“Clinicians Driving Technology” - Developing ST CPOE Practice Guidelines and Supporting Their Adoption

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Objectives

1. Describe a provincial strategic plan for safety improvement in chemotherapy delivery based on guidelines development.

2. Describe the importance of guidelines in evaluating technology solutions in healthcare.

3. Describe the provincial measurement framework and process as it relates to computerized order entry systems (CPOE) for chemotherapy.

Disclosures

None

Cancer Care Ontario

As a Provincial Agency:

• CCO is accountable to the Government of Ontario in exercising its mandate, specifically, to the Minister of Health and Long-Term Care

As the government’s cancer advisor, CCO:

• Develops and implements quality improvements and standards

• Uses electronic information and technology to continually improve the safety, quality, efficiency, accessibility and accountability of Ontario’s cancer services

• Plans and develops Ontario Cancer Plan
Context

Ontario
- Population: 13.5 million people
- Health Regions: 14
- Distributed cancer system: 14 Regional Cancer Programs and one central cancer agency: Cancer Care Ontario (CCO)
- New cancers: 75,000+ new cancer cases per year
- Pathology: 116 hospitals (49 primary) and 2 large private laboratories
- Facilities: 77 Systemic Treatment facilities in the region

Chemotherapy Medication Errors

Unique Medication Class
- often prone to errors due to complex protocols
- dosing, monitoring and administration
- Narrow therapeutic index

High-risk alert medication Institute for Safe Medication Practices (ISMP)

Performance Improvement Cycle

Clinicians engaged in all components

1. Data/Information
   - Identifying quality improvement opportunities
   - Horizon-scan and championing innovation

2. Knowledge
   - Standardizing development and guidelines

3. Transfer
   - Developing and implementing improvement strategies

4. Performance Management
   - Monitoring performance

Why Systemic Treatment Computerized Prescriber Order Entry (ST CPOE)?

Organizations such as the Canada Health Infoway, Institute of Medicine (IOM), the Leapfrog Group, and Certification Commission for Health Information Technology (CCHIT) have advocated increased use of technology to improve patient safety.

**Benefits**
- Standardization of ordering practices
- Legibility of information
- Changes are recorded
- Ability to transfer ordering information

**Challenges**
- May lengthen ordering time
- May not match users' preferred workflows
- Interfacing of systems may be problematic
- Lack of engagement of end users
CCO’s Vision

Percentage of systemic treatment visits supported by all ST CPOE systems

CCO’s aim to achieve the goal of 90% systemic treatment (outpatient) visits supported by ST CPOE across Ontario was achieved in March 2013, and is now at 93%

Source: National Ambulatory Care Reporting System (CIHI), self-reported CPOE use

Overall research question to be addressed by the Guideline

What are the features, functionalities and components of a ST CPOE system which are required to ensure safe, high quality systemic treatment?

Benefits of Developing Guidelines for Systemic Treatment Computerized Prescriber Order Entry

1. Enable adherence to best practices to ensure benefits realization associated with ST CPOE systems
2. Support planning, resource management and decision support in the implementation and maintenance of ST CPOE systems
3. Provide mechanism for monitoring guideline concordance and associated clinical outcomes

ST CPOE Best Practice Guidelines

1. Framework (Introduction)
2. PEBC* (Clinical) Document
3. Supporting Tools (Information)
4. Conclusion
5. Measurement Plan

Clinical
- Increasing medication errors
- New errors
- Clinical decision supports
- Impacts on practice
- Implementation

Technology & Information
- Information standards
- Functional requirements
- System integration
- Usability
- Privacy & security

*Program in Evidence-Based Care
Methodologies Used to Support Guideline and Indicator Development

Review of the literature
Environmental Scan: industry and professional reports
Cancer Centre Consultations
Engagement of content experts:
- Expert Panels
- Targeted Peer Reviewers
- Professional consultations
- Modified Delphi Exercise

Supporting Tools Recommendations

Recommendations have been categorized as:

- Essential
  - Must be included in the design/implementation of the CPOE system in order to achieve desired quality, patient safety and user satisfaction.
- Desired
  - Not absolutely necessary for success, but inclusion would increase the likelihood of success and/or achieving significant gains in quality and patient safety.

PEBC (Clinical) Conclusions

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

ST CPOE processes complement current practice and workflow processes to enhance adoption by clinicians should be ensured.

Clinical, technical and leadership champions need to be identified to support the use of ST CPOE within the organization.

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

ST CPOE systems should be used in outpatient chemotherapy delivery to decrease chemotherapy-related medication errors.

Key Recommendations: Pre-Implementation Phase

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendation Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usability</td>
<td>Incorporate a patient-centered approach in the design, implementation and evaluation of CPOE systems.</td>
</tr>
<tr>
<td></td>
<td>Involvement of key stakeholders and end users in system design (e.g. physicians, pharmacists, nurses, information technology professionals, decision support, clinical informaticists).</td>
</tr>
<tr>
<td>Functionality</td>
<td>The system must contain functionality to support the medication ordering, verification, dispensing and administration process.</td>
</tr>
<tr>
<td></td>
<td>Functionality must include the ability to monitor patient entrance/exit screening processes; set minimum and maximum dose levels, dose ceilings and rounding values.</td>
</tr>
<tr>
<td>System Integration</td>
<td>Allows the patient to be uniquely identified across the continuum of care.</td>
</tr>
<tr>
<td></td>
<td>Allows access, management and storage of patient laboratory orders and results through a jurisdictional Laboratory Information system.</td>
</tr>
<tr>
<td></td>
<td>Provides clinicians with an improved ability to manage complete medication profiles through a jurisdictional drug information system.</td>
</tr>
</tbody>
</table>
Indicators provide a quantitative, evidence-based foundation for clinicians, organizations, researchers and health system planners to monitor and evaluate what happens to patients as a consequence of how well professional and organizational systems function to provide for the needs of patients (Mainz, 2003).
Clinical Practice Indicator Development Process

- Core Team (Authors)
- Review of the Literature / external scan
- Initial indicator set 118
- Indicators Aligned per Quality Dimensions
- Finalize Indicators N=11
- Core team Review
- Revised indicator set 59
- Round 1 Review (Extended Core Team)
- Round 2 Review (CCO Leadership)
- Round 3 Review (External Leaders)
- Revised indicator set 20
- ST CPOE Best Practice Guidelines Concordance Survey
- Evaluate ST CPOE systems currently in use as compared to the evidence based recommendations included in the ST CPOE guideline.
- Determine the current state of ST CPOE features and functionalities
- Determine opportunities for quality improvement initiatives

ST CPOE Best Practice Guidelines Concordance Survey

<table>
<thead>
<tr>
<th>Subcategory</th>
<th>Number of items</th>
<th>Total possible score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regimen and Protocols</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Functionality</td>
<td>22</td>
<td>88</td>
</tr>
<tr>
<td>Useful Alerts</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Audit logs</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>System Integration</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Usability</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>208</td>
</tr>
</tbody>
</table>

Responses on a 4 point Likert Scale:
Don’t know, Not Available, Partially Implemented, Fully Implemented

Clinical Practice Indicators

<table>
<thead>
<tr>
<th>Reporting Priorities</th>
<th>Reporting Indicators / Subset of Reporting Indicators</th>
<th>Quality Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future</td>
<td>Triggered Alert Rate (per order, per visit, per patient)</td>
<td>Safety</td>
</tr>
<tr>
<td>Future</td>
<td>Override Rate</td>
<td>Safety</td>
</tr>
<tr>
<td>Future</td>
<td>Adjusted Order Rate (per order)</td>
<td>Safety</td>
</tr>
<tr>
<td>Future</td>
<td>Unsigned Order Rate (per order)</td>
<td>Efficient</td>
</tr>
<tr>
<td>Future</td>
<td>Order Set Rate (per order)</td>
<td>Effective</td>
</tr>
<tr>
<td>Future</td>
<td>Free Text Rate (per order)</td>
<td>Effective</td>
</tr>
<tr>
<td>Future</td>
<td>Protocol-Consistent Order Rate (per order)</td>
<td>Effective</td>
</tr>
<tr>
<td>Near to Midterm</td>
<td>Intercepted Order Rate (per order) / Proxy for Near Miss Rate</td>
<td>Safety</td>
</tr>
<tr>
<td>Near to Midterm</td>
<td>Utilization Rate (per order) / Utilization Rate (per prescriber)</td>
<td>Effectiveness</td>
</tr>
<tr>
<td>Near to Midterm</td>
<td>Chemotherapy Medication Error Rate (per order)</td>
<td>Safety</td>
</tr>
<tr>
<td>Near to Midterm</td>
<td>Adverse Drug Event Rate – related to Chemotherapy</td>
<td>Safety</td>
</tr>
</tbody>
</table>
The results depicted below provide the individual site results compared to the mean results:

- **Min:** 135 (65%)
- **Max:** 192 (92%)
- **Mean:** 157.8 (76%)

The table and the diagram below show the percentage of total possible score per subcategory.

ST CPOE Best Practice Guidelines Concordance Survey

<table>
<thead>
<tr>
<th>Guideline Concordance</th>
<th>Depiction of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Hospital Results</td>
<td>Comparison to “Total”</td>
</tr>
<tr>
<td>Composite score = 82%</td>
<td>Hospital composite score = 72%</td>
</tr>
<tr>
<td>Ontario composite score = 93%</td>
<td></td>
</tr>
</tbody>
</table>

Presence of a Multidisciplinary Advisory Group

- **Yes:** 47.6%
- **No:** 47.6%
- **Not sure:** 4.8%
Quality Monitoring

List of quality indicators used to monitor quality:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triggered alert rate</td>
<td>33.3%</td>
</tr>
<tr>
<td>Override rate</td>
<td>19.0%</td>
</tr>
<tr>
<td>Adjusted order rate</td>
<td>15.6%</td>
</tr>
<tr>
<td>Unsigned order rate</td>
<td>15.0%</td>
</tr>
<tr>
<td>Regimen based order rate</td>
<td>14.6%</td>
</tr>
<tr>
<td>Feedback rate</td>
<td>12.9%</td>
</tr>
<tr>
<td>Protocol consistent order rate</td>
<td>12.5%</td>
</tr>
<tr>
<td>Non-protocol orders: e.g. orders requiring clarification</td>
<td>12.0%</td>
</tr>
<tr>
<td>Utilisation rate: e.g. percentage of chemotherapy orders entered via CPOE</td>
<td>11.5%</td>
</tr>
<tr>
<td>Chemotherapy related medication error rate</td>
<td>11.0%</td>
</tr>
<tr>
<td>Chemotherapy related adverse event rate</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

Site Interviews to Establish a Quality Improvement Agenda

1) Sites to decide on quality improvement plan
   - Develop Quality Indicator

2) Some of the sites who have not yet implemented the following features have been recommended to:
   - Implement pharmacy verification
   - Implement improvements in labeling
   - Implement the take home prescription functionality in OPIS

3) Initiate Multidisciplinary Team

ST CPOE Community of Practice

Multidisciplinary group looking at best practice, standards and quality measurements as it relates to chemotherapy prescribing through ST CPOE systems.

Topics:
- Regimen Building for Costly Regimens
- Changing from one ST CPOE system to another
- Development of a Near Miss Indicator
- Nomenclature of Drugs and Safety

Performance Improvement Cycle

Clinicians engaged in all components

1. Data/Information
2. Knowledge
3. Transfer
4. Performance Management

ST CPOE Guidelines
- ST CPOE Community of Practice
- ST CPOE Quality Improvement
- ST CPOE Guidelines
- Concordance Measurement
Conclusions – “Clinicians Driving Technology and Not the Other Way Around”

1. Ability to create guidelines merging clinical practice and information technology

2. Guidelines have highlighted the importance of clinical practice driving IT solutions

In Ontario:
- A provincial program to evaluate ST CPOE systems, how they are used and are they effective
- Guidelines provide basis for IT solution enhancements and product development
- Better accountability of the quality of IT solutions like ST CPOE systems for chemotherapy delivery
- Community of Practice established – focus on clinical practices

Acknowledgement

This guideline has been generously funded by eHealth Ontario, working in partnership with Cancer Care Ontario to improve the quality, safety and efficiency of systemic treatment across the province.

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.

Listed below is the team that contributed throughout this initiative:

- Annie Cheung
- Cecelia Marie Hamasoor
- Erin Rae
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- Nancy Wolf
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- Roxanne Cosby
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- Sharon Gradin
- Sherris Hertz
- Sindhujah Sivasambu
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- Vahal Rukvori MD