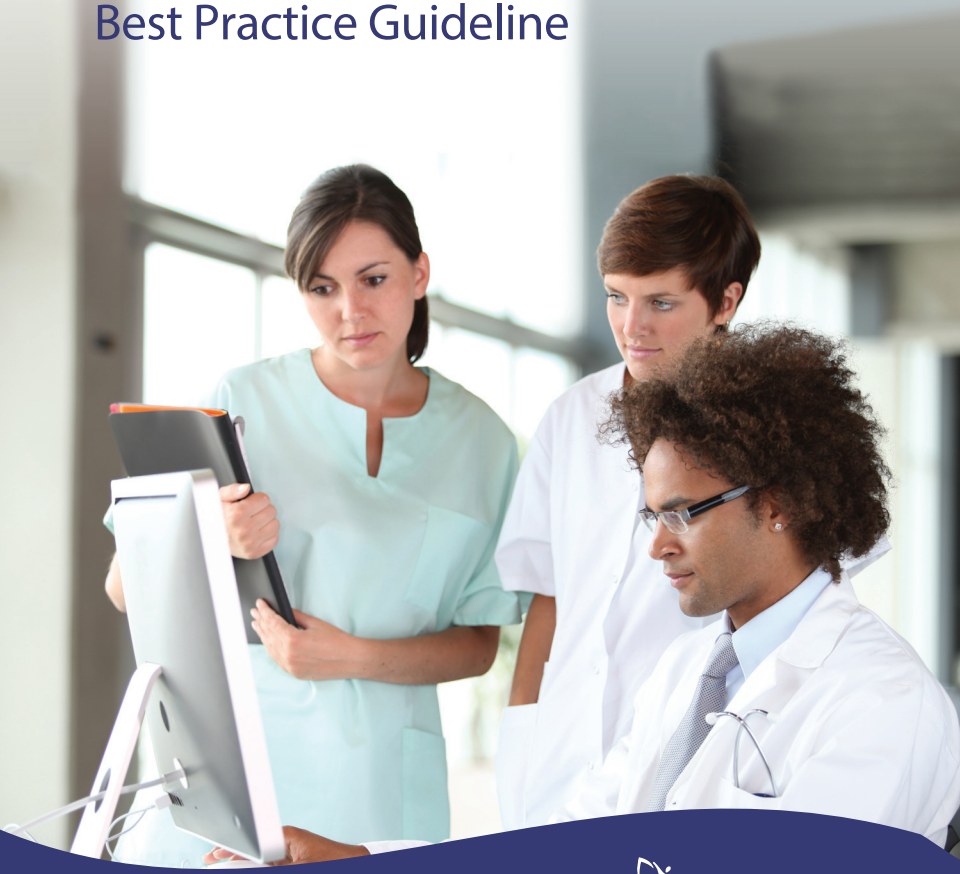
Cancer Care Ontario
Action Cancer Ontario

Computerized Prescriber Order Entry (CPOE) for Systemic Treatment: Best Practice Guideline



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OVERVIEW OF THE DOCUMENT

The Computerized Prescriber Order Entry for Systemic Treatment (ST CPOE): Best Practice Guideline 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. The complete guideline is comprised of four distinct, yet interconnected chapters and reflects a synthesis of the available literature within the clinical and health information technology fields. The individual chapters can be used as stand-alone resources or in conjunction with the information contained throughout the guideline. The chapters are:

1. Clinical Best Practices: Program in Evidence-Based Care (PEBC) Evidence Summary:

Synthesis of the literature describing the clinical best practices supporting clinical decision-making pertaining to appropriate and safe systemic treatment.

2. Information and Technology Standards:

Information standards for collecting, harmonizing and integrating data from cancer sites to support clinical and business requirements for sharing information with the Ministry of Health and Long-Term Care (MOHLTC) and other key partners and stakeholders. Technology standards provide guidance regarding the desired interface between ST CPOE systems and other information systems (e.g. patient information, pharmacy, reporting).

3. Indicators and Measurement plan:

Description of the measurement plan, including the identification of indicators for monitoring the impact and outcomes of ST CPOE systems. In addition to clinical indicators, a series of recommendations regarding optimal system features, functionalities and components can be used to determine the degree of system/software concordance with the recommendations included in this guideline.

4. Conclusions:

Synthesis of the key findings and recommendations from the three previous chapters, along with considerations for practice, policy, research and future innovations.

The Computerized Prescriber Order Entry for Systemic Treatment (ST CPOE): Best Practice Guideline 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 incorporates the synthesis of the available evidence and information gathered from literature reviews, environment scans, established industry guidelines and key informant interviews with cancer centres known for their expertise with ST CPOE systems.

The recommendations included in the 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 Expert Panel members. In addition to the review by the Expert Panels, 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 an 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 with the unique needs of the organization, patient population, clinicians, practice patterns and workflow processes in mind. The degree of customization of 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

CPOE with Clinical Decision Support (CDS) 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:

- CPOE systems should be used in the outpatient chemotherapy delivery setting to decrease chemotherapy related medication errors. Although the focus of this evidence summary was outpatient CPOE, it is likely that many of the principles in this document would also apply to inpatient CPOE.

- Health information technologies such as 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 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.

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

- Ensure that CPOE processes complement current practice and workflow processes to enhance adoption by clinicians.

- Carefully design CPOE systems, clinical decision supports, and associated interface design elements to reduce the potential for error.

- 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 a ST CPOE, the recommendations have been categorized according to the following criteria:

E Essential (E)

Essential recommendations must be included in the design/implmentation of the CPOE system in order to achieve desired quality, patient safety and user satisfaction.

D Desired (D)

Desired recommendations are those that 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 also been categorized according 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 in any phase:

- **Pre-implementation phase** (e.g. early design/selection phase generation of elements for inclusion in vendor Request For Proposal)
- **Implementation phase** (e.g. building or enabling components to meet user needs)
- **Post-implementation** (e.g. considering upgrades and enhancements).

Pre-implementation phase

USABILITY

RECOMMENDATION	PRIORITY LEVEL
Incorporate a human-centred approach in the design, implementation and evaluation of CPOE systems.	E
Involve key stakeholders and end users in system design (e.g. physicians, pharmacists, nurses, information technology professionals, decision support, clinical informatics).	E
Develop an evaluation strategy in the design, implementation and post-implementation phases.	E

USABILITY (continued)

RECOMMENDATION	PRIORITY LEVEL
Determine indicators for ongoing quality monitoring re: usability.	E
Ensure important information "stands out" from surrounding information (e.g. bolded, highlighted, larger font); with all relevant information within one screenshot.	E
The terminology should be consistent with organizational and professional descriptions.	E
The process flow should closely reflect current clinical / best practices.	E
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
Minimize the number of steps or mouse clicks required to complete the task (e.g. use of auto-tabbing, default values, organization of information).	E
Include feedback features to the user about the steps they are about to take and/or that actions have had the desired effect (e.g. warning message before deleting or changing information).	D
Appropriate density: Avoid displaying too much information on a single screen, organize data at the summary level before drilling down to more details; control density through font size, character count and screen resolution.	D
Meaningful use of colour: Colour should be used to convey meaning to the user in a consistent way throughout (e.g. red = warning/alert; yellow = highlight important information; green = proceed, normal).	D
Readability: The ability to find and scan information quickly; use of font (e.g. no less than 12 point, sans serif font); high contrast between background and text (e.g. black on white).	D
Keep screen changes and visual interruptions to a minimum during the completion of the task.	E
Ensure pop-up boxes does not obscure vital information.	E
Changes made are immediately available for viewing by the user without having to refresh screens.	E

FUNCTIONALITY

RECOMMENDATION	PRIORITY LEVEL
System Access and Permissions	
The 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
A secondary level of assigning access permissions by role or individual is required that is consistent with organizational policy and/or professional scope of practice.	E
Consideration should be given to congruent functionality factors to leverage provincial access mechanisms (e.g. OneID).	D
Regimen Templates	
The system must support the development and use of regimen templates including ability to link to specific diagnosis group or clinical trial.	E
Functionality must include the ability to monitor patient entrance/exit screening processes; set minimum and maximum dose levels, dose ceilings and rounding values.	E
Order Template	
The system must contain data fields to capture information as outlined in professional and jurisdictional standards (e.g. ASCO/ONS complete order standards and CCO Databook systemic treatment file).	E
Medication Management	
The system must contain functionality to support the medication ordering, verification, dispensing and administration process. This includes drug eligibility, performance status capture, and independent double check, co-signature and administration checklists.	E
System Integration	
The system must have the ability to integrate with the EHR, barcoding for medication administration and decision support modules. The drug database must support Canadian requirements for drug identification.	D

FUNCTIONALITY (continued)

RECOMMENDATION	PRIORITY LEVEL
Information Display and Alerts	
The system must display version and subversion numbers for any system embedded information (TNM pathology diagnosis, staging).	D
The information display should be clear and organized to prevent the clinician from making juxtaposition errors (TALLman lettering).	E
Ability to set alert sensitivities and clinician review of order alerts.	E
Reporting Capability	
Reporting tools must enable end users to query relevant tables and data elements.	D
Systems should have some prebuilt reports available. There should be flexibility in writing simple queries to constructing complex reports and the system should allow multiple tools or report writers (e.g. Excel, Crystal Reports, ETL tools) to extract data.	E
The system must have reports for auditing and monitoring functionality such as interfaces or alert generation or printing log files.	E
Report templates to be designed for interoperability (e.g. HL7).	D

SYSTEM INTEGRATION

RECOMMENDATION	PRIORITY LEVEL
Client Registry Standards	
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	
Allows the unique identification for the healthcare service provider. Demographic information includes name, role, gender, regulatory college license number and the locations the provider delivers their service.	E

SYSTEM INTEGRATION (continued)

RECOMMENDATION	PRIORITY LEVEL
Laboratory Standards Allows access, management and storage of patient laboratory orders and results through a jurisdictional laboratory information system.	E
Drug Standards Provides clinicians with an improved ability to manage complete medication profiles through a jurisdictional drug information system.	E
Interoperable Electronic Health Record (EHR) Standards Allow sharing of relevant clinical information through a jurisdictional shared health information repository to support timely clinical decision-making and continuity of care.	D
Order Details Order details from the CPOE system should flow automatically into the pharmacy system. Medications ordered on the CPOE system would match to products listed in the pharmacy system.	E
Synchronization When an update of information is made in one system then the corresponding table in the second system is automatically updated (e.g. when the admission–discharge–transfer (ADT) system updates its "patient beds" table, an HL7 message is transmitted to the CPOE system to initiate an immediate update).	D
Medication data building and maintenance The CPOE system must provide a clear method for building, maintaining, and implementing the parent/child relationship for medication data.	E
Reduction of redundant work User-centred interfaces with automated systems need to be carefully planned to reduce the need for redundant work.	E
Electronic Prescribing CPOE systems should enable electronic prescribing.	E

USEFUL ALERTS AND PREVENTION OF ALERT FATIGUE

RECOMMENDATION	PRIORITY LEVEL
Software must have appropriate computer display and screen sizing so the alerts are displayed properly.	E
Alerts need to fit into the appropriate workflow process at the right time – too early or late will require extra time for the clinician to rectify and add to the burden of work.	E
Complete, accurate and current information makes the launching of alerts highly specific and sensitive.	E
Test drug to drug interactions for high sensitivity and determine if medication interactions will alert with clinical significance.	E
Categorize alerts into groups and assign action to the alert based on severity and risk: **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. **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.	E
Collaboration must occur with key stakeholders such as informatics experts, clinical application specialists and clinicians, who are the end user of these alerts in the safe design, testing and use of the alerts.	E

BUILDING OF PROTOCOLS AND REGIMENS

RECOMMENDATION	PRIORITY LEVEL
Pre-loaded starter set of modifiable regimen templates assist in the building of a final version by the user.	E
Capability to customize rules for decision support tools and specific warnings (e.g. lab parameters displayed to trigger decision support).	E

BUILDING OF PROTOCOLS AND REGIMENS (continued)

RECOMMENDATION	PRIORITY LEVEL
Dose calculation built into ordering system (e.g. pre-built dosing formulas, dose checking, optimal dosing logic and dose rounding).	E
Capturing proper sequencing of treatment (e.g. multi-modality therapy, linked order, sequencing of regimens within a treatment plan or medications within an order).	E
Documentation section should follow guidelines from relevant health professional organizations and/or regulatory bodies (e.g. ASCO/ONS practice guidelines).	E
Allow screens for the entry of changes in chemotherapy treatment including reasons for modification which can be accessed by relevant system users.	E
Order locking mechanism post order verification.	E
Ability to incorporate logic for determining cycle scheduling and treatment duration (days between cycles and total number of cycles).	E
Flexibility to allow for therapeutic options during regimen builds (e.g. different routes of administration, selection of anti-emetic agents within a drug class).	D
Ability to incorporate text instructions or recommendations within order sets (e.g. items that do not fit typical categories or templates such as dietary or fluid restrictions).	D
Enable direct linkage to the Medication Administration Record (MAR).	E

PRIVACY

RECOMMENDATION	PRIORITY LEVEL
The purposes of data collection and interoperabilities with other systems must be identified with clear rationales provided.	E
Development of framework and criteria that describes the desired set of controls and best privacy practices that the organization is required to have in place.	E
Development of a risk assessment and a privacy impact/breach assessment process for internal monitoring and evaluation.	E

AUDIT LOGS AND MONITORING OF WORKAROUNDS

RECOMMENDATION	PRIORITY LEVEL
Audit trails to 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
Capable of being printed separately from the recorded information.	E
Ensure logging is turned on in the software application.	E
Record the percent of alerts that fire and number of alerts ignored or overridden.	E
Regular review and analysis of log data should be done to identify system performance, trends and identify issues early so they can be addressed.	E
Aggregate log information to provide meaningful information.	E
Apply appropriate permissions for access to audit log information and reports.	E
Monitor the technology in the clinical setting for impacts and barriers to performance including human factors and ergonomics prior to and after implementation.	E

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eHealth Ontario plays the leading role in harnessing technology and innovation to improve patient care, safety and access in support of the government's health strategy. The agency is responsible for implementing the government's ehealth agenda and creating electronic health records for Ontarians.

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Thank you.

Read the ST CPOE Best Practice Guidelines:

http://www.cancercare.on.ca/STCPOE

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