmacist10@db...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist9@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist8@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist7@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist6@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist5@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist4@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist3@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist2@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist1@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
September 23, 2012	1900	pharmacist1@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FIVEHUNDREDSIX...	Open
August 17, 2012	0944	pharmacist10@db...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FOURHUNDREDO...	Open
August 17, 2012	0944	pharmacist9@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FOURHUNDREDO...	Open
August 17, 2012	0944	pharmacist8@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FOURHUNDREDO...	Open
August 17, 2012	0944	pharmacist7@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FOURHUNDREDO...	Open
August 17, 2012	0944	pharmacist6@dbit...	programmer1@db...	programmer1@db...	INFO: Order Notification to Pharmacist for patient PATIENT FOURHUNDREDO...	Open

Refresh

Figure 83: Messages Tab

6.12.2. Respond to COMS Messages

Within the Messages Tab, the vast majority of messages are INFO; most ACTION messages are for providers and involve a change in the treatment plan that requires coordination. Users who receive an ACTION message, may execute their action within the COMS message by selecting the appropriate action and/or approval.

[\(Return to TOC\)](#)

7. Miscellaneous Functionality – Administrative (Site Configuration Tab)

As the underpinning that supports the five clinical modules and overall capabilities, COMS miscellaneous functionality is categorized as non-administrative (i.e., clinical facing) and administrative (i.e., in the background). This manual presented the former in the previous section and will now present the latter as accessed through the Site Configuration Tab. As a non-module section, Site Configuration serves as a robust core for administrative functionality to support Documentation Lists and Contents, Template Management, User Access, Clinical

Decision Support, and Local Facility Preferences. As shown in **Figure 84**, COMS groups Site Configuration by these primary panels; each contain a series of secondary panels.



Figure 84: Site Configuration Tab

These are logically aligned from a user standpoint (i.e., how the user would engage this functionality within the application). Although only COMS administrators may access configuration of these functionalities, they are essential to the performance of the application as viewed by clinical users in the provider, nurse, and pharmacist roles.

COMS miscellaneous functionality provides support and facilitates actions throughout the COMS application. Subsequently, miscellaneous functionality actions and preconditions build upon and support those expressed in the CTOS, OEM, TD, FS, and EoTS Modules. Further, the following specific preconditions – in addition to VistA interoperability – are required to support miscellaneous functionality for the COMS application:

- Local facility contact information and other specific information must be known to View, Add, Edit, or Delete Clinic Information
- Chemotherapy template information must reside within the application to View, Add, Edit, or Delete COMS Database Lookups; Delete Templates; and Import and Export Templates
- Information from authoritative sources (e.g., American Society of Clinical Oncology (ASCO), National Comprehensive Cancer Network (NCCN)) support the ability to Manage Discharge Instructions; Manage Medication Documentation; Configure Common Toxicity Criteria Terminology for Assessments; Manage Disease Staging; Specify Emetic Medications; and Manage Febrile Neutropenia and Emesis Risks
- A user must select a relevant add/edit section within the application to View Locked Sections and Release Locked Sections
- Lifetime medications to be tracked and their recommended maximum lifetime dosages are essential to Manage Cumulative Dose Medications and clinically appropriate vital sign parameters are required to Configure Intelligent Data Elements
- Local facility processes, parameters, and preferences must be known to View and Manage Active Workflows; Lock Down Intravenous Fluid Types for Specific Medications; Manage Medication Hold Functionality; Specify Medications Not Rounded; Set Rounding Rules; and Manage Signature Verifications.

Figure 85 depicts the 20 role-based actions for (Administrative) Miscellaneous Functionality as provided within Site Configuration.

Miscellaneous Functionality (Administrative)	COMS Administrator
1. View, Add, Edit, or Delete Clinic Information	•
2. Manage Discharge Instructions	•
3. View, Add, Edit, or Delete COMS Database Lookups	•
4. Manage Medication Documentation	•
5. Configure Common Toxicity Criteria Terminology for Assessments	•
6. Delete Templates	•
7. Manage Disease Staging	•
8. Specify Emetic Medications	•
9. Manage Febrile Neutropenia and Emesis Risks	•
10. Import and Export Templates	•
11. View and Release Locked Sections	•
12. Designate User Roles	•
13. Manage Cumulative Dose Medications	•
14. Configure Intelligent Data Elements	•
15. View and Manage Active Workflows	•
16. Lock Down Intravenous Fluid Types for Specific Medications	•
17. Manage Medication Hold Functionality	•
18. Specify Medications Not Rounded	•
19. Set Rounding Rules	•
20. Manage Signature Verifications	•

Figure 85: Miscellaneous Functionality (Administrative) Role-Based Actions

7.1. Documentations Lists and Contents Panel

The Documentation Lists and Contents panel within Site Configuration contains five subordinate panels for authorized users to configure and manage various lists presented throughout the application. **Figure 86** shows the Documentation Lists and Contents panel of the Site Configuration Tab and its five subordinate panels of Clinic Information, Discharge Instructions, Lookups, Medication Documentation, and Toxicity.



Figure 86: Site Configuration – Documentation Lists and Contents Panel

7.1.1. View, Add, Edit, or Delete Clinic Information

Within the Documentation Lists and Contents panel of Site Configuration, Clinic Information enables management of detailed information regarding local facility contacts presented as options within the Treatment Documentation Module's Discharge Instructions panel. COMS Administrators may create/edit labels for clinic information as free text and provide details in the rich text edit field. This administrative panel provides functionality to manage (e.g., add, edit, or delete) the clinic information available as options within the Discharge Instructions panel of the TD Module and ultimately printed out for the patient. **Figure 87** shows Clinic Information as the default subordinate panel for the Documentations Lists and Contents panel.

Clinic Information	
Label	Details
Dr Kelley	Durham VA Medical Center Provider: Dr. Michael Kelley Address: 508 Fulton Street, Durham NC 27705 Phone: 919.286.0411 ext. 2199
Dr. Daniel Wu	VA Puget Sound Health Care System Provider: Dr. Daniel Wu Address: 1660 South Columbian Way, Seattle WA 98108 Phone: 206.764.2278

Figure 87: Site Configuration – Clinic Information

The COMS application stores and displays entries alphabetically by the Clinic Information label. Users may edit the record by selecting it from the table, making changes, and selecting Save. Documentation of clinic-specific information is not available within the TD Module unless specified through this functionality.

7.1.2. Manage Discharge Instructions

As the second subordinate panel for the Documentation Lists and Contents panel, Discharge Instructions facilitates management of detailed information for symptom-based patient instructions presented as options within the Discharge Instructions panel within the Treatment Documentation Module.

Similar to Clinic Information, COMS Administrators may create/edit discharge instruction labels as free text and provide details in the rich text edit field. This administrative panel provides functionality to manage the general counseling information, such as fatigue, available for selection in the Discharge Instructions panel of the TD Module and ultimately printed out for the patient. Documentation of symptom-based discharge instructions toxicities is not available within the TD Module unless specified through this functionality. **Figure 88** shows the Discharge Instructions subordinate panel for the Documentations Lists and Contents panel.

The screenshot shows the 'Chemotherapy Order Management System (COMS)' interface. At the top, there is a navigation bar with tabs: Patient, Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, and Site Configuration. The 'Site Configuration' tab is highlighted with a red box. Below the navigation bar, there is a secondary navigation bar with tabs: Documentation Lists and Contents, Template Management, User Access, Clinical Decision Support, Facility Preferences, Clinic Information, and Discharge Instructions. The 'Discharge Instructions' tab is also highlighted with a red box. The main content area has a heading 'Discharge Instruction: Diarrhea'. Below this, there is a rich text editor toolbar with font size, bold, italic, underline, superscript, and other styling options. A text area contains the following information:

Diarrhea
Diarrhea means that you have loose, watery stools more than three times in one day. You may also have cramps, bloating, nausea and an urgent need to have a bowel movement.
Causes of diarrhea include bacteria, viruses or parasites, certain medicines, food intolerances and diseases that affect the stomach, small intestine or colon. In many cases, no cause can be found.
Although usually not harmful, diarrhea can become dangerous or signal a more serious problem. You should talk to your doctor if you have a strong pain in your abdomen or rectum, a fever, blood in your stools, severe diarrhea for more than three days or symptoms of dehydration.
Should I treat diarrhea?
Most of the time, diarrhea doesn't require treatment. It usually lasts only a couple of days, whether you treat it or not. However, medicine can help you feel better, especially if you also have cramping.

Note: To edit a record, click the record in the table below, make changes in the Text field above, and click the "Save" button.

Save Cancel Refresh

At the bottom, there is a table titled 'Discharge Instructions' with two columns: 'Instruction' and 'Documentation'. The first row shows 'Constipation' in the 'Instruction' column and its detailed documentation in the 'Documentation' column.

Figure 88: Site Configuration – Discharge Instructions

The COMS application stores and displays entries alphabetically by the Discharge Instruction label. Users may edit the record by selecting it from the table, making changes, and selecting Save.

7.1.3. View, Add, Edit, or Delete COMS Database Lookups

As the third subordinate panel within the Documentation Lists and Contents panel, Lookups provides functionality to manage the numerous data grouped in related categories termed “lookup types”. To manage the lookup type, COMS administrators access the Lookups panel and use the pull-down menu to select the lookup type, as shown in **Figure 89**. Once the lookup type is selected from the pull-down menu, administrators may add, edit, or remove/delete the lookup type from the application database.

The screenshot shows the 'Chemotherapy Order Management System (COMS)' interface. The top navigation bar includes Patient, Orders, Template Authoring, Template List, Template Promotion, Reports, Messages, and Site Configuration. The Site Configuration tab is active. Below it, the 'Documentation Lists and Contents' tab is selected. Under 'Documentation Lists and Contents', the 'LookUps' tab is also selected and highlighted with a red box. On the left, a dropdown menu titled 'Select Lookup Type:' shows 'Delivery Mechanism' as the current selection. A note below the dropdown says 'Note: To edit or delete a lookup, click on its name in the list below.' Below the note is a table with two columns: 'Lookup Name' and 'Lookup Description'. The table contains three rows: Ambulatory Pumps, Infusion Devices, and Pumps.

Lookup Name	Lookup Description
Ambulatory Pumps	Ambulatory Pumps
Infusion Devices	Infusion Devices
Pumps	Pumps

Figure 89: Site Configuration – COMS Database Lookups

The lookups panel enables authorized users to add, edit, or delete various pull-down menu options throughout the application. Once removed, a lookup is unavailable for user selection unless an administrator adds it back to the database.

7.1.4. Manage Medication Documentation

As a subordinate panel within the Documentation Lists and Contents panel, Medication Documentation closely aligns with Clinic Information and Discharge Instructions. This panel's functionality enables management of detailed information for regimen medications. COMS automatically provides this information in patient discharge instructions consistent with medications within the template currently applied to the selected patient.

COMS Administrators may select medications from the inpatient medication list and provide details in the rich text edit field. This administrative panel provides functionality to manage (e.g., add, edit, or delete) the medication-specific information that automatically appears in the Discharge Instructions panel of the TD Module and ultimately printed out for the patient. Information for medication documentation is not available within the TD Module unless specified through this functionality. **Figure 90** depicts Medication Documentation within the Documentation Lists and Contents panel.

Chemotherapy Order Management System (COMS)

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Site Configuration

Documentation Lists and Contents **Medication Documentation** (highlighted with a red box)

Select InPatient Medication: PACLITAXEL INJ,CONC

Important Warning

Paclitaxel injection may cause a large decrease in the number of white blood cells (a type of blood cell that is needed to fight infection) in your blood. This increases the risk that you will develop a serious infection. You should not receive paclitaxel if you already have a low number of white blood cells. Your doctor will order laboratory tests before and during your treatment to check the number of white blood cells in your blood. Your doctor will delay or interrupt your treatment if the number of white blood cells is too low. Call your doctor immediately if you develop a temperature greater than 100.4 °F (38 °C); a sore throat; cough; chills; difficult, frequent, or painful urination; or other signs of infection during your treatment with paclitaxel injection.

Paclitaxel injection is manufactured with additional ingredients to allow the medication to reach parts of the body where it is needed. One form of paclitaxel injection (Abraxane) is manufactured with human albumin, and the other form of paclitaxel injection (Onxol, Taxol) is manufactured with a solvent called polyoxyethylated castor oil. There are important differences between the two forms of paclitaxel, so these products should not be substituted for each other.

If you are using the form of paclitaxel injection that is manufactured with polyoxyethylated castor oil, you may experience a serious or life-threatening allergic reaction. You will receive certain medications to help prevent an allergic reaction before you receive each dose of paclitaxel. Tell your doctor if you experience any of the following symptoms of an allergic reaction: rash; hives; itching; swelling of the eyes, face, throat, lips, tongue, hands, arms, feet, or ankles; difficulty breathing.

Note: To edit a record, click the record in the table below, make changes in the Text field above, and click the "Save" button.

Documented Medications

Medication	Documentation
DEXAMETHASONE INJ,SOLN	<p>Dexamethasone: (http://www.nlm.nih.gov/medlineplus/druginfo/meds/a682792.html)</p> <p>Why is this medication prescribed? Dexamethasone, a corticosteroid, is similar to a natural hormone produced by your adrenal glands. It often is used to replace this medication is sometimes prescribed for other uses; ask your doctor or pharmacist for more information.</p> <p>How should this medicine be used? Dexamethasone comes as a tablet and a solution to take by mouth. Your doctor will prescribe a dosing schedule that is best. Do not stop taking dexamethasone without talking to your doctor. Stopping the drug abruptly can cause loss of appetite, i</p> <p>What special precautions should I follow? Before taking dexamethasone, tell your doctor and pharmacist if you are allergic to dexamethasone, aspirin, tartrazine (a yell</p> <p>What special dietary instructions should I follow? Your doctor may instruct you to follow a low-sodium, low-salt, potassium-rich, or high-protein diet. Follow these directions carefully.</p>

Save Cancel Refresh

Figure 90: Site Configuration – Medication Documentation

The COMS application stores and displays entries alphabetically by the Discharge Instruction label. Users may edit the record by selecting it from the table, making changes, and selecting Save.

7.1.5. Configure Common Toxicity Criteria Terminology for Assessments

Toxicity is the fifth subordinate panel within the Documentation Lists and Contents panel. This panel enables management of pull-down menu options and associated information for toxicities. Authorized users create toxicity options with Common Toxicity Criteria (CTC) terminology for presentation within the Treatment Documentation Module and Flow Sheet Module.

COMS Administrators may create/modify/delete toxicities, grades, and associated details (via rich text edit field) for clinical documentation. This administrative panel provides functionality to manage (e.g., add, edit, or delete) the toxicity pull-down menu options, grades, and details verbiage presented in the Toxicity section of the FS Module worksheet to Add General Information and the Assessment Panel within the TD Module. Documentation of CTC terminology toxicities is not available within the application unless specified through this functionality. **Figure 91** depicts Toxicity within the Documentation Lists and Contents panel.

Chemotherapy Order Management System (COMS)

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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration
Documentation Lists and Contents Template Management User Access Clinical Decision Support Facility Preferences							
Clinic Information Discharge Instructions LookUps Medication Documentation Toxicity							
Toxicity * : Anorexia Grade * : Grade 1 - Mild							
<small>Tahoma</small> B I U A⁺ A⁻ ab> Loss of appetite without alteration in eating habits							
Note: To edit a record, click the record in the table below, make changes in the Text field above, and click the "Save" button							
<input type="button" value="Save"/> <input type="button" value="Cancel"/>	<input type="button" value="Delete"/> <input type="button" value="Refresh"/>						
Toxicity							
Toxicity	Grade	Detail					
Toxicity: Anorexia							
Anorexia	Grade 1 - Mild	Loss of appetite without alteration in eating habits					
Anorexia	Grade 2 -- Moderate	Oral intake altered without significant weight loss or malnutrition; oral nutritional supplements included					
Anorexia	Grade 3 - Significant	Associated with significant weight loss or malnutrition (e.g. inadequate oral caloric and/or fluid intake)					
Anorexia	Grade 4 - Life-Threatening	Life-threatening consequences; urgent intervention indicated					
Toxicity: Diarrhea							
Diarrhea	Grade 1 - Mild	Increase of < 4 stools per day over baseline; mild increase in ostomy output compared to baseline					
Diarrhea	Grade 2 - Moderate	Increase of 4 - 6 stools per day over baseline; moderate increase in ostomy output compared to baseline					
Diarrhea	Grade 3 - Significant	Increase of 7 or greater stools per day over baseline; incontinence; hospitalization indicated; severe diarrhea					
Diarrhea	Grade 4 - Life-Threatening	Life-threatening consequences; urgent intervention indicated					
Toxicity: Distress							
Distress	Grade 1 - Mild	Mild pain					
Distress	Grade 2 - Moderate	Moderate pain; limiting instrumental Activity of Daily Living					
Distress	Grade 3 - Severe	Severe pain; limiting self care Activity of Daily Living					
Toxicity: Dyspnea							
Dyspnea	Grade 1 - Mild	Shortness of breath with moderate exertion					

Figure 91: Site Configuration – Toxicity

The COMS application stores and displays entries alphabetically in expandable/collapsible groupings by Toxicity. Users may edit the record by selecting it from the table, making changes, and selecting Save. Similarly, selection from the table and deleting the record removes it from the display and database.

7.2. Template Management Panel

The Template Management panel within Site Configuration contains five subordinate panels for authorized users to configure various components within the template regimen and manage the templates within the COMS instance. **Figure 92** shows the Template Management panel of the Site Configuration Tab and its five subordinate panels of Delete Template, Disease Staging, Emetic Medications, Neutropenia/Emesis Risks, and Import/Export Template.

Chemotherapy Order Management System (COMS)

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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration
Documentation Lists and Contents Template Management User Access Clinical Decision Support Facility Preferences							
Delete Template Disease Staging Emetic Medications Neutropenia / Emesis Risks Import / Export Template							

Figure 92: Site Configuration – Template Management Panel

7.2.1. Delete Templates

Within the Template Management panel of Site Configuration, Delete Template enables authorized users to remove templates from the COMS application. Administrators use the Select a Type of Cancer pull-down menu to select the cancer type then use the subsequent pull-down menu to select the desired template for deletion. Alternatively, users may select the Show All Templates button to bypass the two pull-down menus. After the administrator selects the desired template and the Remove Template button, COMS presents a confirmation window to “You are about to delete <template name>. Would you like to delete it and remove all references?” Selection of Cancel or closing the dialogue box returns the user to the displayed template list. However, selection of OK removes the template from the application. **Figure 93** shows Delete Template as the default subordinate panel for the Template Management panel.

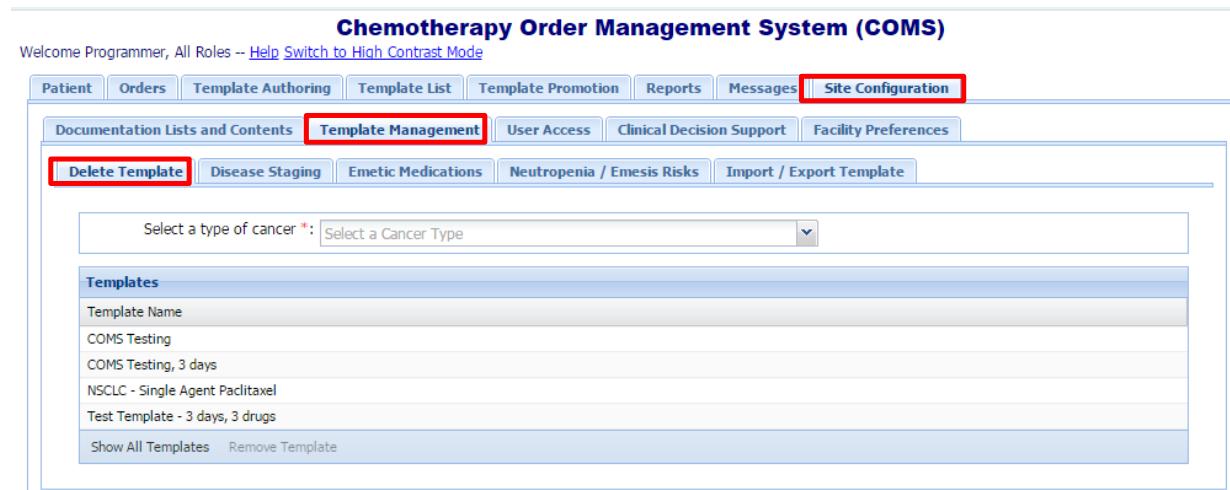


Figure 93: Site Configuration – Delete COMS Template

Once an authorized user deletes a template, it will not appear for selection as a treatment regimen or for modification to create another template.

7.2.2. Manage Disease Staging

As the second subordinate panel for the Template Management panel, Disease Staging permits authorized users to establish relationships between types of cancer and their various disease stages. This enables the application to present options for selection of disease staging in a clinical contextual manner during the template authoring process. Authorized users may use the Select a Type of Cancer pull-down menu to select a cancer type then enter free text to define the Stage (e.g., Stage I, Stage IIIA, Limited Stage). Once the user saves the entry, it appears in the Disease Stages table within this subordinate panel. This administrative section provides functionality to manage (e.g., add, edit, or delete) the disease staging designations for specific cancer types available for selection in the application. **Figure 94** shows Disease Staging within the Template Management panel.

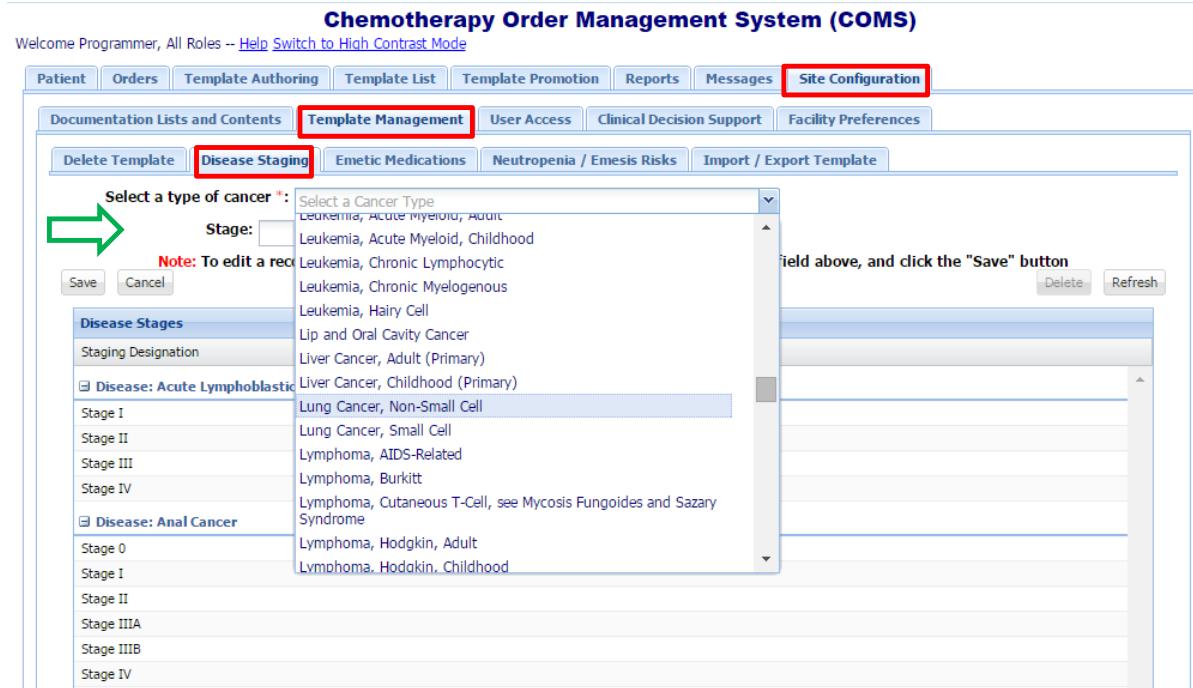


Figure 94: Site Configuration – Disease Staging

The COMS application stores and displays entries alphabetically in expandable/collapsible groupings by Disease/Type of Cancer. Users may edit the record by selecting it from the table, making changes, and selecting Save. Similarly, selection from the table and deleting the record removes it from the display and database. COMS administrator actions within the Disease Staging panel enable clinical users to specify disease staging in a contextual manner. Disease staging is not available in the Chemotherapy Template Order Source Module, Template Authoring Tab, or Patient Information panel unless specified through this functionality.

7.2.3. Specify Emetic Medications

A subordinate panel within the Template Management panel, Emetic Medications enables COMS administrators to specify the clinically based Emetogenic Levels of various chemotherapy medications. Once provided within this panel, miscellaneous functionality presents information for emetic medications during template authoring for the user to consider in determining the regimen's overall Emetogenic Level. This functionality works in tandem with that for Neutropenia/Emesis Risks to provide mitigation recommendations for providers applying treatment templates and health care teams administering the medications to control these risks associated with the regimen. Users select an emetic risk from the Emetogenic Level pull-down menu and use the radio buttons to identify whether the medication is contained within the Inpatient Pharmacy package (e.g., injectable medications) or Outpatient Pharmacy package (e.g., oral medications) within VistA. Users then select the medication from Select Drug pull-down menu and save the record.

Once the user saves the entry, it appears in the Emetic Meds table within this subordinate panel. This administrative section provides functionality to manage (e.g., add, edit, or delete) Emetogenic levels for emetic medications throughout the application. **Figure 95** presents Emetic Medications within the Template Management panel.

Chemotherapy Order Management System (COMS)

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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration												
Documentation Lists and Contents Template Management User Access Clinical Decision Support Facility Preferences																			
Delete Template		Disease Staging	Emetic Medications	Neutropenia / Emesis Risks	Import / Export Template														
Emetogenic Level * : <input type="button" value="Minimal Emetic Risk"/> Medication Type: <input checked="" type="radio"/> InPatient <input type="radio"/> OutPatient Select Drug * : <input type="button" value="CARBOPLATIN INJ"/> <div style="float: right; margin-top: -20px;">←</div>																			
Note: To edit a record, click the record in the table below, make changes in the Text field above, and click the "Save" button																			
<input type="button" value="Save"/> <input type="button" value="Cancel"/> <input type="button" value="Delete"/> <input type="button" value="Refresh"/>																			
Emetic Meds <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Emetic Level</th> <th>Medication</th> </tr> </thead> <tbody> <tr> <td colspan="2">□ Emetic Level: Minimal Emetic Risk</td> </tr> <tr> <td>Minimal Emetic Risk</td> <td>CARBOPLATIN INJ</td> </tr> <tr> <td>Minimal Emetic Risk</td> <td>PACLITAXEL INJ,CONC</td> </tr> <tr> <td colspan="2">□ Emetic Level: Moderate Emetic Risk</td> </tr> <tr> <td>Moderate Emetic Risk</td> <td>CISPLATIN INJ,SOLN</td> </tr> </tbody> </table>								Emetic Level	Medication	□ Emetic Level: Minimal Emetic Risk		Minimal Emetic Risk	CARBOPLATIN INJ	Minimal Emetic Risk	PACLITAXEL INJ,CONC	□ Emetic Level: Moderate Emetic Risk		Moderate Emetic Risk	CISPLATIN INJ,SOLN
Emetic Level	Medication																		
□ Emetic Level: Minimal Emetic Risk																			
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Minimal Emetic Risk	PACLITAXEL INJ,CONC																		
□ Emetic Level: Moderate Emetic Risk																			
Moderate Emetic Risk	CISPLATIN INJ,SOLN																		

Figure 95: Site Configuration – Emetic Medications

The COMS application stores and displays entries alphabetically in expandable/collapsible groupings by Emetic Level. Users may edit the record by selecting it from the table, making changes, and selecting Save. Similarly, selection from the table and deleting the record removes it from the display and database. COMS administrators must specify emetic medication(s) for this functionality to present within Chemotherapy Template Order Source Module and Template Authoring Tab.

7.2.4. Manage Febrile Neutropenia and Emesis Risks

As the fourth subordinate panel within the Template Management panel, Neutropenia/Emesis Risks functionality fosters control of the options for grade/level of Febrile Neutropenia risk and Emesis risks and their associated recommendations, based on American Society of Clinical Oncology (ASCO) and National Comprehensive Cancer Network (NCCN) guidelines. Entries in this panel enable information/recommendation functionality for the chemotherapy/biotherapy headers within the Flow Sheet and Treatment Documentation Modules as well as regimen-specific narrative for the Order Entry Management Module.

COMS administrators may create/edit reference labels in free text for the Febrile Neutropenia or Emesis risk and provide details in the rich text edit field. This administrative section provides functionality to manage (e.g., add, edit, or delete) the Febrile Neutropenia/Emetogenic Level information displayed in the OEM, TD, and FS modules.

The COMS application stores and displays entries alphabetically by the reference label within this subordinate panel. Users may edit the record by scrolling through the table, selecting it from those listed, making changes, and selecting Save. Similarly, selection from the table and deleting the record removes it from the display and database. **Figure 96** presents Neutropenia/Emesis Risks within the Template Management panel.

Chemotherapy Order Management System (COMS)

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Site Configuration

Template Management (highlighted with a red box)

Neutropenia / Emesis Risks (highlighted with a red box)

Reference Label: Low Emetic Risk

Details:

Tahoma **B** **I** **U** **A⁺** **A⁻** **AB⁺** **AB⁻** **U** **U** **U** **U**

ASCO Guidelines
Dexamethasone (8 mg) recommended; no routine preventive use of antiemetics for delayed emesis recommended.

NCCN Guidelines
Metoclopramide, with or without diphenhydramine; dexamethasone (12 mg); or prochlorperazine recommended, with or without lorazepam.

Note: To edit a record, click the record in the table below, make changes in the Text field above, and click the "Save" button

Risk Information

Label	Details
High Emetic Risk	ASCO Guidelines For patients receiving an anthracycline and cyclophosphamide, the three-drug combination of a 5-HT ₃ receptor antagonist, For patients receiving other chemotherapies of moderate emetic risk, the two-drug combination of a 5-HT ₃ receptor antago
Low Emetic Risk	ASCO Guidelines Dexamethasone (8 mg) recommended; no routine preventive use of antiemetics for delayed emesis reco NCCN Guidelines Metoclopramide, with or without diphenhydramine; dexamethasone (12 mg); or prochlorperazine recon

Save Cancel Refresh

Figure 96: Site Configuration – Febrile Neutropenia and Emesis Risks

COMS administrators must specify Febrile Neutropenia and Emesis risks within this subordinate panel for the information to appear in the OEM, TD, and FS Modules.

7.2.5. Import and Export Templates

Import and Export Templates is the fifth panel within the Template Management panel. This subordinate panel's functionality enables authorized users to download a chemotherapy regimen template from a central library for local modification and/or use. It also enables authorized users to export those locally created templates for review and consideration for inclusion in the central library. Authorized users commonly use the functionality within this administration panel in tandem with that for Template Promotion Tab. Accordingly, import actions provide template availability within the CTOS Module, Template Authoring Tab, Template List Tab, and Template Promotion Tab. Export action does not remove the template from use at the local COMS instance and/or local facility.

7.3. User Access Panel

The User Access panel within Site Configuration provides two subordinate panels for COMS administrators to identify sections of the application locked by users and release those sections for use by subsequent users and to add, edit, or delete users. **Figure 97** shows the User Access panel of the Site Configuration Tab and its two subordinate panels of Lockout and User Roles.



Figure 97: Site Configuration – User Access Panel

7.3.1. View and Release Locked Sections

Within the User Access panel of Site Configuration, Lockout provides visibility for COMS administrators to view applications of the section locked by any user and to unlock any locked section. Within the application, if an initial user has accessed and locked any add/edit section, COMS presents subsequent users with a pop-up message to indicate the section is locked by <the identified> user. The section will remain locked until no longer accessed by the first user or unlocked by a COMS administrator, as detailed in the next section. COMS administrators may view locked sections by selecting the Lockout panel within Site Configuration. The application provides a sortable list of locked sections that includes columns for Name (i.e., patient name and identifier), Section of the application locked, Date Locked, and the User locking the section.

COMS presents any user role with a pop-up message to indicate a specific section is locked by another user. However, the application requires a COMS administrator to access the Lockout panel and unlock the section for availability by subsequent users requiring access to the previously locked section. After viewing the list of locked sections, administrators may release any section for use by subsequent users. Since the initial user will be removed from that section, it is appropriate to ensure the user locked the section inadvertently prior to releasing the section especially since a timeout due to inactivity will automatically signoff the user and release the section. When a section requires release, the administrator simply selects the section from the table within this panel and selects the Unlock button. After the administrator selects the Refresh button, the list will update, the previously locked session will not appear on this panel's list, and the section is available for user access. **Figure 98** shows Lockout as the default subordinate panel for the User Access panel within Site Configuration.

Lockout Sections			
Name	Section	Date Locked	User
FIVEHUNDRED , PATIENT (f0500)	Amputations	Feb 23 2015 6:16PM	Programmer

Figure 98: Site Configuration – Lockout

7.3.2. Designate User Roles

Within the User Access panel of Site Configuration, User Roles provides functionality to set access privileges for individual users. COMS administrators may designate users, assign roles, and set permissions to author templates. Authorized (super) users may use free text entry to specify a new user's last name and first name then select "Get Users" to query the associated VistA instance for authorized users. The COMS application returns user(s) matching names entered or provides a list of potential options. Authorized super users then specify the user's role within the application through the pull-down menu; uncheck the "Preceptee" box for users with autonomy (for patient safety consideration, the preceptee box is checked by default to require co-signature by preceptor); and check the "Template Authoring" box for users granted those privileges. Actions in this panel enable role-based access for various COMS users. **Figure 99** depicts the User Roles panel within the User Access panel.

The screenshot shows the COMS interface with the 'Site Configuration' tab selected. Under 'User Access', the 'User Roles' sub-tab is active. A search bar at the top allows entering a last name and first name, with a 'Get Users' button. Below it, a dropdown for 'Users' shows 'No match for name entered'. A note below the dropdown says 'No match for name entered, please select from choices provided'. There are checkboxes for 'Preceptee' and 'Template Authoring'. A table titled 'User Roles' displays four entries:

Name	DUZ	Role	Preceptee	Template Authoring
Programmer,One	1	All Roles	No	Yes
Tdnurse,Five	10000000065	Nurse	No	No
Radiologist,One	11716	Provider	No	Yes
Provider	1radiologist	Provider	No	Yes

Figure 99: Site Configuration – User Roles

The COMS application stores and displays User Role entries alphabetically by Name within this subordinate panel. The table provides sortable columns for Name, DUZ, Role, Preceptee, and Template Authoring. Authorized users may edit the record by scrolling through the table, selecting it from those listed, making changes, and selecting Save. Similarly, selection from the table and deleting the record removes it from the display and database. This subordinate panel within the User Access panel enables COMS administrators to designate user roles and their template authoring privileges. Individual users will not be able to access COMS or author templates within the application unless specified through this functionality; user actions are subject to co-signature if the "Preceptee" box remains checked.

7.4. Clinical Decision Support Panel

The Clinical Decision Support panel within Site Configuration presents two subordinate panels for COMS administrators to manage cumulative dose medication options with their recommended maximum lifetime dosages and configure intelligent data entry for comparison of entered vital signs with previous entries. **Figure 100** shows the Clinical Decision Support panel of the Site Configuration Tab and its two subordinate panels of Cumulative Dose Medications and Intelligent Data Entry.



Figure 100: Site Configuration – Clinical Decision Support Panel

7.4.1. Manage Cumulative Dose Medications

Within the Clinical Decision Support panel of Site Configuration, Cumulative Dose Medications provides functionality to set parameters for cumulative lifetime dosing notifications and overall capabilities within the application. COMS administrators may select the chemotherapy medication for tracking and enter the recommended maximum dosing per patient that the application will monitor throughout the patient's lifetime.

COMS administrators may create/modify/delete medications for tracking and their maximum lifetime dosages. Authorized users may select a medication from the Medication pull-down menu, enter a numeric value for the Max Dosage, and select the appropriate unit of measurement (e.g., mg, mg/m²) from the Units pull-down menu. When the user saves the record, COMS lists it in the Cumulative Dose Medication List table within the Cumulative Dose Medications panel. This administrative panel provides functionality to manage (e.g., add, edit, or delete) the Medication Cumulative Dose Tracking pull-down options within the Patient Information panel. It also contains the values ultimately used in cumulative dose functionality for displayed lifetime totals, consideration during the apply template process, and alerts, as appropriate.

Figure 101 shows Cumulative Dose Medications as the default subordinate panel for the Clinical Decision Support panel within Site Configuration.

Medication	Max Dose	Units
BLEOMYCIN INJ,SOLN	300	Units
DAUNORUBICIN INJ, SOLN	800	mg/m ²
DOXORUBICIN INJ	400	mg/m ²
EPIRUBICIN INJ, SOLN	900	mg/m ²
IDARUBICIN INJ, SOLN	150	mg/m ²
IFOSFAMIDE INJ, SOLN	72,000	mg/m ²
MITOMYCIN INJ	50	mg/m ²
MITOXANTRONE INJ	160	mg/m ²

Figure 101: Site Configuration – Cumulative Dose Medications

The COMS application stores and displays entries alphabetically by Medication within this subordinate panel. The table provides sortable columns for Medication, Max Dosage, and Units. Users may edit the record by scrolling through the table, selecting it from those listed, making changes, and selecting Save. Similarly, selection from the table and deleting the record removes it from the display and database. This subordinate panel within the Clinical Decision Support panel enables COMS administrators to specify medications and recommended cumulative lifetime dosages for tracking. Cumulative lifetime dosage functionality is not available within the application unless specified through this functionality.

7.4.2. Configure Intelligent Data Elements

As the second panel within the Clinical Decision Support panel, Intelligent Data Entry (IDE) functionality enables COMS to assess vital sign entries against the identified IDE parameters for maximum/minimum values and/or variance percentages from previous entries and/or clinical guidelines. The application uses this functionality during entry via the Patient Vitals panel and Treatment Documentation Module's General Information panel.

COMS Administrators may create/modify/delete vital signs configurations for intelligent data entry detection based on specified values or variances. These configurations include the capability to specify the alert message for any of the three intelligent data parameter checks.

- Minimum/Maximum Value to detect entries out of the specified clinical range
- Percentage Variance from Value to detect entries exceeding identified variance of the specified clinical value
- Percentage Variance from last Entry to detect entries exceeding identified variance from the patient's last assessment/vital signs entry.

Figure 102 depicts the IDE panel with parameters established to assess entries against minimum/maximum values and variance from the last entry.

Chemotherapy Order Management System (COMS)

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Patient Orders Template Authoring Template List Template Promotion Reports Messages Site Configuration

Documentation Lists and Contents Template Management User Access Clinical Decision Support Facility Preferences

Cumulative Dose Medications Intelligent Data Entry

Intelligent Data Elements Configuration

Select Data Element to configure *:

Min/Max Value:	<input type="checkbox"/>	Min:	<input type="text"/>	Max:	<input type="text"/>	Display if exceeding Min/Max:	<input type="text"/>
% Variance from Value:	<input type="checkbox"/>	% Variance:	<input type="text"/>	Value:	<input type="text"/>	Display if exceeding % Variance:	<input type="text"/>
% Variance from last entry:	<input type="checkbox"/>	% Variance:	<input type="text"/>	Display if exceeding % Variance:	<input type="text"/>		

Note: To edit a record, click the record in the table below, make changes in the Text field above, and click the "Save" button

Save Cancel Delete Refresh

Intelligent Data Entry

Vital	Min	Max	Msg	%	Value	Msg	%	Msg
Temperature	92	105	Temperature exceeds parameters; reassess an...					
Height								
BP_Systolic	80	180	Systolic Blood Pressure exceeds parameters; va...					
BP_Diastolic	40	100	Diastolic Blood Pressure exceeds parameters; v...					
Pulse								
SP_O2	80		Provide medical attention for oxygen saturation					
Pain		5	Provide medical attention for pain					
Respiration								

Figure 102: Site Configuration – Intelligent Data Entry

COMS administrators may configure intelligent data elements by selecting and element from the Select Data Element to Configure pull-down menu of pre-populated vital sign options available for recording within COMS. Authorized users then select one or more check boxes to specify the parameter check, enter numeric values for minimum/maximum and variance, as appropriate, and enter free text narrative for the message to display when entries exceed the established parameter. The COMS application accommodates site preferences for detection of one, two, or all three of the intelligent data parameter checks and performs these checks concurrently without priority; the functionality of each detection method is independent of one another. The COMS application presents clinical users with alert messages, as appropriate, when entries exceed the parameters established within Site Configuration panel, as noted in [section 5.3.3](#) and [section 6.5.2](#) for the TD Module's General Information panel and the Patient Vitals panel, respectively.

The COMS application stores and displays entries in the Intelligent Data Entry table within this subordinate panel. The table provides sortable columns for Vital, Min, Max, and Message (for minimum/maximum parameter entries) and percentage, value, and message (for each of the variance parameter entries). Authorized users may edit any record by scrolling through the table, selecting it from those listed, making changes, and selecting Save. Similarly, selection from the table and deleting the record removes it from the display and database. This subordinate panel within the Clinical Decision Support panel enables COMS administrators to specify IDE parameters to be applied during Vital Signs entry and saving. Intelligent Data Entry detection is not available within the Patient Vitals panel or TD Module's General Information panel unless specified through this functionality.

7.5. Facility Preferences Panel

The Facility Preferences panel within Site Configuration presents seven subordinate panels for COMS Administrators to configure the COMS instance to best support local facility policies and practices for various functionalities. **Figure 103** shows the Facility Preferences panel of the Site Configuration Tab and its seven subordinate panels of Active Workflows, IV Fluid Types, Medication Holds, Medications Not Rounded, Rounding Rules, Pharmacy Management, and Signature Verifications.



Figure 103: Site Configuration – Facility Preferences Panel

7.5.1. View and Manage Active Workflows

Within the Facility Preferences panel of Site Configuration, Active Workflows provides non-clinical functionality to view and manage the application's active workflows to foster effective communication among the healthcare team. The COMS application utilizes active workflows in COMS messaging to communicate the reason for medication changes and provide informational notifications or request additional action. Configured to support local facility guidelines and preferences, the workflow may initiate either an INFO or ACTION message for the healthcare

team. COMS administrators may add a workflow or select an existing one for edit or removal. After COMS administrators initiate and confirm deletion action, users may not access the workflow until again added to the database. **Figure 104** shows Active Workflows as the default subordinate panel for the Facility Preferences panel within Site Configuration.

Workflow Name	Reason	Body	Active
Cancelled	Notification	Your order for this patient has been cancelled.	1
Change Administratio...	Approval of Change	The administration time for this medication has been changed for this patient. Please review the Order...	1
Change in Patient-spe...	Approval of Change	Changes in Patient-specific Parameters has prompted this order to be changed. Please review the Ord...	1
Change Route of Adm...	Approval of Change	The route for this medication has been changed for this patient. Please review the Order Entry Man...	1
Change Sequencing	Approval of Change	The sequencing for this medication has been changed for this patient. Please review the Order Entry M...	1
Dose rounding	Communication	The dose for this medication has been rounded for this patient. Please review the Orders tab or the Or...	1
Drug Shortage	Approval of Change	Currently there is a drug shortage for this medication. Please choose another medication for this patient.	1
Fluid/Volume Change	Communication		1
Non-formulary	Approval of Change	This is a Non-Formulary medication that will be used for this order. Please review the Order Entry Man...	1
Order Change Notifica...	Approval of Change	The Order that was placed for this patient has been changed. Please review those changes using the...	1
Orders Generated, Re...	Notification	This message is notify you that the patient in this subject will be receiving chemotherapy treatment an...	1
Policy/Protocol	Approval of Change	Based on local Policy and/or Protocol, this medication has been changed for this patient.	1

Figure 104: Site Configuration – Active Workflows

The COMS application stores and displays entries in the Active Workflow table within this subordinate panel. The table provides sortable columns for Workflow Name, Reason, Body (i.e. message content), and indication the workflow is Active. Authorized users may edit any record by scrolling through the table, selecting it from those listed, making changes, and selecting Save. Similarly, selection from the table and deleting the record removes it from the display and database. This subordinate panel within the Facility Preferences panel enables COMS administrators to specify application processing for various transactions directly, indirectly, or contingent upon further communication/coordination actions and to specify the required actions. This panel controls Messaging functionality and Orders Tab/Order Entry Management Module actions as they relate to coordination of changes to ordered medications.

7.5.2. Lockdown Intravenous Fluid Types for Specific Medications

As the second subordinate panel for the Facility Preferences panel, IV Fluid Types functionality enables local facilities to “lock down” specified intravenous (IV) medications to specific fluid types (e.g., normal saline, ringer’s lactate). This tailoring of IV Fluid Types implements local facility preferences for the IV medications specified for the COMS instance; it directly affects options available within Chemotherapy Template Order Source Module, Template Authoring Tab, and subsequently the Order Entry Management Module.

This administrative panel provides functionality to manage (e.g., add, edit, or delete) the options for restricting available IV fluid types for specific medications when providers author and/or modify templates or the healthcare team considers changes to the medication order. COMS administrators may access this subordinate panel, select a medication from the Select IV Medication pull-down menu, specify the fluid(s) to use for this medication via the Select IV Fluid Type pull-down menu, and save the record. **Figure 105** presents IV Fluid Types within the Facility Preferences panel.

Chemotherapy Order Management System (COMS)

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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration																
Documentation Lists and Contents Template Management User Access Clinical Decision Support Facility Preferences																							
Active Workflows IV Fluid Types Medication Holds Medications Not Rounded Rounding Rules Pharmacy Management Signature Verifications																							
<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> Select IV Medication: CARBOPLATIN INJ </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> Select IV Fluid Type (one or more): <input type="text" value=""/> CARBOPLATIN INJ </div> <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th style="width: 30%;">IV Fluid Types</th> <th style="width: 70%;">IV Fluid Type</th> </tr> </thead> <tbody> <tr> <td>Medication</td> <td>Normal Saline</td> </tr> <tr> <td>ACETAZOLAMIDE INJ</td> <td>Ringer's Lactate</td> </tr> <tr> <td>ACETAZOLAMIDE INJ</td> <td>D5W</td> </tr> <tr> <td>ACYCLOVIR INJ</td> <td>Normal Saline</td> </tr> <tr> <td>ACYCLOVIR INJ</td> <td>Ringer's Lactate</td> </tr> <tr> <td></td> <td>D5W</td> </tr> <tr> <td></td> <td>Normal Saline</td> </tr> </tbody> </table>								IV Fluid Types	IV Fluid Type	Medication	Normal Saline	ACETAZOLAMIDE INJ	Ringer's Lactate	ACETAZOLAMIDE INJ	D5W	ACYCLOVIR INJ	Normal Saline	ACYCLOVIR INJ	Ringer's Lactate		D5W		Normal Saline
IV Fluid Types	IV Fluid Type																						
Medication	Normal Saline																						
ACETAZOLAMIDE INJ	Ringer's Lactate																						
ACETAZOLAMIDE INJ	D5W																						
ACYCLOVIR INJ	Normal Saline																						
ACYCLOVIR INJ	Ringer's Lactate																						
	D5W																						
	Normal Saline																						

Figure 105: Site Configuration – IV Fluid Types

The COMS application stores and displays entries in the IV Fluid Types table within this subordinate panel. The table provides sortable columns for Medication and IV Fluid Type, listing the medication multiple times for each acceptable IV fluid type. Authorized users may edit any record by scrolling through the table, selecting it from those listed, making changes, and selecting Save. Similarly, selection from the table and deleting the record removes it from the display and database effectively removing the restriction to permit any IV fluid type for the medication. For medications not listed in the table, the COMS application presents users with all available fluid types. This subordinate panel within the Facility Preferences panel enables COMS administrators to lock down options within the CTOS Module, Template Authoring Tab, and OEM Module to those desired by the facility for specific medications.

7.5.3. Manage Medication Hold Functionality

As the third subordinate panel within the Facility Preferences panel, Medication Holds provides toggle capability to enable the local facility to utilize medication holds or disallow the action/functionality. With a default Yes selection, COMS administrators may select the No radio button to turn off the functionality and capability to use this option for medication orders.

Figure 106 presents Medication Holds within the Facility Preferences panel.

Chemotherapy Order Management System (COMS)

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Patient	Orders	Template Authoring	Template List	Template Promotion	Reports	Messages	Site Configuration
Documentation Lists and Contents Template Management User Access Clinical Decision Support Facility Preferences							
Active Workflows IV Fluid Types Medication Holds Medications Not Rounded Rounding Rules Pharmacy Management Signature Verifications							
<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> Allow Medication Holds: <input checked="" type="radio"/> Yes </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <input type="radio"/> No </div> <div style="text-align: right; margin-top: 5px;"> Save Cancel </div>							

Figure 106: Site Configuration – Medication Holds

Medication Holds directly influences the displayed options for Administration Days listed within the Order Entry Management Module. Selection of the Yes radio button permits the visible display and use of the “Hold” action link and complementary “Release from Hold” link.

7.5.4. Specify Medications Not Rounded

As a subordinate panel within the Facility Preferences panel, Medications Not Rounded provides COMS administrators with the capability to manage medications the application should not permit to be rounded during dosage calculations or medication finalizing. COMS administrators may add a medication to the list to exclude it from the facility's rounding rules by selecting the medication from the pull-down menu and saving the record. **Figure 107** displays Medications Not Rounded within the Facility Preferences panel of the Site Configuration Tab.

The screenshot shows the COMS interface with the following navigation path: Home > Site Configuration > Facility Preferences > Medications Not Rounded. The 'Medications Not Rounded' tab is highlighted with a red box. The main content area displays a table with one row: ABACAVIR SOLN,ORAL, which is listed under the 'Non-Rounding Applied' column. The 'Name' column contains ABACAVIR SOLN,ORAL and the 'Count' column contains 1.

Figure 107: Site Configuration – Medications Not Rounded

The COMS application utilizes the medications not rounded list during the dosage calculation and order finalization processes. Functionality for Medications Not Rounded complements that for Rounding Rules, as presented in the next section. Specifically, if a facility enables rounding rules of 5% or 10%, COMS administrators may further specify medications excluded from rounding (i.e., exact dosing for the specified medications). Unless a COMS administrator identifies a medication in the not rounded list, calculations for the medication will comply with the facility's rounding rules specified in that panel. Accordingly, COMS administrators typically consider the Medication Not Rounded and Rounding Rules subordinate panels in tandem to ensure the COMS application properly reflects and enacts local facility guidelines and preferences for dosage calculations.

7.5.5. Set Rounding Rules

The fifth subordinate panel within the Facility Preferences panel is Rounding Rules. COMS administrators use this functionality to manage the rounding process of medications during dosage calculations. **Figure 108** displays Rounding Rules within the Facility Preferences panel of the Site Configuration Tab.

The screenshot shows the COMS interface with the following navigation path: Home > Site Configuration > Facility Preferences > Rounding Rules. The 'Rounding Rules' tab is highlighted with a red box. The main content area includes a section titled 'Select Rounding Percentage:' with three radio button options: 'No rounding' (selected), '5%', and '10%'. A note below states: 'Rounding Rules are applied based on the percentage specified when the Pharmacist finalizes an Order Entry Management Record'. At the bottom right are 'Save' and 'Cancel' buttons.

Figure 108: Site Configuration – Rounding Rules

With a default setting of No Rounding and other options of 5% and 10%, COMS administrators may specify the facility's preference for medication dose rounding applied during dosage calculations or medication finalizing. As noted in [section 7.5.4](#), COMS administrators typically consider Medications Not Rounded and Rounding Rules in tandem to ensure the COMS application properly reflects and enacts local facility guidelines and preferences for dosage calculations. Specifically, if a facility enables rounding rules of 5% or 10%, COMS calculations and users finalizing the medication order may consider rounding to the specified percentage unless identified as "not rounded" in the Medications Not Rounded subordinate panel.

7.5.6. Pharmacy Management

The sixth subordinate panel within the Facility Preferences panel is Pharmacy Management. Pharmacist users with Site Configuration access use this functionality to synchronize medications lists between COMS and the associated VistA instance. This functionality aligns identical medication lists for the two applications and enables interoperability of COMS with the local VistA instance pharmacy packages. **Figure 109** displays Pharmacy Management within the Facility Preferences panel of the Site Configuration Tab.



Figure 109: Site Configuration – Pharmacy Management

When the COMS application is initially setup, an authorized user must synchronize medication lists to permit interoperability with the associated VistA instance. Periodic synchronization whenever updates are processed for the local VistA instance will ensure the two applications contain identical medication lists and preserve full interoperability of pharmacy packages.

7.5.7. Manage Signature Verifications

As the final subordinate panel within the Facility Preferences panel, Signature Verifications functionality enables COMS Administrators to specify whether the local facility requires one or two healthcare professionals to verify medication dosing prior to administration; two signature verifications is the default selection. This functionality directly impacts the number of users required to Sign to Verify medication dosing on the Treatment Documentation Module's General Information panel (*see [section 5.3.3](#)*). Functionality for the Signature Verifications panel is reserved for further development.

[\(Return to TOC\)](#)