Guidelines for developing ambulatory chemotherapy preprinted orders

VERSION 1.0
Executive Summary

This document reflects the findings related to the design and implementation of preprinted orders learned throughout the research study, *Improving the Safety of Ambulatory Intravenous Chemotherapy in Canada*. This work was funded by the Canadian Patient Safety Institute (CPSI), Canadian Association of Provincial Cancer Agencies (CAPCA) and individual provincial cancer agencies across Canada.

Preprinted orders (PPOs) are protocol-specific paper order forms on which the standard order information is preprinted. They help simplify and standardize the ordering process because much of the basic information is already pre-filled such that the prescriber needs to fill in only patient-specific information to complete the order. Although PPOs are the primary tool used for communicating ambulatory chemotherapy by Canadian cancer care providers, not all cancer care facilities use them. Also, existing PPOs vary widely in format, content and layout and do not incorporate the flexibility required for the dynamic needs of oncology ordering practices.

To address the structural issues associated with PPOs, and thus encourage their use, human factors experts from the University Health Network (UHN), oncology clinicians from CAPCA Systemic Therapy Safety Committee and the CPSI study co-investigators, and nine graphic designers from the Ontario College of Art and Design (OCADU) collaborated through an iterative user-centered design (UCD) process to develop this document. The document provides guidance on the design process, content and graphic design elements for PPOs of standardized ambulatory chemotherapy protocols. Although the guidelines are intended for developing/improving ambulatory chemotherapy orders for adult patients, some of the general design principles may apply to designing PPOs of other clinical areas and/or of other patient populations.

This document consists of three sections: 1. Design Process, 2. Content Guidelines and 3. Design Guidelines. At the end of each section, key guidelines are outlined in a checklist, which is designed to help organizations evaluate their existing PPOs and PPO development process. The first section introduces an iterative UCD method with multidisciplinary involvement for developing PPOs. The second and third sections are comprised of 80 guidelines that are categorized into “must”, “should” and “may/consider” based on their relative importance. The second section consists
of 28 content guidelines that describe desirable and undesirable information, expressions and nomenclature. The third section consists of 52 design guidelines about content organization, page layout, and formatting-related topics. To help readers develop PPOs that follow these guidelines, a link to the website where customizable PPO templates can be downloaded is included.

Readers are reminded that the foundation of well-designed PPOs is well-standardized protocols. Standard protocols must be as simple as possible, requiring minimal user effort to successfully understand and follow them. It is impossible to design a PPO that is easy to use and understand if the protocol itself is unnecessarily complex and difficult to follow.

These guidelines and the accompanying PPO templates should help cancer care providers develop PPOs that are more user-friendly and flexible to accommodate dynamic ambulatory chemotherapy orders. Also, the guidelines should help those developing a computerized physician order entry (CPOE) system ensure that its user-interfaces and functionalities meet the needs of cancer care providers. Ultimately, it is hoped that any organization developing/selecting PPOs or a CPOE system learn from these guidelines and achieve improved patient safety.
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## Revision History

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Introduction

This document is the result of a collaboration between the University Health Network (UHN) and the graphic design department of the Ontario College of Art and Design (OCADU) as a part of a research study, *Improving the Safety of Ambulatory Intravenous Chemotherapy in Canada*. This study was funded by the Canadian Patient Safety Institute (CPSI), Canadian Association of Provincial Cancer Agencies (CAPCA) and individual provincial cancer agencies across Canada. The CAPCA Systemic Therapy Safety Committee served as a steering committee for this study.

Multiple methods were used to develop the guidelines in this document:

- Comprehensive literature reviews and environmental scan
- Analysis of the field observations at six cancer centres across Canada including:
  - Chemotherapy order information flow mapping
  - Sample incident reports analysis
  - Human factors evaluation of sample PPOs
  - Systematic risk analysis
- Six focus group sessions and reviews by medical oncologists, an oncology nurse, oncology pharmacists, human factors engineers and graphic designers
- Five iterations of analyzing user requirements, designing & prototyping and evaluation by seven senior graphic designers and two faculty members of the OCADU
- Review by 20 users, including four medical oncologists, three hematologists, four pharmacists, seven nurses, one pharmacy technician and one oncology unit clerk

Scope

This document provides guidance on the design process, contents and graphic design elements for preprinted orders (PPOs) of standardized ambulatory chemotherapy protocols. The guidelines are intended to help cancer care organizations develop/improve the format and contents for PPOs to allow accurate communication of ambulatory chemotherapy orders. Although the guidelines are intended for ambulatory chemotherapy orders for adult patients, some of the general design principles may apply to designing PPOs of clinical trials, inpatient chemotherapy orders, pediatric patient population and other clinical areas. Also, the guidelines should help those developing a computerized physician order entry (CPOE) system ensure that its user-interfaces and functionalities meet the needs of cancer care providers.
Although outside the scope of this document, establishing policies and procedures that ensure proper maintenance of existing PPOs and approval of new/modified PPOs is critical. Readers are encouraged to consider the PPO approval and maintenance guidelines in the Guidelines for Standard Order Sets by the Institute for Safe Medication Practices (ISMP).

How to use this document

This document consists of three sections: design process, content and design guidelines. The design process section introduces an iterative user-centered design (UCD) method with multi-disciplinary involvement, which was employed in developing the sample PPOs used in this document (see Appendices A to C). The content guidelines section describes desirable and undesirable information, expressions and nomenclature. The design guidelines section advises about content organization, page layout & formatting, typography, user-entry fields, use of checkmarks & checkboxes, use of lines and printing. Whenever there is existing literature supporting a guideline, the articles are referenced at the end of the guideline statement. The full citations of the articles can be found at the end of the document.

The design and content guidelines are classified into three categories depending on how they are phrased. A “must” indicates a mandatory requirement, a “should” indicates a guideline that is strongly recommended but not mandatory, and a “may” or “consider” indicates an optional statement. Whenever possible, graphic illustrations are used to visually describe the issues and implementation examples of the guidelines. Three sample PPOs used in this document (see Appendices A to C) are potential implementation solutions, and their editable versions are available to download from www.capca.ca. Readers are reminded that these sample PPOs are not prescribed PPO designs that every cancer care provider must follow. As such, organizations should consider their own unique processes and needs, and adopt the sample PPOs accordingly. Also, modifying the sample PPOs should be done with caution as doing so may lead to violating the guidelines in this document.

The checklists following each section of the guidelines are designed to help organizations that are currently using PPOs assess their existing PPO development process and existing PPOs against the key guidelines in this document. However, satisfying all the requirements in the checklists does not guarantee perfect PPOs. Each organization has its own unique workflows, processes and culture, and thus, unique user needs. The design process outlined in this document describes an ideal process that organizations may want to employ to ensure their unique user needs are considered in their PPO design. However, it is acknowledged that the suggested process may not be feasible and/or may conflict with the existing process for some organizations. As such, each organization should define its own process to understand the needs of its users and design its PPOs accordingly.

Finally, the foundation of well-designed PPOs is well-standardized protocols. Standard protocols must be as simple as possible, requiring minimal user effort
to successfully understand and follow them. It is impossible to design a PPO that is easy to use and understand if the protocol itself is unnecessarily complex and difficult to follow. Therefore, each organization should ensure that its standard protocols are simple, complete and reflect current best practices before trying to develop/improve its PPOs following this document. Readers are encouraged to consider Guidelines for Standard Order Sets by the ISMP[1] and Order Sets in Health Care: An Evidence-based Analysis by Healthcare Human Factors, UHN, for guidance on successfully developing and implementing standard order sets[2].

### Abbreviations and Acronyms

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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BSA</td>
<td>Body Surface Area</td>
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<tr>
<td>CAPCA</td>
<td>Canadian Association of Provincial Cancer Agencies</td>
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<td>CPOE</td>
<td>Computerized Physician Order Entry</td>
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<td>CPSI</td>
<td>Canadian Patient Safety Institute</td>
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<td>IV</td>
<td>Intravenous</td>
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<td>ISMP</td>
<td>Institute for Safe Medication Practices (US)</td>
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<td>ISMP Canada</td>
<td>Institute for Safe Medication Practices Canada</td>
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<td>NCR Paper</td>
<td>No-Carbon-Required Paper</td>
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<td>OCADU</td>
<td>Ontario College of Art and Design</td>
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<td>PPO</td>
<td>Preprinted Order</td>
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<td>UCD</td>
<td>User-Centered Design</td>
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<td>UHN</td>
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For further details about the methods and resources used, please see Improving the Safety of Ambulatory Intravenous Chemotherapy in Canada - full study report and recommendations[5].
Design Process Guidelines

The design process outlined in this section is an ideal process that organizations may want to employ to ensure their unique user needs are considered in their PPO design. The process consists of multiple iterations of analyzing user requirements, designing/prototyping and evaluating involving representatives of all the user groups, a human factors professional and a graphic designer. However, it is acknowledged that completely following this process may be impossible for some organizations depending on their budget, time, and/or resources. These organizations should ensure that their design process meets the minimal requirements shown on p. 17. For more information about user-centered design and interface design methods, readers are referred to Mayhew (1999) and Sharp et al. (2007).

Iterative user-centered design

Iterative user-centered design (UCD) is a product design method that involves multiple iterations of analyzing user requirements, designing, prototyping and evaluating. As illustrated in Figure 1, users are at the core of UCD and involved throughout its processes. This helps ensure that the end product meets all the users’ needs and is highly adaptable.

Chemotherapy preprinted orders (PPOs) are used concurrently by multiple users from different professions, including physicians, nurses, clerks, pharmacists and pharmacy technicians. Therefore, it is critical that all these user groups are involved throughout the PPO development process.

In addition to the end users, a human factors professional and a graphic designer should be consulted when developing PPOs. Human factors professionals have expertise in analyzing user/system problems, determining user requirements, conducting usability testing and analyzing testing data for design improvements. Graphic designers, who have expertise in typography, page layout and formatting, can help develop PPO designs that meet the user requirements identified by human factors professionals.
ANALYZING USER REQUIREMENTS

The first step in UCD is analyzing user requirements. To identify different user types and their needs, the complete “life cycle” of chemotherapy PPOs must be understood from the point when PPOs are printed to when patients have received their treatments. Following a sample of orders throughout their “life cycle” via shadowing and interviewing the clinicians processing the orders is ideal, and human factors professionals can greatly contribute to this process. The observations from this ethnographic exercise will help understand how chemotherapy PPOs are used in the real world, which is difficult to capture via indirect observation methods such as surveys and chart reviews. Such shadowing and interviews should be targeted at answering the following questions:

BY WHOM, HOW AND WHEN ARE PPOS

- Printed/purchased and stored?
- Retrieved for prescribers?
- Completed?
- Checked?
- Photocopied/scanned/faxed?
- Transported from one clinical area to another?

TOOLS AND ENVIRONMENT

- What sources of information/tools are used for carrying out their tasks with PPOs?
- What is the user’s working environment? For example, are users frequently interrupted when carrying out their tasks? What are the lighting conditions?
USER FRustrations

- Did users encounter any problems using PPOs? If so, what were they?
- Did users express any frustrations or difficulties when using PPOs?

Designing and prototyping

The identified user requirements should be translated into appropriate PPO design and contents. Graphic designers can help develop various designs that meet the user requirements and rapidly prototype these ideas. Prototypes facilitate group discussions and allow different ideas to be evaluated by users. Prototypes do not have to look like the actual PPOs to be implemented. During the early stages of the design process, prototypes can even be rough sketches on a whiteboard or paper.

Starting with PPOs for a few protocols that are different from each other in terms of their complexity, user types (e.g. hematologists vs. oncologists) and types of medications involved should ensure that the diversity of chemotherapy protocols are considered in the design process.

Evaluation

Prototypes should be evaluated by users to identify any design problems that can lead to user errors and/or frustrations. A number of methods can be used to evaluate PPO prototypes depending on the purposes and the level of completeness of the prototypes.

Focus groups of users can be an efficient way to evaluate prototypes during the early stages of the design process. Focus groups do not require many resources to plan and conduct, but can yield valuable user feedback. When conducting focus groups, it is important that representatives of all user groups be involved.

For fine-tuning prototypes during the later stages of the design process, usability testing is recommended. Usability testing involves mimicking the real-world user environment and asking users to carry out selected core tasks they normally carry out using the product. Usability testing does not yield data for statistical analysis such as predicting how successfully users are going to complete their tasks given a specific PPO design. Rather, this method helps identify problematic areas of PPOs that may lead to user errors or frustration.

Participants

Two to three people from each user group including physicians, nurses, pharmacists, pharmacy technicians and clerks should be tested. If PPOs are to be used at multiple sites, participants should ideally be recruited from all the sites.

Preparing for Testing

Identify the core tasks of each user group. The core tasks should include both common tasks and those tasks that are expected to be problematic or challenging. Although the full responsibilities of user groups vary from site to site, the typical core tasks of PPO user groups are as follows:
• Oncologist:
  • Retrieves the PPO from its storage
  • Completes the PPO
• Clinic nurse:
  • Checks the accuracy and completeness of the order
  • Makes photocopies of the order if necessary
• Clerk:
  • Books the chemotherapy treatments and laboratory tests
  • Notifies the patient about the scheduled treatments
  • Prints/orders PPOs
  • Makes photocopies of the order if necessary
  • Sends copies of the order to the pharmacy and the treatment area
• Pharmacist and pharmacy technician:
  • Checks the accuracy and completeness of the order
  • Enters the order into the pharmacy information system
  • Checks the patient’s laboratory test results against the order
  • Prepares and checks the mixed chemotherapy medications against the order
• Treatment nurse:
  • Checks the accuracy and completeness of the order
  • Checks the patient’s laboratory test results against the order
  • Checks the prepared medications against the order
  • Prepares and administers medications according to the order
  • Documents the medications administered

After identifying the core tasks, a realistic scenario involving the core tasks should be developed. For example, *Figure 2* shows a scenario and task used for testing the sample PPOs presented in this document.
CONDUCTING TESTING

Testing can be conducted where users normally work, or in an isolated area (e.g. a meeting room). Observe users carrying out their tasks without interrupting them. Consider asking participants to speak their thought processes aloud as they carry out their tasks. This method, called think-aloud protocol, helps understand the rationale behind participants’ behaviours. Any errors and misinterpretations by users should be recorded for analysis, and not corrected on the spot. If having users on-site is impossible, consider sending the PPOs, scenarios, tasks and test instructions to users and have them carry out the testing by themselves. Users can provide their feedback by making notes directly on PPOs and/or sending them to the study investigator via email/fax/mail. Although this method does not allow observing users directly, this may be an effective method to gather user feedback when users are geographically dispersed.

ANALYZING RESULTS

When analyzing the data collected from PPO usability testing, distinction should be made between the feedback stemming from how protocols are standardized and that from how PPOs are designed. Results of testing data may lead to further user needs analysis. Redesign solutions to the problems identified from the analysis should be explored through the next iteration.
Checklist for evaluating your PPO design process

☐ The process involves at least one iteration of analyzing user requirements, designing, prototyping and evaluating.

☐ Physicians, pharmacists, nurses, pharmacy technicians and unit clerks are involved throughout the process.

☐ If PPOs are to be used at multiple sites, the representatives from all the sites are involved throughout the process.

☐ The process involves one or more evaluations with the end users.
Content Guidelines

Basic elements of all chemotherapy orders

The contents listed in this section are derived from peer-reviewed literature as basic elements for ambulatory chemotherapy preprinted orders (PPOs). As such, they are not discussed further in this document. Those contents that should be preprinted as opposed to be filled out by the prescriber are tagged “preprinted”.

PATIENT DEMOGRAPHICS & TREATMENT PLAN

- Space for the patient’s name and at least one unique patient identifier at the top-right corner of the page
- Protocol name at the top of the page (preprinted)
- Prompt to indicate the current cycle number and the total cycle number at the top of the page
- Prompt to indicate the patient’s height (in cm), weight (in kg) and body surface area (in $m^2$) at the top of the page
- Prompt for the prescriber to sign and date at the bottom of the page

HYDRATION ORDERS (IF APPLICABLE)

- Solution type and volume (preprinted)
- Duration of infusion (preprinted)
- Route of administration (preprinted)

SUPPORTIVE MEDICATIONS/PROPHYLACTICS (IF APPLICABLE)

- Standardized full generic name of the medication (preprinted)
- Dose (preprinted)
- Route of administration (preprinted)
- If applicable, duration of infusion (preprinted)

CHEMOTHERAPY MEDICATION ORDERS

- Standardized full generic name of the chemotherapy agent (preprinted)
- Prompt to fill in patient-specific calculated dose for each medication (e.g. in mg)
- Standardized route(s) of administration (preprinted)
- If applicable, standardized diluent type and volume (preprinted)
- Standardized duration of infusion (preprinted)
- Diluent type and volume, if applicable (preprinted)
Recommended additional contents

2.1 The diagnosis that the PPO is designed for must be shown at the top of the first page via the protocol name and/or by explicitly stating the diagnosis. Given the large number of chemotherapy protocols available, users can select a wrong PPO. Displaying the diagnosis that a PPO is designed for can help ensure that the correct PPO is selected.

2.2 When a protocol is designed for a specific treatment intent (e.g. adjuvant, palliative, etc.), then the intent should be shown on the first page of the PPO.

The intent of treatment that a PPO is designed for can help ensure that the correct PPO is selected and used.

2.3 Duration of a single cycle must be shown. Duration of a cycle can help clinicians check the interval between the previous cycle and the current cycle. Clinicians should be able to identify any delays in the treatment schedule and incorporate this information when checking the treatment interval.

2.4 There must be a prompt to indicate if the patient has any known allergies. If a patient has an allergy, the prescriber should follow the organization’s polices and procedures to document the information.

Prompting prescribers to indicate if a patient has any known allergies can encourage them to complete the documentation required by the organization. Also, the prompt can help ensure that prescribers consider patients’ allergies when ordering chemotherapy.

2.5 There must be a prompt to indicate all the planned (as opposed to actual) administration date(s) over the course of the cycle, and these dates should be clearly differentiated from other dates on the PPO.

Although it is not always possible to indicate the actual administration dates when ordering, indicating at least the planned administration dates on chemotherapy orders allows clinicians to check if the actual administration date is within the safe range of the planned date as per local policies and procedures.

2.6 Protocol-specific requirements for proceeding with the treatment must be shown whenever applicable. Such requirements may include bloodwork results and laboratory results. Other detailed criteria such as toxicity scores should be readily available for reference via another mechanism.

Protocol-specific requirements/prerequisites on a PPO allow clinicians to confirm if a patient can proceed to receive the treatment without looking up another reference. Also, having prerequisites on PPOs can help ensure that
every clinician makes the decision to proceed with a given treatment based on the same criteria.

2.7 All the prompts for documenting the date should show the organization’s standard date format[1].
   Organizations should establish a single consistent format for documenting dates, and the format should be displayed with the prompts for documenting dates on PPOs.

2.8 Whenever applicable, the route of administration of pre-medications should be shown as “PO/IV”.
   If the patient has difficulty swallowing, then the nurse should be allowed to administer an oral pre-medication intravenously rather than orally.

2.9 A unique identification number and the most recent revision date of the PPO must be shown on every page[1, 9, 11].
   A unique form number and revision date on each PPO ensures that only the most up-to-date version of PPOs are used.

2.10 Space must be allocated for prescribers to print their name as well as to sign. For teaching institutions where residents complete PPOs and their supervisor co-signs the orders, enough space must be allocated for both the resident and the supervisor’s name and signature.
   Prescriber’s name printed in a legible manner allows any user to quickly identify the prescriber in case of emergency.

2.11 Whenever applicable, standardized post-chemotherapy medications should be shown following chemotherapy orders[8, 9, 12].
   If a separate prescription form is used for supportive medications for home use, the prescriber may forget to complete a separate prescription. Showing supportive medications on PPOs can serve as a reminder to prescribers to do so.

2.12 Whenever applicable, standardized pre- and post-hydration orders should be shown separately prior to and after chemotherapy orders, respectively.
   Showing both pre- and post-hydration orders under one hydration orders section prior to chemotherapy orders can lead to nurses forgetting to administer post-hydration orders.
HYDRATION ORDERS OVER 60 MINUTES
1000 mL NS IV **before** and **after** treatment on treatment days that cisPLATin is ordered.

PRE-MEDICATIONS (HL-4)
[ ] Ondansetron 8 mg
Dexamethasone [ ] 8 mg or [ ] 12 mg
[ ] Prochlorperazine 10 mg

DAY 1 CHEMOTHERAPY

ISSUE
Two hydration orders, one prior to and one after each chemotherapy treatment, are stated together under one hydration order section shown before the chemotherapy orders. If the chemotherapy medication orders go over the page where the hydration order is shown, nurses may forget to administer the post-chemotherapy hydration.

GUIDELINE
The hydration orders are split into two sections: “Pre-hydration” and “Post-hydration”. Thus, there is less risk of omitting the post-chemotherapy hydration.
Special guidelines for multi-page PPOs

2.13 On every page, the following information **must** be shown:

**AT THE TOP**
A. the page number in the format “Page y of yy”, where “y” is the current page number and “yy” is the total number of pages\(^1\)
B. a prompt to indicate the current cycle number and the total cycle number (e.g. Cycle 1 of 4)\(^1,8\)
C. a prompt to indicate the patient’s name and at least one unique patient identifier.

**AT THE BOTTOM**
D. a prompt for the prescriber to print his/her name, sign and date

The total number of pages of a PPO and the current page number are critical for users to be able to check that all pages of a multi-page PPO are communicated to all relevant care providers. The current cycle number should be clearly displayed on every page to prevent the order for one cycle from getting mixed up with the order for another cycle. Having both the current cycle number the total number of cycles throughout the therapy helps clinicians understand the order in context of the treatment plan. Finally, patient identifiers, the prescriber’s name in print, signature and the date the order was signed must be on every page such that each page is uniquely identifiable. Users should not be asked to indicate the patient’s BSA on every page since handwriting BSA on multiple pages is prone to transcription error. The patient safety risk related to such transcription error outweighs the inconvenience of flipping to the first page for the BSA.
2.14  All the pages except for the last page must show “CONTINUED ON PAGE [the next page number]” at the bottom right corner of the pages (see Figure A). Also, all the pages except for the first page must show “CONTINUED” at the top of the pages (preprinted, see Figure B).

Showing these phrases can help ensure that all the pages of a multi-page PPO are communicated.

2.15  When chemotherapy medication orders span multiple pages, at the top of the page where the orders are continued,

A.  “CHEMOTHERAPY ORDERS CONTINUED” must be shown for protocols of a single treatment day

B.  “Day # CHEMOTHERAPY ORDERS CONTINUED” must be shown for protocols that consist of multiple treatment days
Guidelines for expressing chemotherapy medication orders

2.16 For orders that require infusion via an elastomeric infusion pump, the parameters that allow the identification of the appropriate pump product model must be shown on the PPO.

The rates at which elastomeric pumps infuse drugs vary widely depending on their product model. Therefore, it is critical that the right elastomeric pump product is selected by verifying the information identifying the correct pump product model.

If total dose is less than or equal to 4400 mg, to a volume of 92 mL by continuous infusion at 2 mL/hr via Baxter SV2 Infusor

GUIDELINE
For Baxter Infusors®, the rate of infusion in milliliters per hour (or mL/hr) and the relative size of the pump product (i.e. ‘LV’ for large volume and ‘SV’ for small volume) should be printed on the PPO.

2.17 For chemotherapy medication orders that require a programmable ambulatory infusion pump (AIP) OR a large-volume general infusion pump, the infusion flow rate (e.g. 10 mL/hr) must be shown in the unit in which the pump should be programmed[1]. Also, the infusion rate must be shown in close proximity to the infusion duration.

The process of calculating an infusion flow rate is prone to human errors[13]. Therefore, nurses should be given the opportunity to check their calculation against a pre-calculated flow rate. The deviation that may result from overfills in IV bags is negligible compared to large-scale overdoses that may
result from rate calculation errors. Since the infusion flow rate is dependent on the infusion duration, the flow rate should be shown in close proximity to the duration to ensure that the rate is changed whenever the infusion duration is changed.

2.18 Whenever applicable, chemotherapy medication doses must be shown in both dose per specific patient factor (e.g. body surface area, weight or area under the curve) and calculated dose to be administered (e.g. in mg). Indicating chemotherapy medication doses per specific patient factor such as body surface area (BSA), weight, or area under the curve (AUC), as well as calculated dose, allows clinicians to easily check the accuracy of dose calculations.

2.19 For continuous infusions that require multiple drug containers, the following information must be shown:

- total cycle/course dose in mg/m² in parentheses
- dose per container
- total number of containers used per day

2.20 For continuous infusions over multiple days that require only one patient visit, the daily dose in both mg/m² per day and mg per day as well as the total dose in both mg/m² and in mg must be shown.

Clearly showing both daily doses and total doses can help avoid misinterpretation of a total dose as a daily dose and vice versa.
Information, nomenclature and expressions to avoid

2.21 Using “Day 0” should be avoided when describing treatment schedules[6].

“Day 1” typically describes the day on which a chemotherapy treatment starts.

**EXCEPTION**
This guideline may not be applicable to patients such as bone marrow transplant patients since “Day 0” is used to indicate the day of the transplant. Also, some clinical trials may use “Day 0” to indicate the day the first pre-medications are administered.

2.22 Preliminary form-filling instructions should be avoided whenever possible. If a section requires specific user instructions, the instructions should be placed within the section itself[18, 19].

Although the ISMP recommends the inclusion of directions for completing the order set at the top of the form, research has shown that form users generally do not read preliminary form-filling instructions[18, 19]. Ideally, users should be able to use forms without any instructions. When an instruction is necessary for a specific item on the form, the instruction should be shown in close proximity to the relevant part of the form.

---

**Instruction:** All orders to be carried out must be checked/completed as appropriate.

**ISSUE**
Users of PPOs with checkboxes must be aware that only those orders that are checked off can be initiated. A basic policy like this should be part of user training rather than explained on every PPO.

---

**Pre-medications** (Strikeout to exclude)

- ondansetron 8 mg PO/IV
- dexamethasone 12 mg PO/IV

**GUIDELINE**
A short, specific instruction to strike out items to exclude is shown next to the section heading.
2.23 Warning messages or policies and procedures applicable to all PPOs and all users should not be shown on PPOs.

With generic warning messages, policies and procedures that are repeated on every PPO, users will likely experience “alert fatigue”, which occurs when irrelevant and unimportant warnings/alerts appear repeatedly[20, 21]. Consequently, users may not pay much attention to such messages, and valuable space on PPOs will be wasted.

2.24 A hyphen/dash mark must not be used for expressing dosing schedules. Instead of showing the span of days, the specific days of therapy should be listed along with the daily dose[1, 22].

Span of days for administration of a course of therapy in medication orders such “vincristine 1.4 mg/m² days 1-8” can be misinterpreted as days 1 through 8 while it was meant to be on days 1 and 8 or vice versa. Rather than showing span of days, the specific days of therapy should be listed along with the daily dose to prevent any potential misinterpretation (e.g. vincristine 1.4 mg/m²/day on day 1 and 8).

2.25 Negatively framed and/or conditional statements should be avoided[17, 23-25].

Negative statements such as “Unless allergic, give...” of “If... then” tend to be ambiguous. Also, this type of statement transfers clinical and legal responsibility from the prescriber to others down the line.

2.26 If return appointment orders are part of PPOs, unclear expressions such as “Return in 3 weeks for Doctor and Cycle 2” and “Return in 2 weeks for Doctor and FOLFOX” should be avoided.

Since a single PPO can be used for multiple treatments within a single cycle, depending on when the clerk makes return appointments, expressions such as those shown above can be confusing. Return appointment orders should
clearly state the cycle day the return appointment should be scheduled for. For example, “Return to the doctor 3 weeks after the first day of the current cycle for FOLFOX.”

2.27 Instructions for hypersensitivity or infusion-associated reactions should be readily available via a communication mechanism other than PPOs.

Having the instructions for hypersensitivity/infusion reactions on PPOs may allow nurses to treat a patient experiencing a reaction in a timely manner without looking for a separate document for the instructions. However, such reaction instructions and corresponding dosing guideline tend to be lengthy, and thus, increase the length of PPOs. The longer the PPO the larger the chance of a page(s) of the order getting lost. For those reaction protocols that require the prescriber’s signature, organizations may decide to include the reaction instructions on their PPOs, but should be aware of the risks associated with doing so.

2.28 Use of symbols, abbreviations and dose designations should follow the Accreditation Canada standard.

Accreditation Canada requires each organization to implement ISMP Canada’s “Do Not Use List”[26] to prevent medication errors related to the use of abbreviations, symbols, and dose designations[9,10,27].

EXCEPTION:
For indicating the required laboratory values for proceeding with the treatment, using logical operators such as “≥” as opposed to writing out “greater than or equal to” is preferred.

May proceed with doses as written if within 24 hours
ANC greater than or equal to 1 x 10^9/L, Platelets greater than 100 x 10^9/L, Creatinine Clearance greater than or equal to 60 mL/min.

ISSUE
When multiple laboratory value requirements are shown, writing out the logical operators in words takes up a lot of space and requires more cognitive resources to understand the requirements.

GUIDELINE
Using the logical operators, the same laboratory values can be displayed in a more succinct and intuitive manner.
2.1 Metastatic Colorectal Cancer  Palliative Therapy

Cycle: _______ of _______  Duration: 14 days

Ht  Wt  BSA  Allergies

Yes  No

Planned Administration Date

Day 1 (mm/dd/yy)

Delay by _______ week(s)

Requirements within 42 hours

ANC  Platelets  Creatinine

≥ 1 × 10^9/L  ≥ 100 × 10^9/L  ≥ 60 mL/min

Other:

Pre-medications (Strikeout to exclude)

✓ ondansetron  8 mg  PO/IV
✓ dexamethasone  12 mg  PO/IV
✓ prophylactic atropine  0.3 mg  SC

Other:

CHEMOTHERAPY ORDERS

irinotecan & leucovorin may be infused at the same time by using a Y-Connector placed immediately before the injection site.

irinotecan  180 mg/m² = _______ mg

Other: _______ mg/m² = _______ mg

IV in 500 mL D5W over 90 minutes
Approximate rate = 333 mL/hr

Prescriber Name  Prescriber Signature  Date (mm/dd/yy)

CONTINUED ON PAGE 2
Cycle: .......... of ...........

CONTINUED

2.11 Post-medications (Strikeout to exclude)

✓ loperamide 2 mg caplets:
  4 mg PO at first onset of diarrhea

then

  2 mg PO every 2 hours until diarrhea free × 12 hours.
  May give 4 mg PO every 4 hours during the night.
  Mitte: 48 caplets.

✓ atropine 0.3 to 0.6 mg SC PRN
  Repeat up to 1.2 mg for early diarrhea, abdominal
  cramps, rhinitis, lacrimation, diaphoresis or flushing.

☐ Other: ..........................................................

Doctor’s Appointments

☐ Current cycle is the last cycle. Return in .......... weeks

☐ Return to the doctor 2 weeks after the first day of the
  current cycle.

Laboratory Orders

Prior to each cycle

✓ CBC & Diff   ✓ AST    ✓ Bili
✓ Creatinine   ✓ Platelets ✓ Alk Phos

☐ Other: ..........................................................

Prescriber Name                  Prescriber Signature                  Date (mm/dd/yy)

CONTINUED ON PAGE 4
## Checklist for evaluating your existing PPO contents

The bolded items are “must” guidelines, and the others are “should” guidelines.

### All PPOs include

- The basic elements on p. 18
- **Diagnosis that the PPO is designed for** shown at the top of the first page via the protocol name and/or by explicitly stating the diagnosis (preprinted)
- Intent of treatment when the PPO is for a protocol with a specific treatment intent (preprinted)
- **Duration of a single cycle** (preprinted)
- Prompt to indicate if the patient has any known allergy
- Planned administration dates, clearly differentiated from other dates on the PPO
- **Whenever applicable, protocol-specific requirements for proceeding with the treatment** (preprinted)
- Detailed criteria for proceeding with the treatment other than bloodwork and laboratory results such as toxicity scores readily available for reference via mechanism other than PPOs
- All the prompts for documenting the date show the organization’s standard date format (preprinted)
Whenever applicable, the route of administration of pre-medications shown as “PO/IV” (preprinted)

Unique identification number for each PPO on every page (preprinted)

Most recent revision date on every page (preprinted)

Prompt for the prescribers to print their name as well as to sign. For teaching institutions where residents complete PPOs and their supervisor co-signs the orders, prompt for both the resident and the supervisor to print their name and sign.

Whenever applicable, standardized post-chemotherapy medications follow chemotherapy orders (preprinted)

Whenever applicable, standardized pre- and post-hydration orders shown separately prior to and after the chemotherapy orders, respectively (preprinted)

Multi-page PPOs include

At the top of every page:

- The page number in the format “Page y of yy”, where “y” is the current page number and “yy” is the total number of pages (preprinted)
- A prompt to indicate the current cycle number and the total cycle number (e.g. Cycle 1 of 4)
- A prompt to indicate the patient’s name and at least one unique patient identifier

At the bottom of every page:

- A prompt for the prescriber to print his/her name, sign and date
All the pages except for the last page show “CONTINUED ON PAGE [the next page number]” at the bottom right corner of the pages.

All the pages except for the first page show “CONTINUED” at the top of the pages.

When chemotherapy medication orders span multiple pages, at the top of the page where the orders are continued:

- “CHEMOTHERAPY ORDERS CONTINUED” shown for protocols of a single treatment day (preprinted)
- “Day # CHEMOTHERAPY ORDERS CONTINUED” shown for protocols that consist of multiple treatment days (preprinted)

Chemotherapy medication order expressions

- For orders that require infusion via an elastomeric infusion pump, the parameters that allow the identification of the appropriate pump product model are shown.

- For orders that require a programmable ambulatory infusion pump (AIP) OR a large-volume general infusion pump, the infusion flow rate (e.g. 10 mL/hr) is shown in the unit in which the pump should be programmed. Also, the infusion rate is shown in close proximity to the infusion duration.

- Whenever applicable, chemotherapy medication doses are shown in both dose per specific patient factor (e.g. body surface area, weight or area under the curve) and calculated dose to be administered (e.g. in mg).
For continuous infusions that require multiple drug containers, the following information is shown:

- Total cycle/course dose in mg/m$^2$ in parentheses
- Dose per container
- Total number of containers used per day

For continuous infusions over multiple days that require only one patient visit, the daily dose in both mg/m$^2$ per day and mg per day as well as the total dose in both mg/m$^2$ and in mg

Information and expressions to avoid

- “Day 0” is not used for describing treatment schedules except for bone marrow transplant patients and clinical trials
- Preliminary form-filling instructions not used whenever possible
- When user instructions necessary for a specific section, the instructions shown within the relevant section itself.
- Warning messages or policies and procedures applicable to all PPOs and all users not shown on PPOs
- A hyphen/dash mark not used for expressing dosing schedules. Rather, the specific days of therapy listed along with the daily dose
- Negatively framed and/or conditional statements not used
- Expressions such as “Return in 3 weeks for Doctor and Cycle 2” and “Return in 2 weeks for Doctor and FOLFOX” not used
☐ Instructions for hypersensitivity or infusion-associated reactions readily available via a communication mechanism other than PPOs

☐ Use of symbols, abbreviations and dose designations follow the Accreditation Canada standard (Exception: For indicating the required laboratory values for proceeding with the treatment, using logical operators such as “≥” as opposed to writing out “greater than or equal to” is preferred).
Design Guidelines

Given the limited space, only a portion of the sample PPOs are shown to illustrate the guidelines whenever necessary. To see the full sample PPOs, please see the Appendices A to C.

Content organization

3.1 Each PPO must be designed and used for a single cycle only. A patient’s condition is more likely to change significantly over multiple cycles than within a single cycle. Accordingly, the initial order on a PPO is more likely to be modified and become messy with changes when the PPO is used for multiple cycles than for a single cycle. Further, when changes are made to a multi-cycle PPO, it is difficult to indicate or understand which changes apply to which cycle.

ISSUE
The required bloodwork counts and chemotherapy medication doses have been modified (one medication dose was changed more than once). Since the order is for multiple cycles and does not show when and why these changes were made, it is unclear if the changes are applicable to Cycle 11 or Cycle 12 or both.
3.2 Contents of PPOs must be clearly divided into logical sections with headings [1, 7, 9, 10, 24, 25, 28-31].

Cycle # ______ of 6 Day 1
_____ Granisetron 1 mg IV pre-chemotherapy
_____ Ondansetron 8 mg IV pre-chemotherapy
Dexamethasone 40 mg IV pre-chemotherapy

Prehydration:
1000 mL NS IV over 2 hours

Gemcitabine 1000 mg/m² = ___ mg IV in 100 mL NS over 30-60 minutes. Max admin time = 60 minutes
Cisplatin 75 mg/m² = ____ mg IV in 250 mL NS+
250 mL 10% mannitol (25g) over 1 hour

Posthydration:
500 mL NS IV over 1 hour
Dexamethasone 40 mg po daily on Days 2, 3 and 4

ISSUE
The pre-medication, pre-hydration, chemotherapy medication, post-hydration and supportive medication orders are all shown in one long list without bullets. It is difficult to differentiate types of orders.
### Day 1 Requirements within 96 hours

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC</td>
<td>≥ 0.8 × 10⁹/L</td>
</tr>
<tr>
<td>Platelets</td>
<td>≥ 100 × 10⁹/L</td>
</tr>
</tbody>
</table>

**Pre-medications** (Strikeout to exclude)

- **ondansetron**: 8 mg PO/IV
- **dexamethasone**: 12 mg PO/IV

**Pre-hydration** (Strikeout to exclude)

- Infuse NS as primary line at 75 mL/hr while drugs administered

---

**GUIDELINE**

Grouping PPO contents into sections allows each user group to quickly locate a specific content desired depending on the group’s workflow. Also, section headings provide users with a context to understand the section contents. Section divisions can be indicated using lines and/or white space.

---

3.3 Within each section, medication orders **must** be shown in the sequence of their administration.

Users should be able to understand the sequence in which medications should be administered at a glance.

3.4 Medication orders **should not** be numbered.

The numbers indicating the sequence of medications may be confused with part of the medication order statements such as medication dose\[^{1,32}\]. If the medication orders are shown in the sequence of their administration on all PPOs by default following Guideline 3.3, numbering medication orders to show their sequence should not be necessary.

---

**2 ondansetron 8mg PO**

**ISSUE**

“2. ondansetron 8 mg PO” can be misinterpreted as “two doses of ondansetron 8 mg PO”.

---

[^1]: Reference 1
[^32]: Reference 32
3.5 Chemotherapy agents must not be listed vertically with boxes or spaces to tick without a sufficient space separating one medication from another[5, 17, 33]. In particular, look-alike chemotherapy medication names must not be shown near each other whenever possible[1].

When medications are listed vertically with boxes or spaces to mark, without a sufficient space separating one medication from another, the prescriber can easily check off the wrong medication. Also, clinicians processing the order may associate the checkmark with the wrong medication. This is especially likely when look-alike medications are listed near each other.

3.6 If a cycle consists of more than one treatment day, all medication orders within each section should be grouped based on their administration days[9, 34].

EXCEPTIONS
This guideline is not applicable to oral medications and those drugs that are administered via continuous infusions lasting longer than 24 hours.

ISSUE
In 1999, the ISMP reported an incident where a pharmacist dispensed TOBRADEX while TOBREX was ordered. The figure shows the PPO involved in the incident (adapted from ISMP’s Medication Safety Alert newsletter, June 30, 1999)[33].
**CHEMOTHERAPY**:  
Gemcitabine 1250 or 1000 mg/m²/day x BSA x (__%) = ____ mg IV in 250 mL NS over 30 minutes on **DAY 1 AND 8**

Cisplatin 70 mg/m²/day or ___ mg/m²/day x BSA x (__%) = ___ mg IV in 1000 mL NS with 20 mEq/L potassium chloride, 1 g/L magnesium sulfate, 30 g/L Mannitol over 60 minutes **DAY 1 ONLY**  
OR  
Cisplatin 35 mg/m²/day x BSA x (__%) = ___ mg IV in 1000 mL NS with 20 mEq/L potassium chloride, 1 g/L magnesium sulfate, 30 g/L Mannitol over 60 minutes **DAYS 1 AND 2 OR DAYS 1 AND 8 (circle one)**  
OR  
Carboplatin (AUC = 5) x (GFR + 25) = ____ mg IV in 250 mL D5W over 30 minutes **DAY 1**

**ISSUE**  
The days on which medications should be administered are indicated at the end of the medication order statements. With many options available depending on the treatment day, it is difficult to understand which medications should be administered on which day.

### CHEMOTHERAPY ORDERS CONTINUED

**Day 2 CHEMOTHERAPY ORDERS**

If Option 2 administered on Day 1

- **CISplatin** 35 mg/m² = ________ mg

   □ Other: ________ mg/m² = ________ mg

   IV in 1000 mL NS over 60 minutes
   
   Approximate rate = 1000 mL/hr

   With potassium chloride 20 mEq/L
   
   magnesium sulfate 1 g/L
   
   mannitol 30 g/L

**Day 8 CHEMOTHERAPY ORDERS**

- **gemcitabine** 1250 mg/m² = ________ mg

   □ 1000 mg/m² = ________ mg

   □ Other: ________ mg/m² = ________ mg

   IV in 250 mL NS over 30 minutes
   
   Approximate rate = 510 mL/hr

**GUIDELINE**

Orders are clearly grouped based on their administration day.

---

3.7 Information **should** be presented in a manner that is consistent with users’ workflows\(^{25}\).

Clinicians should be able to locate information they need with minimal effort. Ideally, clinicians should be able to read down the order in parallel with their tasks.
CHEMOTHERAPY:
Gemcitabine 1250 or 1000 mg/m²/day x BSA x (___%) = ____ mg IV in 250 mL NS over 30 minutes on DAY 1 AND 8

Cisplatin 70 mg/m²/day or ___ mg/m²/day x BSA x (___%) = ____ mg IV in 1000 mL NS with 20 mEq/L potassium chloride, 1 g/L magnesium sulfate, 30 g/L Mannitol over 60 minutes DAY 1 ONLY
OR
Cisplatin 35 mg/m²/day x BSA x (___%) = ____ mg IV in 1000 mL NS with 20 mEq/L potassium chloride, 1 g/L magnesium sulfate, 30 g/L Mannitol over 60 minutes DAYS 1 AND 2 OR DAYS 1 AND 8 (circle one)
OR
Carboplatin (AUC = 5) x (GFR + 25)= ____ mg IV in 250 mL D5W over 30 minutes DAY 1

DOSE MODICATION REQUIRED ON DAY 8:
Gemcitabine 1250 or 1000 mg/m²/day x BSA x (___%) = ____ mg IV in 250 mL NS over 30 minutes on Day 8

 ISSUE
The gemcitabine order for Day 1 & 8 is shown as the first chemotherapy medication order while the dose modification that may be required on Day 8 is shown in a separate section after the chemotherapy medication orders. Nurses may notice the dose modification only after administering the medication following the gemcitabine order at the top.

3.8 If information on PPOs is transcribed into an electronic health information system (e.g. pharmacy information system, computerized physician order entry system), consider maximizing the consistency between the flow of information on PPOs and the flow in the electronic health information system as long as doing so does not conflict with any other guidelines in this document[39].

Consistency of layout between electronic health information systems and PPOs could help reduce transcription errors.

Page layout & formatting

3.9 Separate lines/entries must be used for each medication order. Multiple orders must not appear on one line or within a single entry[23].

When multiple medications orders are shown on one line, it is easy to confuse the dose of one medication for another or overlook one of the orders.
Guidelines for developing ambulatory chemotherapy preprinted orders version 1.0

3.10 Enough page margins must be left for PPOs to be properly bound and stored following the organization’s policies. Depending on how PPOs are stored, extra margins are necessary to ensure that the contents of PPOs remain clearly legible at all times.

3.11 Page layout of PPOs should be simple and easy to follow such that users can understand the pattern at a glance[24]. If the page layout of a PPO is complex, it is difficult for users to follow. Given that clinicians are frequently interrupted and rushed, using a PPO must require minimal effort by users.
### MEDICATION AND I.V. ORDERS

<table>
<thead>
<tr>
<th>Ht (cm)</th>
<th>Wt (kg)</th>
<th>BSA (m²)</th>
<th>Cycle #</th>
</tr>
</thead>
</table>

**PREMEDICATION**

Premedications 30-60 mins prior to start of rituximab

1. Acetaminophen 375 mg po
2. Diphenhydramine 50 mg IV
3. Ensure Day 1 prednisone has been taken (from provided 5 day supply) (Pharmacy to send DCU with chemo)
4. Hydrocortisone Sodium Succinate 50 mg IV

**NOTE:** Rituximab is to be infused prior to chemo.

### CHEMOTHERAPY

1. Rituximab (375 mg/m²) ______ mg IV in 250 mL NS
   
   * IV infusion at an initial rate of 50 mg/hour and may be increased in increments of 50 mg/hr at 30min intervals to max of 400mg/hour.

   On subsequent infusions, if 1st cycle well tolerated, administer 50 mL of 250 mL infusion bag over 30min and then remaining contents to max of 60min.

   Total infusion time 90min.

   In the event of a hypersensitivity reaction slow or stop rituximab infusion. Give Diphenhydramine 50 mg IV. Once recovery of symptoms, continue infusion at one-half the previous rate.

   Check vital signs every 15 min.

2. Onadestron 8 mg IV/po pre chemo
3. Vincristine (1.4 mg/m²) (max 2 mg) ______ mg IV in 50 mL NS over 10 min** OR undiluted IV push
4. Doxorubicin (50mg/m²) ______ mg IV undiluted infusion over 15-20 min ** OR IV push
5. Cyclophosphamide (750 mg/m²) ______ mg IV in 100 mL NS over 20-30 min
6. Prednisone 100 mg po on Days 1-5

**see vesicant infusion policy**

### DOSE ADJUSTMENT

<table>
<thead>
<tr>
<th>ANC (x10⁹/L)</th>
<th>Dose this cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1.5</td>
<td>Treat on time; 100% dose</td>
</tr>
<tr>
<td>&gt; 1.0 but &lt; 1.5</td>
<td>Give filgrastim to allow 100% dose and treat on time</td>
</tr>
<tr>
<td>&lt; 1.0</td>
<td>Delay drugs for one week, then reassess and continue as per this table</td>
</tr>
</tbody>
</table>

### LAB WORK

Prior to Day 1 of each cycle of chemo:

- CBC + diff
- Total bilirubin, AST, ALT, alk phos, total protein, albumin, creat, glucose, LDH

Total cumulative dose of Doxorubicin including today’s dose is ______ mg/m²

**Rituximab infusion**

*Initial infusion:* Vitals should be checked at baseline and every 5 min, after every titration (i.e. every 30 min)

**Treatment should be withheld** and physician contacted, if patient has a high number of circulating malignant cells (>25 x 10⁹/L), with or without evidence of large tumour burden.

*Subsequent infusions:* if no hypersensitivity or infusion related reactions in initial treatment, vital signs may be checked at baseline and every 60 minutes.

### Oncologic Imaging Tests

- CT _____ before cycle _____
- MUGA Scan
- Arrange Chemo at ACC/CCC for cycles _____ to _____

Recall: 3 weeks OPD/DCU

_ RNO

Clinic: ___________ (date)
DCU: ___________ (date)

---

**ISSUE**

Although users would expect all medications and IV order information to be shown on the left column “Medication and I.V. Orders”, special notes about the rituximab infusion, and the prompt for documenting the cumulative doxorubicin dose are shown on the right column in between laboratory and imaging orders. Consequently, users must jump back and forth between the two columns to follow the orders as shown by the arrows. This may result in users missing some critical information.
Cycle: __________ of __________

### Day 1 CHEMOTHERAPY ORDERS

- **Gemcitabine**
  - 1250 mg/m² = ______ mg
  - Option 1: 1000 mg/m² = ______ mg
  - Other: ______ mg/m² = ______ mg
  - IV in 250 mL NS over 30 minutes
  - Approximate rate = 500 mL/hr

- **Cisplatin**
  - 70 mg/m² = ______ mg
  - Other: ______ mg/m² = ______ mg
  - IV in 1000 mL NS over 30 minutes
  - Approximate rate = 2000 mL/hr
  - With potassium chloride 20 mEq/L
  - magnesium sulfate 1 g/L
  - mannitol 30 g/L

- **Cisplatin**
  - 35 mg/m² = ______ mg
  - Other: ______ mg/m² = ______ mg
  - IV in 1000 mL NS over 60 minutes
  - Approximate rate = 1000 mL/hr
  - With potassium chloride 20 mEq/L
  - magnesium sulfate 1 g/L
  - mannitol 30 g/L

---

**GUIDELINE**

Although the sample PPOs shown in Appendices A to C use a two-column layout similar to the PPO shown above, they are much easier to understand. The left column displays only the standard order information while the right column is dedicated for documenting any change orders and leaving patient-specific instructions. Therefore, the user only needs to follow down the left column, and just check the right column for any change orders or prescriber's notes.
3.12 The line length should be 12 characters or longer but shorter than 50 characters (plus/minus five characters, counting both spaces and characters)[36].

Chemotherapy PPOs consist of mostly short lines of self-contained text that are less than a full-page width. Also, checkboxes are often used for a list of medication orders. To keep the checkboxes and relevant text close together, having multiple columns of short line length is preferred. Longer lines of text make it difficult for eyes to make an accurate return sweep from the end of a line to the checkbox or to the next line. This may result in readers re-reading the same line, omitting a line, or marking off a wrong checkbox. Bringhurst (2005) recommends 40 to 50 characters for long lines of text (e.g. a paragraph) of multiple-column page layout, and as few as 12 to 15 characters for small and isolated patches of text[36].

Leucovorin 400 mg/m² x BSA = ____ mg IV in 250 mL D5W over 90 minutes*
*Irinotecan and Leucovorin may be infused at the same time by using a Y-connector placed immediately before the injection site
OR
Leucovorin 20 mg/m² x BSA = ____ mg IV push
Fluorouracil 400 mg/m² or ____ mg/m² x BSA = ____ mg IV bolus
Bevacizumab 5 mg/kg x ____ kg = ____ mg IV in 100 mL NS over 100 minutes via infusion pump. Flush line with 10 mL NS pre and post dose.
Fluorouracil 2400 mg/m² or ____ mg/m² x BSA = _________ mg IV over 46 hours in D5W to a total volume of 92 mL by continuous infusion at 2 mL/h via Baxter SV2 Infusor**
(**For total dose greater than 4400 mg to a total volume of 230 by continuous infusion at 5 mL/h via Baxter LV5 infusor)

ISSUE
A full-page line length is used for this PPO, forcing the reader’s eyes to make a large return sweep, which makes it difficult to follow the order statements.

Post-medications (Strikeout to exclude)
✓ prednISONE as ordered for CHOP-R protocol
✓ domperidone
  20 mg PO regularly x 3½ days
  starting before supper on Day 1
✓ metoclopramide
  10 mg then 10–20 mg PO qid prn to control nausea
  Quantity: 60 x 10 mg
✓ ranitidine
  150 mg PO bid x 7 days, then bid prn to control heartburn
  Quantity: 60 x 150 mg

☐ Other: ...........................................

Doctor’s Appointments

GUIDELINE
A two-column page layout with an average line length of 50 characters is used. Each medication order is stated over multiple lines depending on the type of information to ensure that lines of text are as short as possible.
3.13 Whenever possible, a series of items **should** be shown in a vertical bulleted list. When a series of items must be shown horizontally, the items **must** be separated by sufficient white space.

---

**LAB WORK**

CBC & Diff, Platelets, Creatinine, AST, ALT, Alk Phos, Bili, LDH prior to each cycle  
CBC & Diff, Platelets, Creatinine prior to Day 8

**ISSUE**  
Nine laboratory tests are shown in a series separated by commas. The unit clerk could easily miss one of the tests and fail to book it for the patient.

---

**Laboratory Orders**

<table>
<thead>
<tr>
<th>Prior to each cycle</th>
<th>Prior to Day 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ CBC &amp; Diff</td>
<td>✓ CBC &amp; Diff</td>
</tr>
<tr>
<td>✓ Creatinine</td>
<td>✓ Platelets</td>
</tr>
<tr>
<td>✓ Platelets</td>
<td>✓ Creatinine</td>
</tr>
<tr>
<td>✓ AST</td>
<td></td>
</tr>
<tr>
<td>✓ Alk Phos</td>
<td></td>
</tr>
<tr>
<td>✓ Bili</td>
<td></td>
</tr>
<tr>
<td>✓ LDH</td>
<td></td>
</tr>
</tbody>
</table>

**GUIDELINE**  
With checkmarks as bullets, laboratory orders are shown in a vertical list, each order on a separate line.

---

3.14 Equations **should not** be broken into multiple lines on mathematical operators (e.g. ‘×’ for multiplying) other than the equal sign.

A mathematical equation that spans multiple lines and that is broken over mathematical operators is difficult to follow. The equal sign, “=”, is an exception since it signals the end/start of a group of terms.

---

Carboplatin AUC 5 × (GFR + 25) = _____ mg IV in 250 mL D5W over 30 minutes

**ISSUE**  
The equation is broken in the middle of the term “(GFR + 25)” over the plus sign.
Carboplatin AUC 5 × (GFR + 25)
= ____ mg IV in 250 mL D5W over 30 minutes

GUIDELINE
Since the terms before and after the equal sign form different concepts, the equation is easy to follow, even though it is broken over two lines.

3.15 All text on PPOs should be aligned flush left with a ragged right margin.

Multiple lines of text are more readable when flush left with a ragged right margin than centered or justified.

<table>
<thead>
<tr>
<th>FLUSH LEFT WITH A RAGGED RIGHT MARGIN</th>
<th>CENTERED</th>
<th>JUSTIFIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>When only one or a few items within a list of orders using checkmarks as bullets require the prescriber's intervention, those items could be easily missed by the prescriber and result in an incomplete order.</td>
<td>When only one or a few items within a list of orders using checkmarks as bullets require the prescriber's intervention, those items could be easily missed by the prescriber and result in an incomplete order.</td>
<td>When only one or a few items within a list of orders using checkmarks as bullets require the prescriber's intervention, those items could be easily missed by the prescriber and result in an incomplete order.</td>
</tr>
</tbody>
</table>

EXAMPLE
Illustration of the same text aligned flush left with a ragged right margin (left), centered (middle) and justified (right)

3.16 Information hierarchy should be shown by applying the same formatting to the information at the same level and indenting information that is lower in the hierarchy inwards.

Information on chemotherapy PPOs can be categorized into different levels. For example, section headings such as "Pre-medications" and "Planned administration date" are at the same level, and the individual pre-medication order details and planned administration dates are one level lower in the hierarchy. Vertically aligning and applying the same formatting to the information at the same level visualize this hierarchy and allow users to understand the system by which information is laid out on PPOs.
CHOP-R

Gastric Lymphoma

Cycle: _______ of _______ Duration: 21 days

<table>
<thead>
<tr>
<th>Ht</th>
<th>Wt</th>
<th>BSA</th>
<th>Allergies</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm</td>
<td>kg</td>
<td>m²</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Planned Administration Dates

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Delay by</th>
<th>Reason</th>
<th>Date (mm/dd/yy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 2</th>
<th>Delay by</th>
<th>Reason</th>
<th>Date (mm/dd/yy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Day 1 Requirements within 96 hours

- ANC Platelets
  - $\geq 0.8 \times 10^9/L$
  - $\geq 100 \times 10^9/L$
  - Other:

- Pre-medications (Strikeout to exclude)
  - ondansetron 8 mg PO/IV
  - dexamethasone 12 mg PO/IV
  - Other:

- Pre-hydration (Strikeout to exclude)
  - Infuse NS as primary line at 75 mL/hr while drugs administered

GUIDELINE

Patient-specific order information is differentiated from the header information (i.e. protocol name, cycle number, duration of the cycle and the page number) by indenting the patient-specific order information inwards. Also, the same font is used for each of the section titles and the section contents.

3.17 If it is necessary to show the organization’s name and the logo on PPOs, they should be shown at the bottom of the page rather than at the top since they are not pertinent to understanding chemotherapy orders.

New Health HOSPITAL

FOLFIRI CYCLE #:

ISSUE

The organization’s name and logo are often placed at the top of the page and take up a lot of space, although they are not pertinent to communicating chemotherapy orders.

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GUIDELINE
Placing the organization’s name and the logo at the bottom frees additional space for key pieces of information at the top of the page.

3.18 Whenever possible, **consider** having all the information that belongs to the same section or to the same treatment day on the same page without reducing the legibility and readability of the information.

When one or two items that belong to the same section or treatment day are shown on a different page from the rest of the section items, these items can be missed by users.

3.19 **Chemotherapy medication names** *should* stand out from the rest of the information.

| Establish IV of NaCl 0.9% 250 mL for medication administration on chemotherapy days. |
| Granisetron ____ mg (usually 1 mg) po 30 min before chemotherapy |
| Dexamethasone ____ mg (usually 12 mg) po 30min before chemotherapy. |
| Atropine ____ mg (usually 0.5 mg) IV Push over 2-3 min. |
| Irinotecan ____ mg (usually 180 mg/m²) IV in D5W 500 mL over 90 min |
| Leucovorin calcium ____ mg (usually 400 mg/m²) IV in D5W 250 mL over 2 hours |
| Fluorouracil ____ mg (usually 400 mg/m²) IV Push over 5 minutes |
| Fluorouracil ____ mg (usually 2400 mg/m²/dose) IV by ambulatory pump continuously over 46 hours. |

**ISSUE**
It is difficult to identify the chemotherapy agents on this PPO.
Use of checkmarks and checkboxes

3.20 There **should** be a minimum number of options and inactive orders that can be activated by the prescriber. When options or inactive orders must be offered, these **should** be shown vertically preceded by a checkbox whenever possible.

A large number of options and inactive orders on a PPO means more work necessary by the prescriber to complete the orders and greater chances of incomplete orders. Therefore, there should be only essential options and inactive orders on PPOs. Using checkboxes is recommended for showing options and inactive orders. Checkboxes are commonly used to represent optional items as marking them off is intuitive and requires minimal effort by the prescriber.

**Premedications** (Verify administration by patient or administer the following indicated premedications)
- □ Ondansetron 8mg po prior to treatment
- □ Dexamethasone 8mg or □ 12mg po prior to treatment
- □ Hydrocortisone 100mg IV prior to Etoposide
- □ Diphenhydramine 50mg IV prior to Etoposide
- □ Other
- □ Other

**ISSUE**
The standardized pre-medications are made inactive with checkboxes and must be marked off by the prescriber every time this treatment is ordered.
3.21 Standardized pre- and post- medication and hydration orders should be listed using a checkmark as a bullet while allowing prescribers to strike out items to omit them.

A checkmark signals to users that the item has been reviewed and standardized by the organization who provided the PPO. With blank checkboxes, users may find it difficult to differentiate those checkboxes that are marked-off by the prescriber and those that had been pre-marked when printed. Also, checkboxes can make PPOs look cluttered. In addition, using blank checkboxes and requiring the prescriber to mark off the desired items may encourage prescribers to unnecessarily deviate from the standardized protocols. Finally, prescribers may find it tedious to mark off the items that are usually ordered.

Striking out unwanted information is intuitive and provides a semantic indication that visually states what is implied.
### Post-medications (Strikeout to exclude)

- **predniSONE** as ordered for CHOP-R protocol
- **domperidone**
  - 20 mg PO regularly × 3½ days
  - **starting before supper on Day 1**
- **metoclopramide**
  - 10 mg then 10–20 mg PO qid prn to control nausea
  - Quantity: 60 × 10 mg
- **ranitidine**

---

**EXAMPLE**

Post-chemotherapy supportive medications are listed with checkmarks.
3.22 All the items in a list using a checkmark as a bullet must not require prescribers’ interventions. If an item in a list of orders must require prescribers to select from choices, those choices should be shown vertically using checkboxes and “or” in between the choices\[1,23\].

When only one or two list items require the prescriber’s intervention, those items could be easily missed by the prescriber and result in an incomplete order. Whenever possible, standardized protocols should be simplified such that prescribers do not need to select from options or indicate a specific value. When an item in a list of orders must require the prescriber to select from options, show those options vertically using checkboxes such that it is salient to prescribers that an option must be selected.

**Pre-medications (Strikeout to exclude)**

<table>
<thead>
<tr>
<th>medication</th>
<th>dose</th>
<th>route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ondansetron</td>
<td>8 mg</td>
<td>PO/IV</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>12 mg</td>
<td>8 mg</td>
</tr>
<tr>
<td>Prochlorperazine</td>
<td>10 mg</td>
<td>PO/IV</td>
</tr>
</tbody>
</table>

**Issue**

Prescribers can overlook that a dose has to be selected for dexamethasone since it is the only medication that requires an intervention in the list.

**Guideline**

The prescriber must check off one of the two dexamethasone orders, which are clearly separated by an "or".

3.23 When checkboxes are used in front of items requiring prescribers’ interventions, checkboxes should be outdented.

To ensure that PPOs are completely filled out, prescribers should be able to quickly identify those items that require their intervention. “Outdenting” moves the checkboxes into the left margin, and is the opposite of indenting, which moves text away from the margin, or to the right\[40\]. Checkboxes that are given an outdent stand out clearly from the rest of the contents and signal to prescribers that the items require their intervention.
Doctor’s Appointments

☐ Current cycle is the last cycle. Return in __________ weeks

☐ Return to the doctor 2 weeks after the first day of the current cycle

Laboratory Orders

Prior to each cycle

☑ CBC & Diff  ☑ AST  ☑ Bili

☑ Creatinine  ☑ Platelets  ☑ Alk Phos

☐ Other: ________________________________

GUIDELINE
The checkmarks and checkboxes are in the left margin as they are outdented, making it easy to scan the page and find items that require the user's intervention.

User-entry fields

3.24 Sufficient space must be allocated around user-entry fields[1]. If there is not enough vertical space above and below the user entry fields, the user can write on top of the text near the field.

DAY 1, CYCLE # 5 (Cycle 1 of trastuzumab/paclitaxel)

Trastuzumab 8 mg/kg x wt = __________ mg IV in
Observe for 60 minutes post infusion.*

ISSUE
The medication dose is written over the text around the user-entry field since there is not enough space for the prescriber's handwriting.

CHEMOTHERAPY ORDERS

Irinotecan & leucovorin may be infused at the same time by using a Y-Connector placed immediately before the injection site.

► Irinotecan  180 mg/m² = 210 mg

GUIDELINE
Sufficient white space is allocated around the user-entry field allowing the prescriber to clearly indicate the medication dose.
3.25 Size of answer spaces **must** align with the size of expected answers\(^{[25, 30]}\).

The size of answer spaces provides the prescriber a clue to the expected length of the answer/order necessary. Therefore, this guideline helps ensure that PPOs are filled out accurately and completely.

3.26 User-entry fields **should not** be placed in the middle of sentences except when absolutely necessary\(^{[25]}\).

Having to fill out fields in the middle of sentences or questions is unintuitive.

Administer pre-medication at least (          ) minutes prior to chemotherapy unless noted.

**ISSUE**
Users can miss the user-entry field in the middle of the sentence.

**EXCEPTION**
*Embedding blank fields for the prescriber to indicate drug dose is a common and necessary practice that is not as likely to create confusions to users.*

3.27 Sub-divided answer spaces **should not** be used\(^{[25, 30]}\).

Sub-divisions such as those shown below slow down the form filler and reduce the legibility of the material.

<table>
<thead>
<tr>
<th>Comments/Changes</th>
<th>Date</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 mL/min</td>
<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>

**ISSUE**
Date fields that are sub-divided by slashes ("/") can be difficult for users with large handwriting to properly fill out.

**Typography**

3.28 Typefaces used on PPOs **must** be **sans-serif** with regular weights and that are neither expanded nor condensed.

X-height and counters are important factors that determine the legibility of different typefaces. X-height is the height of the lowercase x character above the baseline, which is a horizontal line that delimits the base of capital letters\(^{[38]}\). Typefaces at the same point size may have different x-heights,
and the perceived size of lowercase letters is directly related to the x-height rather than the nominal point size. Therefore, typefaces with larger x-heights are more legible, especially at a smaller size. For example, both x’s in the figure below are of 36 points. However, the x on the left in Arial is taller than the x on the right in Courier.

Counters are empty spaces inside the letters such as “o”, “p”, and “m”. At small type sizes, the characters of typefaces with large counters are easier to identify than those with small counters\(^1\). Moreover, typefaces that have a heavy weight tend to have smaller counters, and thus, counters of such typefaces at small sizes are difficult to see\(^2\). Narrow typefaces have relatively narrow counters, which can also lead to reduced legibility. For example, the three “opm”s in the figure below are at 36 points. However, the version on the left in regular Arial has larger counters than the bold and condensed versions on the right.

Compared to serif typefaces\(^3\), sans-serif typefaces\(^4\) typically have larger x-heights and larger counters. Strokes and counters that differentiate characters are more easily perceived with sans-serif typefaces compared to serif typefaces. Sans-serif typefaces also have more consistent stroke weights. The thin strokes that are typical of serif typefaces may be difficult to discern at small sizes. Further, serifs can be distracting, acting as visual noise in small typefaces\(^5\). For example, the figure below illustrates typical drawbacks associated with serif typefaces. The “opm” in Times on the right is visually smaller, has smaller counters and has significant variation in stroke width compared to the “opm” in Arial on the left. In conclusion, serif typefaces are not recommended for displaying information when the use of small type is required such as on chemotherapy PPOs\(^6, 7\).

---

\(^1\)Typefaces with small terminal strokes added to the end of the main stroke or line of a character

\(^2\)Typefaces without serifs

\(^3\)Typefaces with small terminal strokes added to the end of the main stroke or line of a character

\(^4\)Typefaces without serifs
Finally, avoid typefaces that are mono-spaced (all letterforms take an equal amount of horizontal space) and/or extended since they require a lot of space to achieve the same level of legibility than other typefaces. For example, Courier, which is a mono-spaced typeface, occupies more space than Arial, which is a proportionally spaced typeface, as shown in the figure below.

```
The quick brown fox jumps over the lazy dog.
    The quick brown fox jumps over the lazy dog.
    The quick brown fox jumps over the lazy dog.
```

**EXAMPLE**
A sentence in Arial (top), Courier (middle) and Arial Extended (bottom)

```
Arial
The quick brown fox jumps over the lazy dog.

Helvetica
The quick brown fox jumps over the lazy dog.
```

**EXAMPLE**
The regular (as opposed to bold or condensed) versions of Arial and Helvetica have large x-heights and regular stroke weights, and thus, suitable for use on PPOs.

3.29 Typefaces used on PPOs **must** have an x-height of **no less** than 1.8 mm.

Characters and numerals on chemotherapy PPOs should be highly legible, just like information on medication labels. The Canadian Standards Association (CSA) requires the x-height of letters to be at least 1.76 mm for manufacturer’s labels on parenteral drug containers larger than 2 mL [38]. The American Society of Testing Materials (ASTM) also requires the type size of 10-point for drug names on user-applied labels for syringes in anesthesia (the x-height of Arial at 10 points is approximately 1.8 mm) [44]. The ISMP recommends 12-point sans-serif fonts for standard order sets. We endorse the ISMP’s guideline as long as doing so does not lead to violating any other guidelines in this document.
3.30 Variations to fonts may be used to signal different types of information but only a few of them should be used.

Variations in fonts can help visually differentiate different types of information. For example, bolding or italicizing specific words signify to users that these words convey important pieces of information. However, overusing these variations may devalue their effect.

<table>
<thead>
<tr>
<th>Typeface</th>
<th>Minimum Point Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arial</td>
<td>9.5 pt</td>
</tr>
<tr>
<td>Verdana</td>
<td>9.5 pt</td>
</tr>
<tr>
<td>Helvetica</td>
<td>9.5 pt</td>
</tr>
<tr>
<td>Franklin Gothic</td>
<td>10 pt</td>
</tr>
<tr>
<td>Lucida Sans</td>
<td>9.5 pt</td>
</tr>
<tr>
<td>Tahoma</td>
<td>9 pt</td>
</tr>
<tr>
<td>Trebuchet</td>
<td>9.5 pt</td>
</tr>
</tbody>
</table>

Bolding is used on every line of text including the section title (Premedications), warning message (Rituximab within 72 hours of CHOP), and chemotherapy medication names and doses.

**Date:**

**RITUXIMAB WITHIN 72 HOURS OF CHOP**

**PREMEDICATIONS:** Patient to take own supply. RN/Pharmacist to confirm

- Diphenhydramine 50 mg PO prior to Rituximab and then q 4 h if the infusion exceeds 4 h
- Acetaminophen 650-1000 mg PO prior to Rituximab and then q 4 h if the infusion exceeds 4 h
- Prednisone as ordered for the LYCHOP-R protocol

**GUIDELINE**

Bolding is used sparingly to emphasize critical linking clauses, ‘or’ and ‘then’.

- Infuse 50 mL (or 100 mL of 500 mL bag) of the dose over 30 minutes
  Approximate rate = 100 mL/hr

- then

- Infuse the remaining 200 mL (or 400 mL of 500 mL bag) over 60 minutes
  Approximate rate = 200 mL/hr

  or

  400 mL/hr if 500 mL bag
3.31 Tall man lettering should be used to help differentiate look-alike, sound-alike drug names\cite{1,32,54}.

Tall man lettering is a technique of visually differentiating look-alike, sound-alike drug names by highlighting the sections of names that are different from each other by using uppercase letters. Many authorities in medication safety including the US Food and Drug Administration (FDA), Joint Commission (US), ISMP and ISMP Canada recommend using tall man lettering\cite{45,47,54}, and it is gaining wide acceptance in healthcare\cite{48}. The most recent standardized tall man lettering system should be consistently applied to all mechanisms related to communication of medication names (e.g. PPOs, pharmacy information system, medication administration record, pharmacy labels, etc.).

<table>
<thead>
<tr>
<th>carboplatin</th>
<th>cisplatin</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARBOplatin</td>
<td>CISplatin</td>
</tr>
</tbody>
</table>

**EXAMPLE**
Tall man lettering applied to differentiate cisplatin and carboplatin

3.32 Consider highlighting sections of look-alike, sound-alike protocol names using font variation such as bolding, underlining, etc.

Confusing look-alike, sound-alike protocol names (e.g. FOLFIRI and FOLFOX) has been identified as a contributing factor of chemotherapy prescribing errors reported to ISMP Canada between 2002 and 2009\cite{49}. To minimize the risk of confusion between PPOs with look-alike, sound-alike protocol names, font variation could be applied to highlight the parts of the names that differentiate one protocol from another.

**EXAMPLE**
FIRI and FOX in FOLFOX and FOLFIRI, respectively, are bolded to help differentiate the two protocol names.

3.33 Consider using white text and a black background to emphasize different days of treatment.

Protocols involving different treatments over multiple days within a single cycle can be long and complex. Reversing the text and background colour, as shown in the example below, can help users quickly identify orders for a specific treatment day. Gabriel (2008) demonstrated that this technique can help users differentiate look-alike drug name pairs\cite{50}.
### Change orders

Chemotherapy orders are intrinsically fluid since they need to be changed according to the patient’s condition. A standardized protocol may need to be modified to meet the needs of a specific patient. In the course of the treatment, a cancer patient’s condition may change significantly (e.g., low blood cell levels, kidney/liver function impairment and weight loss). Therefore, a “change order” is often made to chemotherapy PPOs. A change order is any patient-specific customization made to the standard order information on PPOs, including any addition, omission, modification, and any change made to the prescriber’s initial order. It is critical that any change order is clearly documented on PPOs as they are the main communication tool between care providers[55].

3.34 **PPOs must** be designed such that any change made to the standard/initial order is clearly documented with:

- Reason for the change
- Date the change was made
- Clinician who authorized the change

Given the flexible nature of chemotherapy orders, standard orders are often modified, and the initial treatment plan is modified over the course of therapy. Furthermore, chemotherapy orders are passed around between care providers. Thus, it is critical that PPOs allow prescribers to document the reason(s), date and initial any change made to a PPO to ensure that the change is noticed and understood by other care providers.
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The chemotherapy dose reduction made on this order is difficult to follow since the PPO has not been designed for users to clearly indicate the reason, date and authorizer of the change.

### Day 1 Requirements

<table>
<thead>
<tr>
<th>ANC</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 0.8 × 10^9/L</td>
<td>≥ 100 × 10^9/L</td>
</tr>
</tbody>
</table>

**GUIDELINE**

The space to the right of the orders is designated for the prescriber to describe, date and initial any changes made to the standard order set or to the initial order.

3.35 **PPOs must** allow users to easily keep track of treatment schedule changes by having the following information in close proximity to a space for each planned administration date:

- An option for delaying a treatment day with a prompt for indicating the number of weeks of delay.
- Space for indicating the reason for the delay.
- Date the delay was ordered.
- Initials of the prescriber.

Depending on the patient’s changing condition, chemotherapy treatments are often delayed. Any delay in treatment should be clearly communicated to all the clinicians involved in delivering chemotherapy to ensure that chemotherapy is scheduled, prepared and administered on the right day.
Establish IV of NaCl 0.9% 250 mL for medication administration on chemotherapy days.

**Granistron** __mg (usually 1 mg) po 30 min before chemotherapy

**Dexamethasone** __mg (usually 12 mg) po 30 min before chemotherapy.

**Atropine** __mg (usually .5mg) IV Push over 2-3 min.

**Irinotecan** ___mg (usually 180mg) IV in D5W 500 mL over 90min

**Leucovorin calcium** ___mg (usually 400 mg) IV in D5W 250 mL over 2 hours

**Fluorouracil** ___mg (usually 400 mg) IV Push over 5 minutes

**Fluorouracil** ____mg (usually 2500 mg/dose) IV by ambulatory pump continuously over 48 hours.

**Pre-medications (Strikeout to exclude)**

- ondansetron 8 mg PO/IV
- dexamethasone 12 mg PO/IV
- prophylactic Atropine 0.3 mg SC

**Other:**

**CHEMOTHERAPY ORDERS**

Irinotecan & Leucovorin may be infused at the same time by using a Y-Connector placed immediately before the injection site.

**irinotecan IV in 500 mL D5W**

Over 90 minutes Approximate rate = 333 mL/hr

180 mg/m2 = mg

Other: mg/m2 = mg

**ISSUE**

A treatment delay is indicated in an ad-hoc manner on this order since there is no clearly designated space to indicate the treatment schedule change.

---

**Planned Administration Dates**

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Reason</th>
<th>Date (mm/dd/yy)</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**GUIDELINE**

The prescriber can indicate a treatment delay just next to the planned administration date, which makes it easier for other clinicians to notice and understand. Also, there is a clearly designated space for indicating each of the number of weeks of delay, reason for the delay, the date the schedule change was made and the initials of the authorizer.

---

3.36 **PPOs must** allow prescribers to adjust chemotherapy medication doses.

Depending on the patient’s changing condition, the doses of chemotherapy agents are often reduced. The prescriber should be able to easily and clearly indicate dose adjustments.

**Approximate rate = 500 mL/hr**

- **Option 1**
  - **Cisplatin** 70 mg/m² = mg
  - Other: mg/m² = mg

  IV in 1000 mL NS over 30 minutes
  Approximate rate = 2000 mL/hr

With... extemporaneous chloride... 20 mL/kg

**GUIDELINE**

The “other” dosing option is offered for the prescriber to indicate a chemotherapy medication dose adjusted for a specific patient.

---

3.37 **Sufficient space must** be allocated for prescribers to make comments in a manner that other clinicians can easily identify and understand.

Prescribers often note special instructions on PPOs to address specific needs of the patient. Without a designated space(s) for such comments, each prescriber is forced to add the notes in whichever manner that he/she thinks is intuitive, and this may result in other users failing to notice or understand the comments.
3.38 Standardized supportive care drugs/prophylactics should be listed using checkmarks while still allowing prescribers to easily omit some of them or add at least one non-standard supportive care drug/prophylactic.

Oncologists may want to modify the standard protocol to address the specific needs of the patient by omitting and/or adding certain supportive care drugs/prophylactics in the protocol.
Some pre-medications were added to the order and subsequently crossed out, with a note “delete”. It is difficult to tell which pre-medications should be administered.

☐ Other:  

**Pre-medications** (Strikeout to exclude)  

- ondansetron 8 mg PO/IV  
- dexamethasone 12 mg PO/IV  
- prochlorperazine 10 mg PO/IV  

☐ Other:  

**Pre-hydration** (Strikeout to exclude)  

- Infuse NS as primary line at 75 mL/hr while drugs administered

GUIDELINE  

The “Other” option allows the prescriber to add a pre-medication if necessary. Also, space is allocated to the right of the medication order for the prescriber to properly document the change.

3.39 Space **must** be allocated for adding at least one non-standard requirement for proceeding with the treatment.  

Doing so gives the prescriber flexibility to have additional parameters checked to address the specific needs of the patient.

**Day 1 Requirements** within 96 hours  

<table>
<thead>
<tr>
<th>ANC</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \geq 0.8 \times 10^9/L )</td>
<td>( \geq 100 \times 10^9/L )</td>
</tr>
</tbody>
</table>

☐ Other:  

GUIDELINE  

The “Other” option is offered for prescribers to add a non-standard requirement for proceeding with the treatment as necessary.

3.40 If a PPO includes standardized laboratory orders, space **must** be allocated for adding at least one non-standard laboratory order.  

Doing so gives the prescriber flexibility to have additional laboratory test results checked to address the specific needs of the patient.
Laboratory Orders

<table>
<thead>
<tr>
<th>Prior to each cycle</th>
<th>Prior to Day 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ CBC &amp; Diff</td>
<td>✓ CBC &amp; Diff</td>
</tr>
<tr>
<td>✓ Creatinine</td>
<td>✓ Platelets</td>
</tr>
<tr>
<td>✓ Platelets</td>
<td>✓ Creatinine</td>
</tr>
<tr>
<td>✓ AST</td>
<td></td>
</tr>
<tr>
<td>✓ Alk</td>
<td>□ Other:</td>
</tr>
<tr>
<td>✓ Bili</td>
<td></td>
</tr>
</tbody>
</table>

GUIDELINE
The "Other" option is offered for prescribers to add a non-standard laboratory order as necessary.

3.41 Each organization **must** develop appropriate polices and procedures for ordering a treatment plan that consists of a non-standard combination of chemotherapy medication orders. A patient may require a treatment plan that consists of a combination of chemotherapy medication orders that are not standardized. Chemotherapy medication orders added to or omitted from a standard order without clear indication of the change on the PPO can be easily missed by pharmacists and/or nurses.
Use of lines

3.42 If PPOs are faxed, scanned, or photocopied, solid dark underlines must not be used to indicate user-entry fields. Dotted grey underlines should be used instead.

A solid underline in a dark colour (e.g. black) may come out through faxing/scanning as a blotchy line that may obscure the prescriber’s writing. Also, when a dose is written between two underlines, the tops of the numbers five and seven can be obscured by the underline above, making them indistinguishable from the numbers three and one. A very light dotted grey line that barely shows or does not show at all when faxed/scanned/photocopied is recommended.

![Example of solid underline](image)

**ISSUE**
The tops of the numbers five and seven are obscured by the underline above.

![Example of dotted underline](image)

**GUIDELINE**
Lines of 20% greyness and at 0.5 pt is used for indicating user-entry fields. Although these lines are visible, they are not faxed/scanned/photocopied.

3.43 Test prints of any gray or dotted lines used in PPOs should be conducted. The test prints should be printed by the same machine that will produce the final PPOs.

Every computer monitor, printer and software will display and interpret grey differently, so a definite level of grey cannot be recommended. To ensure the greys are light enough and do not obscure content, while remaining visible, test prints are strongly recommended. Test printing on the same machine that prints PPOs will ensure consistency.

3.44 Unnecessary lines or boxes should not be used. If necessary, use grey rather than black for lines and boxes.

Lines/boxes are often used on PPOs to separate different sections. However, unnecessary lines/boxes may distract users from the form contents. In
Guidelines for developing ambulatory chemotherapy preprinted orders version 1.0

3.45 Consider using horizontal lines of different thickness to visually inform users of beginning and end of different sections.

Complex chemotherapy protocols may consist of many levels of information hierarchy, and it may be difficult to differentiate the beginning and end of different sections. Horizontal lines of different thickness may be used so that users can better differentiate various sections.

ISSUE
Heavy black lines are used between every order. The lines are distracting and make the PPO look cluttered.

<table>
<thead>
<tr>
<th>Pre-medications (Strikeout to exclude)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ ondansetron 8 mg PO/IV</td>
<td></td>
</tr>
<tr>
<td>✓ dexamethasone 12 mg PO/IV</td>
<td></td>
</tr>
</tbody>
</table>

Other:

<table>
<thead>
<tr>
<th>Pre-hydration (Strikeout to exclude)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Infuse NS as primary line at 75 mL/hr while drugs administered</td>
<td></td>
</tr>
</tbody>
</table>

Other:

Guideline
Grey lines are used to indicate the beginning and the end of each section.
<table>
<thead>
<tr>
<th>Post-medications</th>
<th>Comments/Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>prednisonone as ordered for CHOP-R protocol</td>
<td></td>
</tr>
<tr>
<td>domperidone</td>
<td></td>
</tr>
<tr>
<td>20 mg PO regularly × 3½ days</td>
<td></td>
</tr>
<tr>
<td>starting before supper on Day 1</td>
<td></td>
</tr>
<tr>
<td>metoclopramide</td>
<td></td>
</tr>
<tr>
<td>10 mg then 10–20 mg PO qid prn to control nausea</td>
<td></td>
</tr>
<tr>
<td>Quantity: 60 × 10 mg</td>
<td></td>
</tr>
<tr>
<td>ranitidine</td>
<td></td>
</tr>
<tr>
<td>150 mg PO bid × 7 days, then bid prn to control heartburn</td>
<td></td>
</tr>
<tr>
<td>Quantity: 60 × 150 mg</td>
<td></td>
</tr>
</tbody>
</table>

| Other:                              |                 |

<table>
<thead>
<tr>
<th>Doctor’s Appointments</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Current cycle is the last cycle. Return in __________ weeks</td>
<td></td>
</tr>
<tr>
<td>□ Return to the doctor in __________ weeks after the first day of the current cycle.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laboratory Orders</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to each cycle</td>
<td></td>
</tr>
<tr>
<td>□ CBC &amp; Diff</td>
<td></td>
</tr>
<tr>
<td>□ Platelets</td>
<td></td>
</tr>
<tr>
<td>□ Other:</td>
<td></td>
</tr>
<tr>
<td>□ Consults:</td>
<td></td>
</tr>
</tbody>
</table>

**GUIDELINE**

A thick horizontal line is used to indicate the end of medication orders and the start of non-medication orders. Thin horizontal lines are used to separate different types of medication orders (i.e. chemotherapy agents vs. supportive medications) and different types of non-medication orders (i.e. return appointments vs. laboratory orders).

**Printing**

3.46 PPOs **must** be printed on white or very lightly coloured paper with black text. When non-white paper is used, ensure that paper colour does not get transferred when it is photocopied, faxed or scanned.

The black-and-white colour scheme provides the maximum contrast between text and a background, and therefore, ensures high legibility of PPOs. Most colour papers appear grey when photocopied, scanned or faxed, and therefore text becomes difficult to read.
3.47 Information **must not** be printed on the back side of PPOs[^32].

The backsides of PPOs can be easily missed, especially when the forms are photocopied, scanned or faxed. Therefore, double-sided printing must not be used for PPOs.

3.48 If there are resources available and if computerized physician order entry (CPOE) is not planned for the near future, **consider** implementing PPOs as electronic fillable forms in portable document format (PDF)[^29].

By allowing prescribers to type information into PPOs, most of the issues related to illegible handwriting can be eliminated. Also, institutions that do not have appropriate systems for prescribers to complete PDF forms by typing, the PDF forms can be still printed on paper to be completed by hand.

3.49 **Chemotherapy PPOs should not** be printed on no-carbon-required/carbonless (NCR) paper[^23]. Rather, **PPOs should** be distributed in a digital format that is downloadable from a central server and printed as needed[^1].

PPOs on NCR paper must be printed at a central location and distributed manually. Ensuring that only the most recent versions of NCR PPOs are used is very difficult since users sometimes hoard large quantities of forms, and it is impossible to locate and replace them all. Furthermore, copies produced by NCR paper are not highly legible. When orders on NCR paper are faxed, the legibility of the faxed order copies tend to be poor since colour paper such as blue, yellow or red is commonly used for NCR forms to differentiate one copy from another. These colours are faxed as grey, reducing the contrast between text and background. Electronically distributing PPOs via a central server (e.g. web site) allows users to download and print PPOs as
needed, and thus helps ensure that only the most recent version of PPOs are used.

Other design guidelines

3.50 Adequate space **must** be provided between the medication name and dose, and between the numerical dose and unit of measure\(^{[1]}\).

When the medication name and dose are not separated with sufficient space, the dose can be misinterpreted.

![Example: fluorouracil 20 mg/m²](image)

**ISSUE**

“fluorouracil 20 mg/m²” may be misinterpreted as “fluorouracil 120 mg/m²”. Also, “5 Units” may be misinterpreted as “50 units”.

3.51 Use of footnotes on PPOs **should** be avoided\(^{[18]}\).

Footnote indicators such as asterisks (*) can be overlooked by users.

![Example: Ondansetron 8 mg IV/po pre chemo](image)

**ISSUE**

The double asterisks signaling a footnote are easy to miss.
Use of linking phrases such as “then” or “followed by” should be limited to highlighting a series of orders that require special attention (e.g. a fluorouracil bolus infusion prior to a continuous fluorouracil infusion). When these linking phrases are used, they should be visually prominent to ensure that they capture users’ attention.

3.52

Use of linking phrases such as “then” or “followed by” should be limited to highlighting a series of orders that require special attention (e.g. a fluorouracil bolus infusion prior to a continuous fluorouracil infusion). When these linking phrases are used, they should be visually prominent to ensure that they capture users’ attention.

The linking phrase, “followed by”, at the end of the fluorouracil bolus infusion order is not differentiated from the surrounding information and can be easily missed by users.

The linking phrase, “then”, is visually prominent, as it is placed on a separate line in bold text with sufficient white space around it.
Checklist for evaluating your PPO design

The bolded items are “must” guidelines, and the others are “should” guidelines.

Content Organization

☐ Each PPO is designed and used for a single cycle only. 3.1

☐ Contents of PPOs are clearly divided into logical sections with headings. 3.2

☐ Within each section, medication orders are shown in the sequence of their administration. 3.3

☐ Medication orders are not numbered. 3.4

☐ Chemotherapy agents are not listed vertically with boxes or spaces to tick without a sufficient space separating one medication from another. 3.5

☐ Look-alike chemotherapy medication names are not shown near each other whenever possible. 3.5

☐ If a cycle consists of more than one treatment day, all medication orders within each section are grouped based on their administration dates (or days on which they should be dispensed for oral drugs). 3.6

☐ Information is presented in a manner that is consistent with users’ workflows. 3.7
Page Layout and Formatting

- Separate lines/entries are used for each medication order. 3.9
- Multiple orders do not appear on one line or within a single entry. 3.9
- There are enough page margins for PPOs to be properly bound and stored following the organization's policies. 3.10
- Page layout of PPOs is simple and easy to follow such that users can understand the pattern at a glance. 3.11
- The line length is 12 characters or longer but shorter than 50 characters (plus/minus five characters, counting both spaces and characters). 3.12
- Whenever possible, a series of items are shown in a vertical bulleted list. 3.13
- When a series of items are shown horizontally, the items separated by sufficient white space. 3.13
- Equations are not broken into multiple lines on mathematical operators (e.g. ‘×’ for multiplying) other than the equal sign. 3.14
- All text on PPOs are aligned flush left with a ragged right margin. 3.15
- Information hierarchy is shown by applying the same formatting to the information at the same level and indenting information that is lower in the hierarchy inwards. 3.16
- If it is necessary to show the organization’s name and the logo on PPOs, they are shown at the bottom of the page. 3.17
- Chemotherapy medication names stand out from the rest of the information. 3.19
Use of Checkmarks and Checkboxes

☐ There are a minimum number of options and inactive orders that can be activated by the prescriber. 3.20

☐ When options or inactive orders must be offered, these are shown vertically preceded by a checkbox whenever possible. 3.20

☐ Standardized pre- and post-medication and hydration orders are listed using a checkmark as a bullet while allowing prescribers to strike out items to omit them. 3.21

☐ All the items in a list using a checkmark as a bullet do not require prescribers’ interventions. 3.22

☐ If an item in a list of orders must require prescribers to select from choices, those choices are shown vertically using checkboxes and “or” in between the choices. 3.22

☐ When checkboxes are used in front of items requiring prescribers’ interventions, the checkboxes are outdented. 3.23

User Entry Fields

☐ Sufficient space is allocated around user-entry fields. 3.24

☐ Size of answer spaces align with the size of expected answers. 3.25

☐ User-entry fields are not placed in the middle of sentences except when absolutely necessary (Exception: Embedding blank fields for the prescriber to indicate drug dose is a common and necessary practice that is not as likely to create confusions to users). 3.26
Sub-divided answer spaces are not used. 3.27

**Typography**

- **Typefaces on PPOs are sans-serif typefaces with regular weights and neither expanded nor condensed.** 3.28
- **Typefaces used on PPOs have an x-height of no less than 1.8 mm.** 3.29
- When variations to fonts are used to signal different types of information, only a few of them are used. 3.30
- Tall man lettering is used to help differentiate look-alike, sound-alike drug names. 3.31

**Change orders**

- **PPOs are designed such that any change made to the standard/initial order is clearly documented with** 3.34
  - Reason for the change
  - Date the change was made
  - Clinician who authorized the change
PPOs allow users to easily keep track of treatment schedule changes by having the following information in close proximity to a space for each planned administration date:

- An option for delaying a treatment day with a prompt for indicating the number of weeks of delay
- Space for indicating the reason for the delay
- Date the delay was ordered
- Initials of the prescriber

PPOs allow prescribers to adjust chemotherapy medication doses.

Sufficient space is allocated for prescribers to make comments in a manner that other clinicians can easily identify and understand.

Standardized supportive care drugs/prophylactics are listed using checkmarks while still allowing prescribers to easily omit some of them or add at least one non-standard supportive care drugs/prophylactic.

Space is allocated for adding at least one non-standard requirement for proceeding with the treatment.

If a PPO includes standardized laboratory orders, space is allocated for adding at least one non-standard laboratory order.

Appropriate polices and procedures have been established for ordering a treatment plan that consists of a non-standard combination of chemotherapy medication orders.
Use of lines

☐ If PPOs are faxed, scanned or photocopied, solid dark underlines are not used to indicate user-entry fields.

☐ Any gray and/or dotted lines on PPOs are test printed using the same machine that produces the final PPOS whenever possible.

☐ Only necessary lines and boxes are used.

☐ The lines and boxes are grey rather than black.

Printing

☐ PPOs are printed on white or very lightly coloured paper with black text.

☐ When non-white paper is used, the paper colour does not get transferred when it is photocopied, faxed or scanned.

☐ Information is not printed on the backside of PPOs (i.e. single-side printing is used).

☐ PPOs are not printed on no-carbon-required/carbonless (NCR) paper.

☐ PPOs are distributed in a digital format that is downloadable from a central server and printed as needed.

Other design guidelines

☐ Adequate space is provided between the medication name and dose, and between the numerical dose and unit of measure.
☐ Use of footnotes is avoided. 3.51

☐ Use of linking phrases such as “then” or “followed by” is limited to highlighting a series of orders that require special attention (e.g. a fluorouracil bolus infusion prior to a continuous fluorouracil infusion) 3.52
### Appendix A: Sample CHOP-R PPO

**CHOP-R PAGE 1 OF 5**

**Gastric Lymphoma**

**Cycle:** of **Duration:** 21 days

<table>
<thead>
<tr>
<th>Ht</th>
<th>Wt</th>
<th>BSA</th>
<th>Allergies</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm</td>
<td>kg</td>
<td>m²</td>
<td>□ Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ No</td>
</tr>
</tbody>
</table>

**Planned Administration Dates**

<table>
<thead>
<tr>
<th>Day 1</th>
<th>(mm/dd/yy)</th>
<th>□ Delay by</th>
<th>week(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 2</td>
<td>(mm/dd/yy)</td>
<td>□ Delay by</td>
<td>week(s)</td>
</tr>
</tbody>
</table>

**Day 1 Requirements** within 96 hours

<table>
<thead>
<tr>
<th>ANC</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 0.8 × 10⁹/L</td>
<td>≥ 100 × 10⁹/L</td>
</tr>
</tbody>
</table>

□ Other:

**Pre-medications** (Strikeout to exclude)

- ondansetron 8 mg PO/IV
- dexamethasone 12 mg PO/IV

□ Other:

**Pre-hydration** (Strikeout to exclude)

- Infuse NS as primary line at 75 mL/hr while drugs administered

□ Other:

**Prescriber Name**

**Prescriber Signature**

**Date (mm/dd/yy)**

CONTINUED ON PAGE 2
Day 1 CONTINUED

CHEMOTHERAPY ORDERS

► DOXOrubicin  50 mg/m² =      mg
   □ Other:      mg/m² =      mg
   IV push over 5 to 15 minutes

► vinCRISTine  1.4 mg/m² =      mg
   □ Other:      mg/m² =      mg
   IV in 50 mL NS over 5 to 15 minutes
   Approximate rate = 200 to 600 mL/hr

► cyclophosphamide  750 mg/m² =      mg
   □ Other:      mg/m² =      mg
   IV in 100 to 250 mL NS over 20 to 60 minutes
   Approximate rate = 100 to 750 mL/hr

► predniSONE  45 mg/m²/day =      mg/day
   □ Other:      mg/m²/day=      mg/day
   PO Daily in AM with food on days 1, 2, 3, 4, and 5
   (Round dose to nearest 25 mg)
Day 2 Continued

Post-medications (Strikeout to exclude)

- domperidone
  - 20 mg PO regularly × 3½ days starting before supper
- metoclopramide
  - 10 mg then 10 to 20 mg PO qid prn to control nausea
  - Quantity: 60 × 10 mg
- ranitidine
  - 150 mg PO bid × 7 days, then bid prn to control heartburn
  - Quantity: 60 × 150 mg

Other:

Day 2 Pre-medications (Strikeout to exclude)

- diphenhydramine 50 mg PO
  - And then every 4 hours if the ritUXimab infusion exceeds 4 hours
- acetaminophen 650 to 1000 mg PO
  - And then every 4 hours if the ritUXimab infusion exceeds 4 hours

Other:

Day 2 Chemotherapy Orders

within 72 hours of Day 1 of CHOP

- ritUXimab 375 mg/m² = mg

- Other: mg/m² = mg

- IV in 250 to 500 mL NS

Prescriber Name

Prescriber Signature

Date (mm/dd/yy)
Day 2 CHEMOTHERAPY ORDERS CONTINUED

If Cycle 1 Day 2 of riTUXimab

Start at 50 mg/hr  Approximate rate = 50 mL/hr

After 60 minutes, increase rate by 50 mg/hour (or 100 mL/hr) every 30 minutes until rate of 400 mg/hour (or 400 mL/hr) is reached unless toxicity occurs.

For the first dose, patients are to be under constant visual observation during all dose increases, and for 30 minutes after infusion completed. Vital signs are not required, unless symptomatic.

For All Subsequent Treatments of riTUXimab

✓ Infuse 50 mL (or 100 mL of 500 mL bag) of the dose over 30 minutes  Approximate rate = 100 mL/hr

then

✓ Infuse the remaining 200 mL (or 400 mL of 500 mL bag) over 60 minutes  Approximate rate = 200 mL/hr

or

400 mL/hr if 500 mL bag

If flushing, dyspnea, rigors, rash, new pruritus, vomiting, chest pain or any other new acute discomfort occurs, stop infusion and page physician.
Post-medications
✓ prednisone as ordered for CHOP-R protocol
✓ domperidone
  20 mg PO regularly x 3½ days
  starting before supper on Day 1
✓ metoclopramide
  10 mg then 10–20 mg PO qid prn to control nausea
  Quantity: 60 x 10 mg
✓ ranitidine
  150 mg PO bid x 7 days, then bid prn to control heartburn
  Quantity: 60 x 150 mg

Other:

Doctor’s Appointments
☐ Current cycle is the last cycle. Return in ________ weeks
☐ Return to the doctor in ________ weeks after the first day of the current cycle.

Laboratory Orders
Prior to each cycle
✓ CBC & Diff
✓ Platelets
☐ Other:

Consults:

Prescriber Name
Prescriber Signature
Date (mm/dd/yy)
Appendix B: Sample Gemcitabine & Cisplatin PPO

---

**Gemcitabine + Cisplatin**

**Page 1 of 4**

**Advanced Bladder Cancer**  
Palliative Therapy

**Cycle:** of **Duration:** 21 days

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ht</td>
<td>Wt</td>
<td>BSA</td>
<td>Allergies</td>
</tr>
<tr>
<td>cm</td>
<td>kg</td>
<td>m²</td>
<td>□ Yes</td>
</tr>
</tbody>
</table>

**Planned Administration Dates**

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Delay by week(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mm/dd/yy)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 2</th>
<th>Delay by week(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mm/dd/yy)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 8</th>
<th>Delay by week(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mm/dd/yy)</td>
<td></td>
</tr>
</tbody>
</table>

**Requirements** within 42 hours

- ANC  
  -  $\geq 1 \times 10^9/L$
- Platelets  
  -  $\geq 100 \times 10^9/L$
- Creatinine  
  -  $\geq 60 \text{ mL/min}$
- Other:

**Pre-medications** (Strikeout to exclude)

- ondansetron 8 mg PO/IV
- dexamethasone 12 mg PO/IV
- prochlorperazine 10 mg PO/IV
- Other:

**Pre-hydration** (Strikeout to exclude)

- 1000 mL NS IV over 60 minutes
  - before treatment on treatment days that Cisplatin is ordered
- Other:

**Prescriber Name**  
**Prescriber Signature**  
**Date (mm/dd/yy)**

CONTINUED ON PAGE 2
Gemcitabine + CISplatin

Cycle: .......... of ............

CONTINUED

Day 1 CHEMOTHERAPY ORDERS

► gemcitabine 1250 mg/m² = ........ mg

□ 1000 mg/m² = ........ mg

□ Other: ........ mg/m² = ........ mg

IV in 250 mL NS over 30 minutes
Approximate rate = 500 mL/hr

□ Option 1

► CISplatin 70 mg/m² = ........ mg

□ Other: ........ mg/m² = ........ mg

IV in 1000 mL NS over 30 minutes
Approximate rate = 2000 mL/hr

With potassium chloride 20 mEq/L
magnesium sulfate 1 g/L
mannitol 30 g/L

□ Option 2

► CISplatin 35 mg/m² = ........ mg

□ Other: ........ mg/m² = ........ mg

IV in 1000 mL NS over 60 minutes
Approximate rate = 1000 mL/hr

With potassium chloride 20 mEq/L
magnesium sulfate 1 g/L
mannitol 30 g/L

Prescriber Name

Prescriber Signature

Date (mm/dd/yy)

CONTINUED ON PAGE 3
Gemcitabine + CISplatin

CHEMOTHERAPY ORDERS

Day 2 CHEMOTHERAPY ORDERS

If Option 2 administered on Day 1

► CISplatin 35 mg/m² = mg

☐ Other: mg/m² = mg

IV in 1000 mL NS over 60 minutes
Approximate rate = 1000 mL/hr

With potassium chloride 20 mEq/L
magnesium sulfate 1 g/L
mannitol 30 g/L

Day 8 CHEMOTHERAPY ORDERS

► gemcitabine 1250 mg/m² = mg

☐ 1000 mg/m² = mg

☐ Other: mg/m² = mg

IV in 250 mL NS over 30 minutes
Approximate rate = 510 mL/hr

Post-hydration (Strikeout to exclude)

✓ 1000 mL NS IV over 60 minutes
on treatment days that CISplatin is ordered

☐ Other:

Prescriber Name
Prescriber Signature
Date (mm/dd/yy)

Continued on page 4
### Doctor's Appointments

- [ ] Current cycle is the last cycle. Return in [number] weeks
- [ ] Book Day 2 chemo if required
- [ ] Return to the doctor in 3 weeks after the first day of cycle [number] to book chemo Day 1 & 8.

### Laboratory Orders

<table>
<thead>
<tr>
<th>Prior to each cycle</th>
<th>Prior to Day 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ CBC &amp; Diff</td>
<td>✓ CBC &amp; Diff</td>
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<tr>
<td>✓ Creatinine</td>
<td>✓ Platelets</td>
</tr>
<tr>
<td>✓ Platelets</td>
<td>✓ Creatinine</td>
</tr>
<tr>
<td>✓ AST</td>
<td></td>
</tr>
<tr>
<td>✓ Alk Phos</td>
<td>[ ] Other:</td>
</tr>
<tr>
<td>✓ Bili</td>
<td></td>
</tr>
<tr>
<td>✓ LDH</td>
<td></td>
</tr>
</tbody>
</table>

- [ ] Other:
- [ ] Consults:

---

Prescriber Name | Prescriber Signature | Date (mm/dd/yy)
Appendix C: Sample FOLFIRI PPO

<table>
<thead>
<tr>
<th>Metastatic Colorectal Cancer</th>
<th>Palliative Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle:</td>
<td>Duration: 14 days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ht</th>
<th>Wt</th>
<th>BSA</th>
<th>Allergies</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm</td>
<td>kg</td>
<td>m²</td>
<td>□ Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ No</td>
</tr>
</tbody>
</table>

**Prescriber Name**

**Prescriber Signature**

**Date (mm/dd/yy)**

---

**Planned Administration Date**

Day 1 (mm/dd/yy)

Box: Delay by ___________ week(s)

---

**Requirements** within 42 hours

<table>
<thead>
<tr>
<th>ANC</th>
<th>Platelets</th>
<th>Creatinine</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 1 × 10⁹/L</td>
<td>≥ 100 × 10⁹/L</td>
<td>≥ 60 mL/min</td>
</tr>
</tbody>
</table>

Box: Other:

---

**Pre-medications** (Strikeout to exclude)

- ondansetron 8 mg PO/IV
- dexamethasone 12 mg PO/IV
- prophylactic atropine 0.3 mg SC

Box: Other:

---

**CHEMOTHERAPY ORDERS**

Irinotecan & leucovorin may be infused at the same time by using a Y-Connector placed immediately before the injection site.

- irinotecan 180 mg/m² = ___________ mg

Box: Other: ___________ mg/m² = ___________ mg

IV in 500 mL D5W over 90 minutes

Approximate rate = 333 mL/hr

---

**Patient Addressograph**

**Reason**

**Date (mm/dd/yy)**

**Initials**

---

**Comments/Changes**

**Date (mm/dd/yy)**

**Initials**

---

**Prescriber Name**

**Prescriber Signature**

**Date (mm/dd/yy)**

CONTINUED ON PAGE 2

Guidelines for developing ambulatory chemotherapy preprinted orders version 1.0
Cycle: __________ of __________

**CHEMOTHERAPY ORDERS CONTINUED**

► leucovorin  400 mg/m² = __________ mg

☐ Other: __________ mg/m² = __________ mg

IV in 250 mL D5W over 90 minutes
Approximate rate = 167 mL/hr

► fluorouracil  400 mg/m² = __________ mg

☐ Other: __________ mg/m² = __________ mg

IV bolus

then

► fluorouracil  2400 mg/m² = __________ mg

(1200 mg/m²/day = __________ mg/day)

☐ Other: __________ mg/m² = __________ mg

( __________ mg/m²/day = __________ mg/day)

IV in D5W over 46 hours

If total dose is less than or equal to 4400 mg, to a volume of 92 mL by continuous infusion at 2 mL/hr via Baxter SV2 Infusor

If total dose is greater than 4400 mg, to a volume of 230 mL by continuous infusion at 5 mL/hr via Baxter LV5 Infusor

<table>
<thead>
<tr>
<th>Comments/Changes</th>
<th>Date (mm/dd/yy)</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

Patient Addressograph

Prescriber Name | Prescriber Signature | Date (mm/dd/yy)

CONTINUED ON PAGE 3
Cycle: .......... of ..........

CONTINUED

Post-medications (Strikeout to exclude)
✓ loperamide 2 mg caplets:
  4 mg PO at first onset of diarrhea

then

2 mg PO every 2 hours until diarrhea free x 12 hours.
May give 4 mg PO every 4 hours during the night.
Mitte: 48 caplets.

✓ atropine 0.3 to 0.6 mg SC PRN
  Repeat up to 1.2 mg for early diarrhea, abdominal cramps, rhinitis, lacrimation, diaphoresis or flushing.

☐ Other:

Doctor’s Appointments

☐ Current cycle is the last cycle. Return in ........ weeks

☐ Return to the doctor 2 weeks after the first day of the current cycle.

Laboratory Orders

Prior to each cycle
✓ CBC & Diff    ✓ AST    ✓ Bili
✓ Creatinine    ✓ Platelets ✓ Alk Phos

☐ Other:

Prescriber Name    Prescriber Signature    Date (mm/dd/yy)
Cycle: _____ of _____

CONTINUED

☐ INR weekly

☐ INR prior to each cycle

☐ Book for PICC assessment/insertion per Centre process

☐ Book for IVAD insertion per Centre process

☐ Consults:

Patient Addressograph

Comments/Changes

Date

(mm/dd/yy)

Initials
References


50. ISMP Canada (March 16, 2010), Medication Incidents Involving Cancer Chemotherapy Agents. ISMP Canada Safety Bulletin, 10(1).


52. Tran, M., The impact of introducing pre-printed chemotherapy medication charts to a day chemotherapy unit. Journal of Oncology Pharmacy Practice, 2000. 6(2): p. 64.


54. ISMP Canada (November 11, 2010), Application of TALLman Lettering for Drugs Used in Oncology. ISMP Canada Safety Bulletin, 10(8).