EXECUTIVE SUMMARY

The Systemic Treatment Computerized Prescriber Order Entry (ST CPOE): Best Practice Guideline for Intravenous and Oral Chemotherapy provides guidance on the key features, functionalities and components of a ST CPOE system which are required to ensure safe, high quality systemic chemotherapy treatment.

This guideline synthesizes the available evidence and information gathered from literature reviews, environmental scans, established industry guidelines, current Canadian clinical consensus and key informant interviews with ST CPOE experts from cancer centres known for their expertise with ST CPOE systems.

The recommendations included in this guideline were identified by including factors such as the extent to which the information was present in the peer reviewed and/or grey literature, the strength of the available evidence, clinical and/or technological relevance, and the opinion of the National Expert Panel members. In addition to the review by the expert panelists, the complete guideline was reviewed externally by known subject matter experts as well as targeted end users of the guideline.

The purpose of this guideline is to provide evidence-based recommendations that can be used to guide the design, selection, implementation and/or evaluation of a ST CPOE system. This guideline can be used by clinicians (e.g. physicians, pharmacists and nurses) to determine optimal safe clinical practice and efficient process flow.

This guideline can also be used by those in clinical informatics, health technology and decision support areas as they determine the necessary system features and functionalities to support the safe delivery of chemotherapy.

The recommendations here are based on the best available evidence, and should be applied considering the unique needs of the organization, patient population, clinicians, practice patterns and workflow processes in mind. The degree of customization of ST CPOE features and functionalities required to meet the unique needs at the point of care should be considered in light of the evidence reflected in the guideline.

Recommendations to Support Clinical Practice and Information & Technology Practice

Clinical Practice Recommendations

ST CPOE with clinical decision support is a promising technology for the reduction of medication errors and potential adverse drug events associated with those medication errors. Based on the review of the literature included in this guideline, the following conclusions are identified:

1. ST CPOE systems should be used in the outpatient chemotherapy delivery setting to decrease chemotherapy related medication errors for both intravenous and oral chemotherapy. Although the focus of this evidence summary was outpatient ST CPOE, it is likely that many of the principles in this document could also apply to inpatient ST CPOE.

2. Health information technologies such as ST CPOE systems can directly impact clinician workflow practices, therefore a comprehensive, multi-faceted change management approach is required in order to effectively implement and sustain the practice and process changes associated with the introduction of ST CPOE. Strategies include the use of local opinion leaders with input into decision-making (e.g. clinical, technical, and leadership champions), educational supports and timely quality monitoring through audit/feedback loops.

3. A multidisciplinary team approach in the design, selection, workflow evaluation, implementation and/or evaluation, and ongoing monitoring of the ST CPOE system should be used.

4. Ensure that ST CPOE processes complement current practice and work-flow processes to enhance adoption by clinicians.

5. Carefully design ST CPOE systems, clinical decision support systems (CDSS), and associated interface design elements to reduce the potential for error.

6. The development and implementation of a risk-assessment process to identify actual/potential unanticipated consequences and new errors generated, as well as the development of strategies to modify the system accordingly, are warranted.

Information and Technology Recommendations

To enable optimal utilization of the recommendations in considering the design and implementation of an ST CPOE, the recommendations have been categorized according to the following criteria: Essential (E) or Desired (D). Essential recommendations must be included in the design/implementation of the ST CPOE system in order to achieve desired quality, patient safety, and user satisfaction. Desired recommendations are those that are not absolutely necessary for success, but inclusion would increase the likelihood of success and/or achieving significant gains in quality and patient safety.

Additionally, the recommendations have been categorized according to project phases where they would be most useful (e.g. system selection/design and implementation). This will enable users to apply the recommendations in a more systematic and purposeful manner whether in the pre-implementation phase (e.g. early design/selection phase, generation of elements for inclusion in vendor RFP), implementation phase (e.g. building or enabling components to meet user needs) or post-implementation (e.g. considering upgrades and enhancements).

SUMMARY OF RECOMMENDATIONS

Recommendation
[Oral] – Signifies recommendations relating to oral chemotherapy only
[IV] – Signifies recommendations relating to IV only

Priority Level
E = Essential; must be included in ST CPOE application
D = Desirable; not as critical for initial implementation, but inclusion could improve quality

Pre-Implementation Phase

System Feature, Functionality or Component(s)	Recommendation	Priority Level
A. Usability	A1. Incorporate a human-centred approach in the design, implementation and evaluation of ST CPOE systems Ensure the process flow closely reflects current clinical/best practices	E
	A2. Involve key stakeholders and end users in system design (e.g. prescribers, pharmacists, nurses, information technology professionals, decision support, clinical informatics, quality representative, patients)	E
	A3. Develop an evaluation strategy in design, implementation and post-implementation phases	E
	A4. Determine indicators for ongoing monitoring of system to ensure quality and patient safety, defined in advance of implementation	E
	A5. System enables important information (e.g. drug name, dose) to "stand out" from surrounding information (e.g. bolded, highlighted, larger font) with all relevant information within one concise screenshot	E
	A6. Ensure terminology is consistent with organizational and professional descriptions (e.g. ISMP)	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	A7. Ensure all required information is presented in a logical sequence, without requiring the user to "recall" information (e.g. previous screens) or process (e.g. where is…?)	E
	A8. System minimizes the number of steps required to complete key safety-related tasks (e.g. use of auto-tabbing, default values, organization of information)	E
	A9. System enables fully-customizable feedback features to the user about the steps he/she is about to take and/or actions that may not have the desired effect (e.g. ordering too early, deleting essential adjuvant medications)	E
	A10. System avoids displaying too much information on a single screen, organizes data at the summary level before drilling down to more details; controls density through font size, character count and screen resolution A11. System uses visual cues to differentiate critical information to the user in a consistent way throughout A12. System enables readability, and allows the user to find and scan information quickly through the use of font (e.g. no less than font size of 12, sans serif font) and high contrast between background and text (e.g. black on white)	E E E
	A13. System minimizes screen changes and visual interruptions during the completion of the task Pop-up boxes within the system do not obscure vital information Changes made within the system are immediately available for viewing by the user without having to refresh screens	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
B. Functionality	**System Access and Permissions**	

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	B1. System must be able to control access to personal health information to comply with information safety and security legislation including the use of electronic signatures and secure passwords	E
	B2. System must have a secondary level of assigning access permissions by role or individual that is consistent with organizational policy and/or professional scope of practice	E
	B3. System enables user roles to be defined with access to order set management, and provides the ability to restrict access to individual order sets by user role or department • Order entry and regimen building restricted to individuals within their scope of practice or determined by local medical directives • Requires signed chemotherapy orders to be verified by an authorized user prior to preparation	E
	B4. System has the ability to build two-party orders (prescriber writes orders in a pending status until verified through pharmacy and/or nursing; orders made in advance can be kept in "hold" status pending relevant clinical/laboratory parameters)	E
	B5. Consider functionality required to leverage provincial/jurisdictional assets (e.g. ONE ID in Ontario)	D
	Regimen Templates	
	B6. System must support the development and use of regimen templates including the ability to link to a specific diagnosis group or clinical trial	E
	B7. System has the ability to monitor patient entrance/exit processes (e.g. restricted access programs such as clinical trials, restricted drug distribution programs surgery type/date, etc.)	E
	B8. System facilitates ease and speed of building and changing orders • Use of quick means (e.g. drop-down menu)	D

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	B9. System is customizable for users to locate and display individual and groups of orders in different ways for safety and efficiency reasons (e.g. prescribers ordering chemotherapy regimens by disease-site) For example: • Easy-to-find order sets (search or filtering; diagnosis and intent based, etc.) • Shortcut to order sets frequently used by prescriber • Captures and displays at least two protocol/clinical trial identifiers associated with a patient's single treatment regimen	E
	Order Template B10. System must contain data fields to capture information as outlined in professional (e.g., ASCO/ONS complete order standards) and jurisdictional standards (e.g., CCO Databook systemic treatment file) B11. System has the ability to identify order sets as being concordant with provincial/jurisdictional, institutional or formulary clinical guidelines	E E
	Dosing Logic B12. System has dose calculation built into electronic ordering system using units consistent with jurisdictional standards (e.g., height in meters and weight in kilograms) • Automatically calculates dosing and modifications, based on dosing algorithms using, for example, patient weight, height, CrCl, target AUC, sex, age • Expresses dose as weight based or BSA-based, as target AUC [IV] or "flat dose", depending on the drug in ordering, dispensing and administering • Calculates and displays BSA based on the most recent height and weight values recorded in the system • Option to select various equations available for BSA and CrCl calculations (e.g., Cockcroft Gault, Jelliffe, Mosteller, etc.) • Alerts the prescriber to absolute and percentage changes in height, weight, or creatinine when reordering an active regimen;	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	the prescriber can then choose whether to use the old or new values to calculate doses for the current treatment • Calculates and displays CrCl values in ml/min, and ensure serum creatinine that is used for dose calculations does not fall outside of a pre-set acceptable range; the serum creatinine value used to calculate the dose should be recorded for reference	
	B13. System automatically calculates dose modifications based on laboratory parameters (e.g. renal or hepatic function)	D
	B14. System has improved dosing logic and allows for complex instructions: • Doses requiring multiple dosage strengths • Alternate day dosing (e.g. 100-125-100-125mg) • Dose tapering (e.g. steroids) • Dose titrations • Treatment interruptions (e.g. hold on weekends) • Total daily dose calculations and displays on order • Predefined template with absolute dose (e.g. drugs where standard dose is not dependent on BSA) • Dosing capping in a specific regimen at a pre-set dosage ▪ If dose is capped, system alerts user that value has been capped • Predefined AUC dosing in regimen template [IV]	E
	B15. System checks ordered dose against a knowledge base (e.g. local guidelines of best practice or other references) of relevant dose, frequency and duration ranges • Single dose medication dosage checking • Cumulative lifetime medication dosage checking (e.g., doxorubicin) • For single dose, can set up minimum or maximum dose allowed, per dose, per day or per course for each available route of the drug • Designates explicit routes, units, diluents for medications and prohibit selection of other routes/units during the order process (e.g. IV only for vincristine)	E
	B16. System has the ability to pre-define dose rounding rules into the regimens and dose calculators	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	• Rounds to a dose that can be reasonably measured based on vial size which is practical to measure and deliver • Calculates dose for oral chemotherapy drugs with multiple dosage strengths (e.g. capecitabine available in 500 and 150 mg strengths). Doses rounded to the nearest available combination as set by the institution/jurisdiction [Oral]	
	B17. Logic in dose modifications displays: • A percentage value • An entered value ("flat dose") • Via preset dose levels	E
	B18. For selected medications, the system displays different dosing indications per intent (e.g. prn, cyclic versus continuous dosing) to be chosen by the prescriber	E
	Medication Management	
	B19. System contains functionality to support the medication ordering, verification, dispensing, administration and monitoring processes – this includes drug eligibility, performance status capture, pharmacy verification, independent double check, co-signature and administration checklists	E
	B20. System has the ability to label relevant drugs such as chemotherapy agents, so only credentialed providers can prescribe or administer these medications	E
	B21. System has the ability to select medications and regimens that default to formulary options or have those listed first • Contains all dosage strengths available for drugs; however, institution can pre-set default dosage forms and strengths based on local availability, to avoid "over-specification" (e.g. need to select identical generic products from different manufacturers). • Supports in dosage form selection; takes into account maximum dosage and dosage forms available	E
	B22. System provides access to chemotherapy drug mixing instructions, solubility information, stability information, monitoring and storage expiration information	D

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	• May reside within system or be provided through links to external sources	
	B23. System has the ability to link to protocol from the order • Link regimen template or order to references or treatment guidelines • Link from order to clinical trial protocols	D
	B24. The drug database must support Canadian requirements for drug identification, while still maintaining relevant clinical decision support (e.g. drug-drug interaction)	E
	Information Display and Alerts	
	B25. System displays version and subversion numbers for any system embedded information (TMN pathology diagnosis, staging)	D
	B26. The information display is clear and organized to prevent the clinician from making errors with look-alike, sound-alike drugs or juxtaposition errors (e.g. use of TALLman lettering)	E
	B 27. System must follow the Joint Commission and ISMP's standards regarding abbreviations, symbols and dose designations	E
	B 28. System has the ability to set alert sensitivities (e.g. system allows customization such as tolerance threshold and expiry date for alerting height and weight or BSA changes)	E
	B29. System alerts for post-verification sign-off of modified order sets	E
	B30. System has the ability to configure eligibility screening criteria based on data in the system • Screening for treatment eligibility purposes, including funding • Criteria may include gender, cancer diagnosis, stage, performance status, etc.	D
	B31. System displays relevant laboratory values, drug interactions, allergy status and dosing regimen during order entry and review	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	B32. System captures and displays disease-specific pathology information or non-anatomic prognostic indicators as discrete data or in a free text field • For example: anatomic site, histology/pathology, biomarkers, grade, lesion size, chromosomal rearrangements and other characteristics of cancers used to predict response, estimate prognosis and/or direct treatment	D
	B33. System provides adequate space for items in order data fields to allow entering and viewing information without truncating any data	E
	B34. System displays diagnosis, drug name, dose, route of administration, dosage form, dose units, frequency, duration, diluent nomenclature and other abbreviations • Consistent with nomenclature used by the institution or ISMP standards • Acceptance of generic drug names • Ability to present brand names in upper case lettering	E
	B35. System displays and alerts for allergies and serious adverse events as coded using NCI CTCAE	E
	Workflow Management	
	B36. System must allow users to view current medication orders in real time and be made aware of changes made by any other user	E
	B37. System captures clinician authentication and date/time stamp for any changes made to the order, including alert override and reason for override	E
	B38. System has the ability to view order statuses (from prescribing, dispensing to administration) with automatic real-time updates to manage workflow	E
	B39. System traces medication products to an order from their preparation/dispensing to administration	D
	B40. System allows the identification of patients receiving multi-modality therapy (e.g. chemotherapy and radiation)	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	B41. System has the ability for users to view pending tasks to ensure the safety delivery of chemotherapy (e.g. critical lab values) B42. System has the ability for users to view pending tasks to manage workflow efficiency (e.g. expiring orders) B43. System tracks progress and changes in the regimen over time. Reasons for modification are indicated on the order and can be accessed by relevant system users. Options include the following: • Changes made in chemotherapy dosing to be carried into subsequent cycles • Ability to order subsequent cycles based on the regimen template. • Ability to hold, delay, omit, delete and resume treatment, proceed notes, verbal orders, interventions by health professionals, with reasons for each intervention • Ability to document that certain treatment day(s) have been omitted, delayed or discontinued, so these do not appear as "not administered" in subsequent cycles (e.g. reason for discontinuing therapy) • Alert if chemotherapy drug is discontinued after the last cycle was ordered • System requests a reason when user changes treatment or dosing to those different from the original protocol, and notifies user that the dosing for this cycle is different from the previous cycle	E D E
	Cognitive Verification of Orders B44. System has order verification function for cognitive review of orders. Order locking occurs when the order is in pharmacy and/or nursing verification. Signing off on order verification is required prior to order processing • Verify orders electronically by pharmacy and/or nursing after prescriber signs • Prevent order changes once the order is in review by pharmacy or nursing • Prohibit order changes that have completed verification unless order is "unlocked" by pharmacy or nursing	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	Reporting Capability	
	B45. System has standardized and customizable prebuilt reports available for quality assurance purposes. There is flexibility in writing simple queries to construct complex reports and the system allows multiple tools or report writers (e.g. Excel, Crystal Reports, ETL tools) to extract data Reporting tools enable end-users to query relevant tables and data elements	E
	B46. System has reports for auditing and monitoring functionality, such as interfaces or alert generation or printing log files	E
	B47. System has the ability to customize printing and formatting of chemotherapy orders and take-home prescriptions to meet best practice recommendations (e.g. including diagnosis, no repeats on oral chemotherapy [Oral])	E
	B48. Report templates are designed for interoperability (e.g. HL7-based messaging)	E
	Documentation	
	B49. Features of the documentation section follow guidelines from health professional and regulatory organizations For example: Ability to capture independent checks and nurse co-signature such as date and name stamps from two practitioners	E
	B50. System allows documentation or update of staging, confirmation of diagnosis and treatment intent prior to ordering chemotherapy	E
	B51. System allows documentation and provider authentication of medication dispensing: • Lot number • Expiry date • Manufacturer	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
C. System Integration	**Client Registry Standards** C1. System allows the patient to be uniquely identified across the continuum of care. The patient identifier must be unique (only one in the system), exclusive (only used for this patient) and eternal (never reused)	E
	Provider Registry Standards C2. System allows the unique identification for the healthcare provider. Demographic information includes name, role, gender, regulatory college license number and the locations the provider delivers his/her service	E
	Laboratory Standards C3. System allows access, management and storage of patient laboratory orders and results through an institutional/jurisdictional laboratory information system	E
	Drug Standards C4. System allows synchronization with jurisdictional drug information system standards, enabling a complete medication profile	E
	Interoperable EHR Standards C5. System allows sharing of relevant clinical information through a jurisdictional shared health information repository to support timely clinical decision-making and continuity of care	E
	C6. For IV drugs, where pharmacy inventory system, pharmacy clinical management system and/or ST CPOE system are separate, interoperable standards must be established to be consistent across all systems (e.g. medications ordered on the ST CPOE system should match to products listed in the pharmacy system) [IV]	E
	C7. For oral chemotherapy, interoperable standards are required to enable integration between pharmacy dispensing systems and ST CPOE [Oral]	D

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	Synchronization	
	C8. Information updated in one system automatically triggers updates in corresponding or related systems (e.g. when the admission–discharge–transfer (ADT) system updates its "patient beds" table, an HL7 message is transmitted to the ST CPOE system to initiate an immediate update)	D
	Medication Data Building and Maintenance	
	C9. System uses a clear method for building, maintaining, and implementing hierarchical relationships for medication data (e.g. first drug name, then appropriate dosage strengths)	E
	Reduction of Redundant Work	
	C10. User-centred interfaces with automated systems are carefully planned to reduce the need for redundant work	E
	C11. System has the ability to integrate with appropriate clinical decision support systems (CDSS) when not available within the ST CPOE system (e.g. knowledge bases that support dosing information support, provincial drug repository, formulary etc.)	D
	C12. System has the ability to integrate with barcoding systems (for positive patient identification and identity-dependent medications) • E.g. For medication preparation, dispensing and administration • Ability to integrate with advanced technology, e.g. admixing robots, smart-pumps, etc.	D
	C13. System has the ability to link with electronic medical records/provincial medication management system	E
	C14. System has the ability to integrate with medication adherence devices/tools (e.g. integrate pill dispenser and reminder systems with general health monitoring systems which can attempt to contact the patient, caregiver or healthcare provider as needed)	D
	C15. Real-time electronic transmission to hospital pharmacy systems occurs so that order re-entry is not required, to prevent delays and potential transcription errors [IV]	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	C16. Real-time electronic transmission to pharmacy dispensing systems (e.g. e-prescribing) occurs so that re-entry is not required, to prevent delays and potential transcription errors [Oral]	D
	C17. System has the ability to link to remuneration/adjudication systems	D

Implementation Phase

System Feature, Functionality or Component(s)	Recommendation	Priority Level
D. Useful Alerts & Prevention of Alert Fatigue	D1. System has appropriate computer display and screen sizing so the alerts are displayed effectively	E
	D2. Alerts fit into the appropriate workflow process at the right time (e.g. too early or late will require extra time for the clinician to rectify and add to the burden of work)	E
	D3. Alerts are non-interruptive to order entry workflow by considering human factors principles in their design (e.g. personalization of alert display)	E
	D4. Launching of alerts is highly specific and sensitive, which is enabled through complete, accurate, current and evidence-based clinical decision support	E
	D5. System tests drug to drug interactions for high sensitivity and determines if medication interactions will alert with clinical significance	E
	D6. System categorizes alerts into groups and assign action to the alert based on severity and risk. Clinically insignificant alerts are minimized: *Trivial:* No clinical significance; no real time alert required; included on batch reports sent to the ordering clinician and auditing system at predetermined time intervals (e.g. daily, weekly) *Minor:* Alerts can be over-ridden by the prescriber	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	Moderately serious: Alerts can be over-ridden by prescriber but reason must be given *Serious:* No ability to override the alert, unable to proceed in order process, and change in the order should be made	
	D7. System has alerts with clear and concise messaging, indicating interacting drugs, actions for clinical management and a statement indicating the consequences of over-riding the alert	E
	D8. System includes context-specific patient laboratory data into drug-drug interaction alerts (e.g. display serum potassium lab results for an interaction that may cause hyperkalemia)	D
	D9. For knowledge bases and CDSS, system alerts users with administrator function when a new version is available and allows setup of reminder alerts	E
	D10. Collaboration occurs with key stakeholders such as informatics experts, clinical application specialists and clinicians, who are the end users in the safe design, testing and use of the alerts	E
	D11. System has the ability to customize rules for decision support tools and specific warnings	E
	D12. System has the ability to customize safety guardrails for modifying orders, for example: • Starter set of rules for medications requiring consideration of renal or hepatic status in dosing • Warning based on patient diagnosis	E
	D13. System has customizable alerts for: • Treatment duplication • Allergies (e.g. acknowledgement/override of alert) • Drug-drug interactions • New prescription versus renewals [Oral] • Inappropriate pill splitting, where applicable [Oral] • Dose/dosing frequency checking (e.g. alert is generated when dose order is outside of the preset maximum or minimum dose range) • Cycle start date too early	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
	D14. System has the ability to alert for early and late reorders with appropriate customization [Oral]	E
	D15. When an alert is triggered, the user can take the actions suggested directly from the alert dialog box to modify or discontinue treatment; rationale for the modification are indicated on the order	E
	D16. System has the ability to alert at drug prescribing, verification and administration when patient values are outside of laboratory parameters	E
	D17. Following an alert, system allows proceed criteria to be documented (i.e. allows pre-set treatment parameters, for verifying patient's actual lab work against these)	E

System Feature, Functionality or Component(s)	Recommendation	Priority Level
E. Building of Protocols & Regimens	E1. System has the ability to pre-load modifiable local/jurisdictional regimens to assist in the building of a final version	E
	E2. System has medication sequencing within an order: • Medications within the order can be added, removed, copied or re-sequenced easily • Subsequent doses can be placed relative to the date of the first dose (e.g. Day 7)	E
	E3. System has logic for displaying, timing and documenting linked orders based on: sequential links, time offset links, mutually exclusive orders, drugs mixed in same bag and split dose. For example: • Two or more medications must be given in a specified sequence • Allows regimen builder to set up relative times for chemo administration ○ e.g.: mesna is to be given at four and eight hours after cyclophosphamide; system will automatically calculate mesna administration time on the order or the MAR if cyclophosphamide administration time is known • Standing and PRN doses cannot be given at the same time. Incorporate logic for handling PRN dosing, have appropriate frequency logic (multiple doses over multiple days)	E

	• Drugs mixed in same bag, e.g. ifosfamide and mesna admixed in the same bag • Split dose, e.g. doxorubicin dose volume required to be given in two separate syringes	
	E4. System allows institution-defined options for orders and order components. Ability to highlight most appropriate or recommended choice. For example: • Propose alternative in a given order set (e.g. pre-set with certain breakthrough antiemetic medication options) • Ability to build IV/PO route alternatives for the same drug	E
	E5. System has the ability to incorporate text instructions or recommendations within order sets • For example: drug funding information related to regimen, hospital formulary status, if certain drugs need to be held on selected treatment days	E
	E6. System provides date logic in orders • Automatic date and time generation, dates fill in automatically for multiday/week therapy • Ability to update the calendar easily and push dates accordingly	E
	E7. System enables direct linkage to the MAR	E
	E8. System allows for therapeutic options during regimen builds. For example: • Link protocols for hydration, growth factors, supportive medications or hypersensitivity management, rescue medications, urine alkalinization, etc. to appropriate regimens • Antiemetic modules or associations of individual antiemetics with chemotherapy medications specified at regimen build	E
	E9. System incorporates logic for determining cycle scheduling and treatment duration (days between cycles and total number of cycles) • Preset the frequency of cycles • Cycle number information is available, including start day • Day of cycle is clearly defined for each drug • Cycles can be specified to repeat a number of times	E
Privacy	E10. The purposes of data collection and interoperability with other systems must be identified with clear rationales provided	E
	E11. Develop a framework and criteria that describes the desired set of controls and best privacy practices that the organization is required to have in place	E

	E12. Develop a risk assessment and a privacy impact/breach assessment process for internal monitoring and evaluation	E

Post-Implementation Phase

System Feature, Functionality or Component(s)	Recommendation	Priority Level
F. Audit Logs & Monitoring of Workarounds	F1. Audit trails include the following information: date and time recorded for each entry, any change in recorded information, and the original content of the recorded information that was changed or updated	E
	F2. Audit trails are printed separately from the recorded information	E
	F3. System ensures logging is turned on in the software application	E
	F4. System records the number and types of alerts that fire, are ignored and are overridden	E
	F5. Regular review and analysis of log data is conducted to identify system performance, trends and identify issues early so they can be addressed	E
	F6. Aggregate log information is meaningful	E
	F7. System applies appropriate permissions for access to audit log information and reports	E
	F8. Users monitor the technology in the clinical setting for impacts and barriers to performance and safety including human factors and ergonomics prior to and after implementation	E