TEACHING NURSES CHEMOTHERAPY ADMINISTRATION IN THE ADULT POPULATION: A SCENARIO-BASED SIMULATION MODULE

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Abstract

Background and Purpose: Administering chemotherapy is a post-entry level competency for Registered Nurses (RNs) in the province of Nova Scotia (NS); therefore, requiring specialized training. While the Nova Scotia Cancer Care Program (NSCCP) incorporates theoretical and clinical components in the systemic therapy education program, there is a gap in learning the associated psychomotor skills. The purpose of this practicum project was to develop a scenario-based simulation module on the administration of chemotherapy to adults, in order to bridge knowledge acquired through the online learning component to the clinical setting. **Methods:** An integrative literature review was conducted to understand the effectiveness of simulation exercises and case studies as teaching methods for a chemotherapy learning module directed at RNs administering medications for adult oncology patients. An environmental scan assessed how other hospitals within Atlantic Canada certify nurses in the administration of systemic chemotherapy. Consultations were held with various health professionals to determine appropriate content for the scenario-based simulation module in NS. **Results:** A scenario-based simulation module was developed as a tool for educators. **Conclusion:** This module facilitates the opportunity for all RNs to practice the required systemic therapy skills in a safe, and non-threatening environment; augmenting nurses' confidence in the administration of chemotherapy. Furthermore, this module enables RNs to have equivalent and relevant training through both theory and practice-based learning, in the province of NS. Future plans are to collaborate with the NSCCP leadership team, with the vision of integrating the module across the province of NS.

Key terms: chemotherapy, simulation, nursing education, oncology.

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In supporting best practices as defined by international oncology organizations − including the Canadian Association of Nurses in Oncology (CANO) − education programs for Registered Nurses (RNs) who are preparing to care for patients with cancer should include theory, clinical, and continuing competency components to support safe patient care (CANO, 2010). The Nova Scotia Cancer Care Program (NSCCP) has created an educational learning program with accompanying skill checklists to be completed during a preceptorship for their oncology RNs. However, there is currently a gap in which no hands-on experience occurs between theory and actually applying clinical skills of chemotherapy administration. This may leave oncology nurses feeling unsafe or uncertain regarding administering, monitoring, and caring for this particular population (Muehlbauer, Parr, & Perkins, 2013). The development (and implementation) of a scenario-based simulation module would enhance the present NSCCP *Administration of Cancer Systemic Therapy Online Learning Program* by facilitating a smoother transition from theory to practice for oncology RNs.

Background

In 2017, it was estimated that over 206,000 new cases of cancer would be diagnosed, and over 80,000 deaths associated with cancer would occur in Canada (Canadian Cancer Society [CCS], 2017a). Cancer is defined by the National Cancer Institute (n.d.a) as "a term for diseases in which abnormal cells divide without control and can invade nearby tissues" (para 1). Chemotherapy, a form of systemic cancer therapy, is frequently used as a treatment option for many types of cancer and often requires focused training to administer. The National Cancer Institute (n.d.b) defines chemotherapy as "treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or

by stopping them from dividing" ("Dictionary of Cancer Terms", para. 1). People diagnosed with cancer often interact with nurses when receiving treatment to cure, control, prevent, or relieve symptoms of their disease (CCS, 2017b). With the number of newly diagnosed cases each year increasing, nurses with training in chemotherapy administration will be in high demand (CCS, 2017b).

Nova Scotia Cancer Care Program

Administering chemotherapy is a post-entry level competency for RNs in the province of Nova Scotia (NS), and requires specialized training (Cancer Care Nova Scotia, 2012). The NSCCP had developed *The Administration of Cancer Systemic Therapy Online Learning Program* to further nurses' understanding of oncology and the principles of chemotherapy administration for adults receiving systemic chemotherapy. Content of the self-directed online program reflects the educational program requirements set out by CANO (2010). As part of the online program, RNs complete short multiple choice questions, case studies, and explore websites of external organizations which can support their practice. Upon completion of the online program, a preceptorship experience is undertaken by the oncology nurse.

Current Issue

While the NSCCP has incorporated theoretical and clinical components into their education program, there is a gap in the knowledge acquisition relating to the psychomotor and critical thinking skills associated with administering systemic cancer treatments. Challenges arising from the current NSCCP competency-based chemotherapy program stem from the preceptorship experience combined with the nurse's ability to practice all of the required skills, prior to working autonomously in their workplace.

The challenge regarding the preceptorship component, relates to the varying degrees of preceptor experience, which impacts the ability to address diversity issues (e.g. age differences, life experience, and ways to foster critical thinking) that could influence teaching strategies utilized (Popkess & Frey, 2016; Sedgwick & Harris, 2012). Furthermore, learning how to address cytotoxic spills, extravasation, and hypersensitivity management is done through discussion, rather than actual hands-on experience to ensure the safety of patients.

Proposed solution. The use of simulation and case study teaching methods have been documented in the literature as having positive results in achieving desired outcomes in clinical education (Gubrud, 2016). This supports the mission of the NSCCP (n.d.) "led by compassion and *driven by evidence*, together we work to alleviate the burden of cancer" (Leadership, para. 1), along with their vision of "*world class cancer care* for generations" (Leadership, para. 1). Although simulation research is not directly focused on patient care, supporting oncology nurses through educational programs can promote optimal patient outcomes, satisfaction, and overall safety (Kean, Iverson, & Boylan, 2016).

Jeffries, Swoboda, and Akintade (2016) suggest that demonstration of theoretical knowledge in a simulation setting allows the practice of skills while ensuring safety of patients. Introducing a face-to-face skills-based module prior to the preceptorship experience, not only reinforces the principles of chemotherapy administration taught online, but also provides an opportunity to practice *all* of the required skills in a safe, non-threatening environment. Furthermore, this experience can enhance nurses' confidence with the administration of systemic chemotherapy (Norman, 2012). The participation in a

scenario-based simulation module would facilitate all nurses in NS to have equivalent and relevant training related to the administration of systemic cancer therapy.

Practicum Objectives

With the present gap of hands-on experience between theory and practice associated with the administration of systemic chemotherapy, development of a scenario-based simulation module would enhance the present NSCCP *Administration of Cancer Systemic Therapy Online Learning Program* by facilitating a smoother transition from theory to actual clinical practice for oncology RNs. The goal of the practicum was to develop a scenario-based simulation module to bridge the theoretical component to the clinical setting by enhancing the psychomotor and critical thinking skills of oncology RNs. The following objectives were created for this practicum project:

1. During the practicum, I will learn about the application of simulation and case studies as teaching modalities for enhancing nurses' psychomotor skills and critical thinking in chemotherapy administration.
2. During the practicum, I will identify RNs' learning needs related to the administration of systemic therapy as a cancer treatment.
3. During the practicum, I will develop a scenario-based simulation module about the intravenous (IV) administration of systemic cancer therapy in the adult population.
4. By the end of the practicum, I will demonstrate the application of advanced practice nursing competencies in the final practicum report.

Overview of Methods

To accomplish all the practicum objectives, several methods were identified and undertaken. For the first objective, an integrative literature review was conducted to provide evidence that scenario-based simulation experiences are an effective teaching strategy to develop psychomotor skills and enhance critical thinking in RNs.

The second objective was completed in two parts, an environmental scan and consultations with key stakeholders. The first part was an environmental scan of health organizations in Atlantic Canada provided program content and relevant teaching strategies that are being utilized to teach oncology RNs the administration of systemic therapy. Additionally, key stakeholders from the Halifax site of the NSCCP were contacted to identify what resources would be available to support the development and implementation of a scenario-based simulation module on systemic cancer therapy administration. The second part involved consultations with health leaders and floor RNs in NS to determine which key skills should be integrated into the scenario-based simulation module.

Summary of Literature Review

A literature search was undertaken to ascertain which teaching strategy was the most effective to develop the RN's psychomotor skills and critical thinking pertaining to the administration of chemotherapy. Several databases were searched including PubMed, CINAHL, and *OneSearch* through the Health Sciences Centre Library, Memorial University. A critical analysis of each article was performed utilizing the Public Health Agency of Canada "Critical Appraisal Tool Kit" (2014).

Teaching strategies specific to oncology nursing education, specifically chemotherapy administration, were sparse in the literature (Muehlbauer et al., 2013). Much of the relevant literature reviewed evolved around student curriculum, rather than hospital or clinical training programs. Granted both forms of education engage learners in a teaching-learning setting, clinical training programs are specifically designed to enhance skills and increase knowledge to accomplish a clinical task; such as the administration of chemotherapy for example (Yakovlev & Yakovlev, 2014). As a result of these discoveries, the literature search was redefined to focus on both psychomotor skills and critical thinking skills, two of the basic skills required to administer chemotherapy. The complete Integrative Literature Review can be found in Appendix A.

Teaching Psychomotor Skills

Bloom's Taxonomy (Anderson & Krathwohl, 2001; Bloom, 1956) is one method that has been created to promote higher forms of thinking; one of the learning domains being psychomotor. "The psychomotor domain deals with the development of manual or physical competencies" most often related to clinical practice (Scheckel, 2016, p.168). In addition to the self-directed learning and preceptorship teaching strategies utilized by the NSCCP, two other methods for teaching psychomotor skills were found in the literature.

1. Videotaping can be utilized as teaching method when incorporated with other learning methods such as self-directed learning, self-assessment, and feedback. When incorporated with these other methods, proposed benefits include providing an "objective record, facilitate instructor's constructive comments, and promote trainee's self-assessment" (Savoldelli et al., 2006). Unfortunately, the true effect of videotaping could be considered distorted through the act of repetition; in other

words, the measurable amount of learning may have occurred by other means (Hill, Hooper, & Wahl, 2000).

2. Simulation is a "pedagogy using one or more typologies to promote improved and/or validate a participant's progression from novice to expert" (International Nurses Association in Clinical Simulation Learning [INACSL], 2011, S6). The broad purpose of simulation is to "improve the safety, effectiveness, and efficiency of healthcare" (Society for Simulation in Healthcare, 2013, About Simulation section, para. 1). Chemotherapy regimens are often very detailed, and chemotherapy drugs are identified as high-alert medications due to the potential for patient safety issues. As such, "hands-on" practice prior to patient interaction (i.e. simulation exercises) should be incorporated into education programs for oncology nurses (Institute for Safe Medication Practices, 2008). According to learners, the use of simulation develops a more effective and meaningful learning experience (Jeppesen, Christiansen, & Frederiksen, 2017).

Teaching Critical Thinking Skills

The cognitive domain according to Bloom's Taxonomy is important to consider when promoting higher forms of thinking; it focuses on knowledge (Anderson & Krathwohl, 2001; Bloom, 1956; Phillips, 2016). Three teaching methods were found in the literature related to developing nurses' critical thinking.

1. Case studies as a teaching method allows the learner to express and work through the critical thinking process. Correlating with adult learning principles, case studies support the learners' prior experience and offer validation of their thinking process, which allows the connection of theory to practice (Phillips, 2016). One

type of case study provides real-life situations that progressively reveal more information, is known as an unfolding case study. This type of case study allows learners to build on previous knowledge (Phillips, 2016). When unfolding cases are combined with simulation, demonstration of hierarchal order can occur by following progression of a health problem and the related nursing care (Jeffries et al., 2016).

2. Problem-based learning (PBL) is student-focused, interprofessionally driven, and used with small group work to analyze problems in a clinical context (Baker, 2000; Roca, Reguant, & Canet, 2016). One challenge of assessing PBL outcomes is that "standardized elements do not exist that can be replicated, measured, and compared" (Baker, 2000, p. 263). Additionally, PBL was found to be utilized more often with undergraduate programs to *develop* critical thinking in students; whereas oncology RNs need to *refine* and *enhance* their skills (Gholami et al., 2016; Roca et al., 2016).
3. Simulation can also have an impact on enhancing critical thinking skills (Adib-Hajbaghery & Sharifi, 2017; Young & Jung, 2015). To aid the enhancement of critical thinking in oncology RNs, the use of high-fidelity scenarios would be advantageous (Sullivan-Mann, Perron, & Fellner, 2009). One of the key features of simulation is debriefing which "encompasses the cognitive domain assessing knowledge; the kinetic domain assessing skill and action; and the affective domain, or how the learner felt or interacted with the patient or other staff" (INACSL, 2016a; Jeffries et al., 2016, p. 315). When providing RNs the opportunity to engage in a supportive environment during a simulation debriefing,

critical thinking can transpire by drawing out performance explanations and enabling development of strategies to enhance future performances. This can therefore, result in increased knowledge and confidence of the nurse (Cant & Cooper, 2011; Crowe, Ewart, & Derman, 2018).

Simulation

Simulation was the only teaching strategy that addressed both psychomotor skills and critical thinking. With documented adverse events associated with the medication administration of chemotherapy combined with the high-alert status of chemotherapy drugs, unfolding case studies and high-fidelity simulation scenarios provide a valuable means for RNs to practice the administration of systemic chemotherapy. A meta-analysis by Hegland, Aarlie, Strømme, and Jamtvedt (2017) supported the finding of Singh et al. (2015), which demonstrated a small but statistical significant difference in the use of simulation as a teaching method, when compared to other teaching strategies.

Although there is a dearth of literature related to the teaching methods in chemotherapy administration for RNs, simulation scenarios (when integrated with unfolding case studies) have shown to engage learners through active learning (Jeffries et al., 2016). Simulation scenarios also offer valuable opportunities for developing psychomotor skills and enhancing critical thinking (Childs & Sepples, 2006). Therefore, it is worth the investment to create such learning opportunities which could enhance RNs' chemotherapy administration and management skills as well as critical thinking abilities.

Design. Several design components are important to consider when utilizing simulation, one of which is fidelity. The INACSL Standards Committee (2016b) defines fidelity as "the degree to which a simulated experience approaches reality; as fidelity

increases, realism increases" (p. S42). The degree to which this occurs is determined by the environment, the tools and resources used, and many factors associated with the participants. High-fidelity simulation experiences (the closer related to reality) are worth the investment because they create opportunities learners highly value, and offer standardization of curriculum (Butler, Veltre, & Brady, 2009). Beginning with psychomotor skill activities and building on the complexities (e.g. critical thinking and clinical judgement) throughout the simulation scenario, learners are able to gain the most from the learning experience (Keene, 2009).

Outcomes. To measure the effect of an intervention, outcomes are required as a means to "represent the integrated knowledge, skills, and abilities or competencies students [learners] are expected to demonstrate" (Sullivan, 2016, p. 107). Within the literature, several common themes (e.g. skill performance, self-confidence, satisfaction) related to simulation outcomes were noted. Skill performance was found to be closely associated with patient safety. Self-confidence was consistently found to be augmented post simulation exercises, regardless of the study design. Furthermore, simulation offers a solution to reduce anxiety and stress of nurses learning to administer and handle high-risk drugs (i.e. chemotherapy) through means of a supportive learning environment. The reduction of this distress felt by the RN when learning could translate into decreased anxiety when applying each skill in the clinical setting (Chen, Chen, Lee, Chang, & Yeh, 2017; Jeppesen et al., 2017). By utilizing teaching strategies, such as simulation, which learners both enjoy and believe they gain value from, participation could be increased, and learning outcomes could be improved.

Debriefing. Taking place at the end of the simulation exercise, informal discussions (i.e. debriefing) should transpire. Debriefing topics should reflect the process, outcomes, application of the scenario to clinical practice, key take-home messages, as well as identification of potential difficulties, with the aim at improving future performances (INACSL, 2016b; Rauen, 2001). As a result of the debriefing, re-training can occur, ultimately minimizing patient risks while also improving clinical effectiveness and quality of care provided (Andreatta & Marzano, 2014). This aspect of simulation allows for learners to "reference real-life experiences, normalize behaviours, and acknowledge emotions" (Jeffries et al., 2016, p. 315), targeting the primary gap of transitioning knowledge and skill into actual clinical practice that nurses may experience.

Theoretical Framework

Simulation-based learning is grounded in the educational principles of two theorists: Benner (1982) *novice to expert* (Dreyfus model) and, Knowles (1984) *adult learning principles*. These cognitive development theories "focus on sequential development of learning over time" (Candela, 2016, p.216). Such learning theories explain the interaction of learners with the teachers, the learning environment, and the subject matter (Candela, 2016). More recently, the literature is evolving around simulation as a method to support the transfer of knowledge and skills into realistic interactions (Jeffries et al., 2016). To support simulation as a teaching strategy in nursing, a simulation model was created by Jeffries (2005). However, clarification of the framework's terminology needs to occur to improve the facilitation of integrating the simulation framework into future studies (Ravert & McAfooes, 2014).

According to Benner (1982), acquisition and development of a skill occurs once completion of five levels of proficiency happens (*Dreyfus Model*). Benner, Hooper-Kyriakidis, and Stannard (1999) expanded on the five levels by stressing the importance of reflection, and that experience does not occur solely through the passing of time but through actual clinical practice. Due to the complexities of nursing practice, ongoing experiential learning and reflection should occur which can be supported through the use of simulation (Benner, Hooper-Kyriakidis, & Stannard, 1999).

For simulation-based learning to be effective, experiences need to be grounded in principles of adult learning. "The goal of deliberate practice in simulation-based learning is constant skill, knowledge, and professional improvement that progresses to the expert level of performance" (Decker, Caballero, & McClanahan, 2014, p. 15). The five principles according to Knowles (1984) state that adults are 1) internally motivated, 2) have past experiences and expects those experiences to be acknowledged, 3) are goal directed, 4) expect relevancy of learning, and 5) want to be respected. As such, simulation activities provide a venue whereby concrete experience, reflective thought, and experimentation can occur (Decker et al., 2014).

Limitations and Implications

As a result of the critical appraisal, there is strong evidence to support the recommendation of utilizing simulation as a teaching strategy when developing psychomotor skills and enhancing critical thinking skills. It could be suggested that simulation may be an effective teaching strategy for RNs learning the administration of chemotherapy due to the positive effect of simulation on teaching psychomotor and critical thinking skills. To strengthen the nursing literature on the use of simulation as an

effective teaching tool, additional high-quality studies are needed, focused on nursing training programs in the clinical care setting.

Training programs which utilize simulation as a teaching strategy, may help RNs transition more quickly and efficiently in the clinical setting (Chen et al., 2017). Simulation not only provides a safe and supportive avenue for RNs to learn, but also affords patient safety. Acknowledging that critical thinking is a skill that develops over time, it is recommended that additional longitudinal studies be designed to contribute to the body of evidence that simulation develops critical thinking skills (Choi, Lindquist, & Song, 2014). The findings from the integrated literature review have assisted in directing the content for the scenario-based simulation module.

Summary of Environmental Scan

An environmental scan was undertaken to identify which teaching strategies the provinces of Atlantic Canada utilize to educate RNs on the administration of systemic chemotherapy. Additionally, this scan sought to identify how these provinces teach the management of unintended events (e.g. cytotoxic spills and chemotherapy extravasation). The second component to the scan involved contacting key stakeholders from the Halifax site of the NSCCP to identify resources available to support the development and implementation of a scenario-based simulation module. The Environmental Scan Report can be found in Appendix B.

Atlantic Canadian Systemic Therapy Programs

Identifying how other provinces in Canada teach oncology nurses the administration of systemic chemotherapy was important to understand prior to divesting time into creating a resource which may already be developed. Provinces within Atlantic

Canada were selected for the intent to work with a manageable amount of information. These provinces have smaller populations when compared to other Canadian provinces and more closely represent the demographics of NS. The health organizations from NS, New Brunswick (NB), Prince Edward Island, and Newfoundland and Labrador were contacted. From scanning the health organizations' websites and having discussions with the chemotherapy certification program liaison in each province, the information was collected and transcribed into a document from which a content analysis was performed.

Information gathered from the Atlantic Canadian provinces was juxtaposed to the NSCCP *Administration of Cancer Systemic Therapy Online Learning*, and similar, different, or unique components were identified. The theoretical content from each Atlantic Canadian program reflects the required material noted within the CANO (2010) *Standards and Competencies for Cancer Chemotherapy Nursing Practice*. As well, all programs utilize written exams as the objective evaluation process upon completion of the theoretical content. The delivery of the theoretical material varied across the Atlantic Provinces (e.g. self-directed online learning modules and presentation workshops), whereas the clinical component consistently applied a preceptorship model. During the preceptorship experience, RNs demonstrate the "chemotherapy competencies relevant to their practice setting" (CANO, 2010, p.18), with the majority of the provinces requiring RNs to complete competency checklists (e.g. IV push, and use of an infusion pump). NB was the only province to utilize simulation exercises (which includes the practice of managing chemotherapy spills, chemotherapy extravasation, and hypersensitivity reactions) as part of their certification program. All other provinces discuss the prevention and management of such events to assess the RNs' understanding.

NSCCP Stakeholders' Responses

Several supporting comments were provided regarding the suggestion of developing a scenario-based simulation module, along with other suggested resources to incorporate. Practicing psychomotor skills associated with chemotherapy administration prior to patient contact was reported to be very important by all key stakeholders. A common theme identified by all stakeholders was that self-confidence of the nurse was critical, as receiving chemotherapy is already a stressful experience for the patient. While not all administration methods or treatment protocols relevant to the oncology RNs' respective practice setting are seen during the preceptorship, simulation scenarios were seen as a teaching method to address this gap in practice and achieve the maximum opportunity for learning. It was also identified that Clinical Nurse Educators (CNEs), with the added support from the NSCCP leadership team, would be the most appropriate facilitators to deliver the module in their respective practice settings.

Ethical Considerations

It was determined this environmental scan did not need the approval from an ethical board because the scenario-based simulation module was not conducting research according to the criteria of the Newfoundland and Labrador Health Ethics Research Board. Permission to obtain the teaching strategies and content overview from other provinces was discussed with the person contacted within each health organization.

Summary of Consultations

A consultation process was required to identify learning needs and associated challenges with the present NSCCP competency-based chemotherapy program, including obtaining suggestions on how to address areas of concern. Information gathered from

health leaders and floor RNs was used to inform the design and content of the scenario-based simulation module. The Consultation Report can be found in Appendix C.

Two groups of individuals at the QEII Health Sciences Center (QEII HSC) located within the NSHA, were the focus for this practicum consultation: health leaders and floor RNs. Eight key stakeholders including the Oncology Practice Consultant (OPC), the Coordinator for the QEII HSC Simulation Program, and the operational staff (unit mangers, charge nurses, and CNE from the two inpatient oncology units) were considered strategic health leaders for this practicum project. Six floor RNs from two adult oncology inpatient units were approached in-person at random to participate in the consultation process. During in-person meetings, and through email conversations, two sets of pre-determined questions were provided and answered by both groups. A content analysis was undertaken with the data collected.

Health Leaders' Responses

All health leaders contacted were supportive of the creation of a scenario-based simulation module and thought that floor RNs could benefit from the hands-on practice of administering simulated high-risk medications. Although the health leaders did not directly use the term "fidelity" in responding to which form of simulation would be best suited for delivering the module content, they all were of the opinion that the higher degree of "reality" would be best suited for the module (e.g. task trainers and real equipment such as infusion pump, syringes, IV line, etc.). Moreover, the OPC believed any form of simulation would be an added value to the current program.

Health leaders reported several tasks that floor RNs should practice in relation to the administration of chemotherapy. The top three tasks identified included:

1) verification processes (e.g. pre-administration label reviews and transcribing/co-signing pre-printed orders), 2) management of a chemotherapy spill, and 3) management of a chemotherapy extravasation. Two other remarks (provided by the CNE) considered to be important were included in the module: management of hypersensitive reactions; and the importance of the floor RNs identifying their own limits, including where to access additional resources for assistance.

Interestingly, when the responses from each health leader were considered, each designation reported different priorities in relation to enhancing the RNs' skills in administering chemotherapy. Unit managers identified tasks that have been found in incident reporting systems (such as verification of pre-printed orders and transcription of orders), the charge nurses focused on group work and collaboration, and the CNE addressed understanding the process of administering chemotherapy more comprehensively. Because of the current program demands and the "lateral movement" of floor RNs between units, one unit manager commented that a hands-on chemotherapy learning module offered quarterly would not be feasible (C. Read, personal communication, March 27, 2018). To overcome several reported obstacles, the unit managers, CNEs, and the OPC suggested to incorporate a few hours of simulation with the unit CNE as part of the first clinical day, prior to the preceptorship experience.

Floor RNs' Responses

The floor RNs' reported their confidence on several tasks related to the administration of chemotherapy. The task which floor RNs' reported to be most confident in carrying out, was to independently administer chemotherapy via an infusion pump (93%), followed by management of a chemotherapy spill (70%), and administering

chemotherapy via gravity (66%). The task associated with the least confidence was management of an extravasation of chemotherapy (56%). This established the need for a chemotherapy learning module with hands-on practice to be developed as part of the NSCCP competency-based chemotherapy program. Additionally, nurses reported that the varying processes and routines utilized between the clinics versus the inpatient setting, left them feeling under-prepared to practice independently on the unit. This indicated that floor RNs undertaking the current competency-based chemotherapy program require further practice to increase their confidence with the administration of chemotherapy, and therefore offering enhanced patient safety.

Ethical Considerations

It was determined these consultations did not need the approval of an ethical board because the scenario-based simulation module was not a research project as determined by the results of the Health Research Ethics Authority Screening Tool (2011). It was made clear to both target groups that participation was voluntary, and they could refuse to answer any questions, at any time. Permission to approach the floor RNs was obtained from both unit managers, and it was made clear to the floor RNs that no identifying information would be collected, and confidentiality would be guaranteed.

Development of the Scenario-Based Simulation Module

Several drafts of the module were developed over the course of the practicum. A preliminary draft of the scenario-based simulation module was created by integrating the results of the literature review, the environmental scan, and the consultation process with the theoretical material. Feedback on the draft was obtained from two oncology CNEs, the OPC, and one floor RN during a mock trial of the module. The final copy of the

simulation module was divided into four sections to more easily demonstrate the contents of the module. The Scenario-Based Simulation Module can be found in Appendix D.

Feedback

Feedback regarding the content of the module and its delivery of information was obtained in two segments. The first segment was obtained from the OPC and CNEs' overview of the content, including whether the development of psychomotor skills and critical thinking of oncology nurses was being accomplished. All three individuals agreed this module was comprehensive and supported the development of psychomotor skills and enhanced critical thinking. The OPC thought that the use of an actual patient room or simulation setting would be beneficial, however, she also commented that it was resource prohibitive.

The second segment involved a mock simulation session of executing the module. Due to scheduling availability, one CNE and one floor RN participated to offer feedback. The module was demonstrated for the CNE through the participation of the floor RN, allowing for the educator to observe for areas of improvement in the delivery of the module. The floor RN completed a questionnaire prior to commencing the simulation experience ranking whether she agreed or disagreed with statements regarding her confidence in skills associated with administering systemic chemotherapy. The same questionnaire was provided post simulation experience; the confidence of the floor RN in all areas increased by a minimum of one point (on a five-point Likert scale). The nurse also reported that the module was a valuable learning experience, and was relevant to her area of practice with realistic case-scenarios. Even though the mock simulation session was only held on one occasion, valuable feedback was obtained about the implementation

process. Future plans include completing additional mock sessions to obtain additional information on the successful implementation of the module.

Module Content Overview

The module was constructed in four sections: 1) overview, 2) facilitator instructions, 3) simulation scenarios, and 4) nurse handouts. Each section was developed with the expectation that the facilitator (i.e. CNE) could implement the module without prior knowledge organizing a simulation experience.

The first section contains an overview of the information encompassed within the module. It offers a brief description of the contents of the module and a general outline on how the module should be utilized. This section also contained the participants' pre-requisites, as well as learning objectives for the simulation experience.

The second section contains resources relevant to running the simulation experience. The following resources are included: titles of relevant NSHA policies and procedures, the NSCCP skill checklists, and instructions on how to locate the CANO (2010) standards and competencies for cancer chemotherapy. Additionally, a comprehensive materials list and examples of chemotherapy medication labels (which increases the realism of the experience) to be used during the simulation are provided. A detailed breakdown of the NSCCP skills are provided in the form of objectives and performance markers to guide educators less familiar with the skills as well as suggestions for debriefing questions.

The debriefing questions are designed to stimulate critical thinking of the nurses after completion of each case-scenario, and after completing the entire simulation

experience. It is suggested that the debriefing be an open conversation rather than a straight question and answer session.

The third section contains two case-scenarios (one inpatient treatment and one outpatient treatment), both of which must be completed to fulfill all NSCCP skill checklists. Each case-scenario has accompanying facilitator notes to direct the experience. There is a case-scenario progression outline to offer suggested time allotments for each action by the nurses. To provide guidance for documentation expectations, completed samples of paperwork are included (e.g. verification checklists and correctly transcribed medication administration records).

The last section contains a copy of the module objectives and case-scenarios to be provided to any nurse participants. There is also accompanying paperwork (physician's orders, completed pre-printed chemotherapy orders, and consents) relevant to each case-scenario. The case-scenarios are designed to be progressive in nature enabling the nurse to draw on the simulation experiences in future systemic therapy administration when in the actual clinical setting.

Advanced Nursing Practice Competencies

During the course of the practicum project, several advanced nursing practice competencies were demonstrated through the knowledge and skills learned throughout the Master of Nursing Program at Memorial University. The three competency categories of research, leadership, and consultation and collaboration were applied during the practicum experience. Reflection on the breadth and range of nursing knowledge, applied theory, research, and the critical inquiry of clinical practice were demonstrated (Canadian Nurses Association [CNA], 2008).

The following examples are provided to illustrate how these competencies were demonstrated during the practicum. I have applied the competency of research by critiquing, and interpreting evidence-based findings, with the application of the findings through the development of a scenario-based simulation module (CNA, 2008). I have demonstrated the competency of leadership by "identify the learning needs of nurses and other members of the health care team" (CNA, 2008, p. 23) through commitment of developing a resource to meets the identified needs. The competency of consultation and collaboration can be found in several aspects of the practicum including, but not limited to, the environmental scan within the NSHA, the consultation report with health leaders and floor RNs, and the comprehensiveness of the finalized module. Collaborating with individuals at a national, provincial, and organizational level further demonstrates characteristics of an advanced practice nurse.

In specialized areas such as oncology, a holistic and integrated approach is required to provide comprehensive care (CNA, 2008). This practicum project utilized evidence from the literature and continued the advancement of nursing practice by enhancing the provision of safe patient care. As an advanced practice nurse, leadership must be demonstrated by seeking new ways to practice and improve the delivery of care (CNA, 2008). Initiatives that have an impact on patient care, such as the development of a scenario-based simulation module, translate the application of advanced nursing practice competencies to clinical practice (CNA, 2008).

Reflections and Moving Forward

As with any project, it is important to reflect on past learning, but more importantly, to reflect on learning going forward. The practice of reflection, according to

the College of Registered Nurses of Nova Scotia (CRNNS), can be done through the process of critical inquiry (CRNNS, 2017). This form of inquiry involves a purposeful, systematic process to achieve desirable outcomes. Reflection of this practicum focused on personal and professional growth. In moving forward, this project has several future phases: 1) to collect additional evidence on the influence of the simulation module on nurses' confidence associated with the required NSCC skill checklists to administer systemic therapy agents, 2) to present the module to the NSCC leadership team, and 3) to disseminate the work accomplished at a relevant conference.

Lessons Learned

During the course of the practicum, I have learned several lessons. From the beginning, I have learned that various teaching strategies are needed to support all styles of learning. For some oncology nurses, perhaps reading the theory and applying the knowledge learned is sufficient to gain the experience in caring for those with an oncological disease. For other nurses however, learning occurs through hands-on or visual learning. The latter can be accomplished with a simulation experience.

During the literature review, I've learned that if limited articles are published on a specific topic, acknowledging that the topic of interest has a gap in the literature is important. It is also important to redefine the concepts of interest to broaden the search, and then make connections back to the original topic searched.

From a nursing lens, I learned that simulation offers a means to develop psychomotor skills and enhance critical thinking skills in the health sector. Furthermore, several aspects of simulation must be considered when creating an experience for learners. As with any learning, challenges arose during the process of developing this

module but were overcome. This process has allowed me to become more knowledgeable in several areas (e.g. teaching strategies utilized in nursing/ health professions, and collaborating with others beyond one health organization). Above all, I have gained further insight as to what is required from an advanced practice nurse.

Moving Forward

As previously mentioned, several actions must now ensue to optimistically implement and evaluate the module. With the module now completed, refining the evaluation tool created for assessing nurses' confidence pre- and post-module on the skills utilized during the administration of systemic therapy agents (including unintended events) will transpire. The evaluation tool will be utilized initially to gather additional evidence prior to presenting the module to the NSCC leadership team. Given this module was not designed for the purpose of evaluating nurses' application of the skills, but rather for the nurse to gain experience through practicing of the skills, an evaluation tool will be added to the module to provide concrete feedback on areas of growth in self-confidence.

The next step will be to present the module and its impact on augmenting nursing confidence and enhancing patient safety to the NSCCP leadership team. The purpose of the meeting is not only to disseminate the module created, but also to determine how this teaching tool could be integrated into the current competency-based learning program. Notwithstanding the outcome of this meeting, an abstract application will be submitted to the next CANO Conference to further disseminate the work accomplished during this practicum.

Conclusion

This practicum project utilized many approaches to gather evidence in supporting the creation of a simulation chemotherapy learning module that bridged the knowledge acquired from the NSCCP online learning modules (theoretical component) to the clinical setting, prior to patient engagement. Key findings from the literature review contributed to the plans for enhancing nursing practice, by supporting and enabling nurses to provide safe and competent care to patients. Through consultation with key stakeholders, learning needs were assessed, and as a result an improved method for teaching nurses the administration of chemotherapy was created. By completing the evidence-informed simulation module, the confidence and ability of oncology RNs will be improved, and this will potentially lead to the enhanced delivery of care to patients in the future (CNA, 2008; Chen et al., 2017; Crannell, 2012; Jeppesen et al., 2017; McLaughlin et al., 2014).

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Appendix A
Integrative Literature Review

Methods for Teaching Nurses Systemic Therapy Administration for Adult Oncology Patients: A Literature Review

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Registered nurses who provide care to oncology patients must be knowledgeable not only with the disease process, but also with the care required for administering chemotherapy. In supporting best practices as defined by international oncology organizations, including the Canadian Nurses Association of Oncology (n.d.), education programs for registered nurses (RNs) who are preparing to care for individuals with cancer should include theory, clinical, and continuing competency components to support safe patient care. The Nova Scotia Cancer Care Program (NSCCP) has created an educational program with accompanying skill checklists to be completed during a preceptorship for their oncology RNs. However, the present gap between theory and practice related to chemotherapy administration may leave nurses feeling unsafe or uncertain regarding administering, monitoring, and caring for this particular population (Muehlbauer, Parr, & Perkins, 2013).

Background

In 2017, it was estimated that 206,000 people would be diagnosed with a new cancer in Canada (Canadian Cancer Society, 2017a). Cancer is defined by the National Cancer Institute (n.d.a) as “a term for diseases in which abnormal cells divide without control and can invade nearby tissues” (para 1). Individuals receiving treatment either to cure, control, prevent, or relieve symptoms of their disease will most likely interact with RNs at one point in time (Canadian Cancer Society, 2017b).

Chemotherapy is frequently used as a treatment option for many types of cancer and often requires focused training to administer. The National Cancer Institute (n.d.b) defines chemotherapy as drugs that are used to stop the growth, or kill cancer cells. With the increasing number of newly diagnosed cancer cases each year, RNs trained in

chemotherapy administration will be in high demand. Albeit there are standards for the administration of systemic chemotherapy and care of individuals with cancer, there are challenges associated with specialized training on a large scale; one is the lack of standardized teaching strategies to be utilized in the delivery of these education programs. Within Nova Scotia (NS), the administration of systemic chemotherapy is a post-entry level competency for RNs, and therefore requires specialized training (Cancer Care Nova Scotia, 2012).

Current Program

In NS, the current teaching strategies utilized as part of the NSCCP for adults receiving systemic chemotherapy involves two components: 1) completion of a self-directed online program "Administration of Cancer Systemic Therapy Program", and 2) a preceptorship experience to demonstrate competency of the Canadian Association of Nurses in Oncology (CANO) standards (along with completing the NSCC skills checklists). Content of the self-directed online program reflects the educational program requirements set out by CANO. As part of the online program, RNs complete short multiple answer questions, case studies, and explore websites of external organizations which could support their practice. The preceptorship experience can be completed in a variety of settings, which include: a local hospital, a larger community hospital that serves a greater population receiving chemotherapy, or at one of the two outpatient chemotherapy clinics within the QEII Health Science Center in Halifax. With patient safety being the primary focus in the clinical setting, needs of the learner are often secondary (Meyer, Connors, Hou, & Gajewski, 2011).

Teaching strategies currently utilized. Self-directed learning is utilized as the teaching strategy for the online learning module (theory) component of the competency-based chemotherapy program. This format of teaching requires the learner to complete information on one concept, based on specific objectives, often involving self-checks (i.e. pretest/posttest) (Phillips, 2016). Regrettably, studies have found no difference in outcomes measured between self-directed learning modules and other teaching strategies (Majumdar et al., 1998, Simonsen, Daehlin, Johansson, & Farup, 2014). Furthermore, a survey by Majumdar et al. (1998) found that self-directed learning was perceived to be more stressful and less relevant in terms of training; therefore, not a preferred teaching strategy by students when learning psychomotor skills.

Specific to the NS competency-based chemotherapy program, there are additional challenges associated with the preceptorship (clinical) component. Unfortunately, as part of the preceptorship experience, exposure to relevant clinical situations (i.e. addressing all psychomotor skills from the checklists) is largely based on chance (Singh et al., 2015). Preceptorship as a teaching strategy involves "acquiring a basic level of knowledge, skills and personal attribute as well as being socialized into the profession of domain of practice" (Canadian Nurses Association, 2004, p. 13). It is formal and often a one-to-one relationship of a pre-determined length. Although positive benefits of the preceptorship experience (e.g. acquiring basic knowledge and skill) have been reported by the Canadian Nurses Association (CNA), challenges of this teaching strategy include lack of support for the preceptor, selection of non-proficient nurse preceptors, and conflict between preceptor and preceptee (Altmann, 2006; CNA, 2004; Mamchur & Myrick, 2003). Learners may also feel awkward being assessed in front of real patients (Norman, 2012).

And furthermore, learning outcomes that have not been empirically demonstrated to be supported through preceptorship (e.g. critical thinking and clinical competence) should be addressed by other teaching strategies (Udlis, 2008).

Rationale for Project

The proposed scenario-based simulation module would enhance the present NSCCP, by facilitating a smoother transition from theory to practice for the oncology RNs becoming certified in the administration of systemic chemotherapy. Teaching strategies specific to oncology nursing education, explicitly chemotherapy administration, are sparse in the literature (Muehlbauer et al., 2013). The goal of this module is to enhance the psychomotor skills and critical thinking skills of oncology RNs, two key aspects of this practicum project.

Critical thinking is an important skill for RNs to utilize for the administration of chemotherapy. Critical thinking is used when obtaining a health history, determining appropriate venous access (or management of central venous access devices), interpreting laboratory results, and understanding the effect of pancytopenia. Unfortunately, within the literature there are varying terms being interchanged relating to this thinking process. To clarify, *critical thinking* is solely the cognitive process for analyzing knowledge (Benner, 1984). *Clinical reasoning* includes the cognitive and metacognitive process, building on critical thinking but focusing on a specific situation or patient (Banning, 2008). And finally, *clinical judgement* goes further to incorporate cognitive, psychomotor, and affective processes demonstrated though actions and behaviours (International Nursing Association for Clinical Simulation and Learning [INACSL],

2011). For the purpose of this paper, due to lack of a definition in the articles critiqued, critical thinking, critical reasoning, and clinical judgement will be used interchangeably.

Using research evidence is one of the central components to advanced nursing practice (CNA, 2008). As such, evaluating current practices in light of research findings is part of the Canadian Nurses Association "Advanced Nursing Practice" research competency (CNA, 2008). This paper consists of an integrated literature review that evaluates teaching strategies used for developing psychomotor skills and enhancing critical thinking skills in oncology nurses, a theoretical framework to guide the practicum project, and implications for the learning module to be developed.

Integrated Literature Review

A literature search was undertaken to ascertain which teaching strategy is the most effective to develop RN psychomotor skills and critical thinking pertaining to chemotherapy administration. Several databases were searched including PubMed, CINAHL, and OneSearch through the Health Sciences Centre Library, Memorial University. Bibliographies were hand searched for relevant articles, as well as assistance provided by the Nova Scotia Health Authority librarians. Key search terms included were: *chemotherapy, oncology, nursing, simulation, case studies, problem-based learning, preceptorship, teaching strategies, psychomotor skills, critical thinking, and education*. Articles were not limited by year, but were restricted only to those in English. The critical analysis of these articles was performed utilizing the Public Health Agency of Canada (2014) *Critical Appraisal Tool Kit* with the full results found in Appendix A.

Teaching Psychomotor Skills for Chemotherapy Administration

On initial search, much of the literature regarding chemotherapy administration programs in nursing was in the form of guidelines and position statements. As such, these were not included in the literature review, but were incorporated into the consultation report. However, there were three studies published on the subject of chemotherapy education programs for oncology nurses. These studies described the creation of hospital chemotherapy education programs and the implementation of skill programs regarding chemotherapy administration (Andam & Silva, 2008; Crannell, 2012; Creaton, Leonard, & Day, 1991). Unfortunately data collection methods were not provided for two of the studies, and all three studies were descriptive in nature. However, these studies reinforce the notion that there is an educational gap (as identified by other health care facilities) supporting the rationale for developing this learning module.

Upon further examination of the literature, two poster abstract presentations demonstrated the utility of a simulation program to improve oncology nurses confidence and skills regarding the administration of chemotherapy agents. A study by Ness et al. (2016), evaluated oncology nurses' knowledge and skills in four core areas (administration of chemotherapy, management of hypersensitivity reactions, management of extravasation, and management of chemotherapy spills) using interactive simulation mannequins. On a five-point Likert Scale, confidence rose from 57.6% in the four areas compared to 97% at three months post simulation (Ness et al., 2016). The second poster abstract by Foley, Robison, and Cline (2015) further supports the use of simulation as a reliable method for improving oncology nurses confidence to perform intravenous skills and oncology procedures (e.g. chemotherapy administration). Self-reported confidence

with intravenous push chemotherapy rose from 3.23 to 4.06 on a 5-point Likert Scale, while administration of chemotherapy in general also rose from 3.33 to 4.45 (Foley, Robison, & Cline, 2015). Unfortunately, both studies had several concerns including: the sample size, limited detailed information on the posters about the details of the studies and the full-text articles were not published. Attempt was made to contact the authors for each article's competed journal submission, however no response was received.

Methods to Teach Psychomotor Skills. *Bloom's Taxonomy* (Anderson & Krathwohl, 2001; Bloom, 1956) has been used to address cognitive, affective, and psychomotor domains of learning. These domains reflect the knowledge, attitude, and skills for RNs to practice safely and effectively (Scheckel, 2016). "The psychomotor domain deals with the development of manual or physical competencies" most often related to clinical practice (Scheckel, 2016, p.168). Part of this literature search sought to ascertain what methods were being utilized to teach psychomotor skills. In addition to the above noted teaching strategies utilized by the NSCCP (self-directed learning and preceptorship), two other methods were found in the literature.

***Videotape*.** Videotaping can be utilized as teaching method when incorporated with other learning methods such as self-directed learning, self-assessment, and feedback. When incorporated with these other methods, supposed benefits include providing an "objective record, facilitate instructor's constructive comments, and promote trainee's self-assessment" (Savoldelli et al., 2006). Yet, a finding by Baldwin, Hill, and Hanson (1991) indicated that while videotapes may augment learning, contact with a teacher remains as a key factor when developing psychomotor skills in learners.

Two other studies found that the use of videotape feedback did not produce statistical significance in comparison to verbal feedback (Backstein, Agnidis, Sadhu, & MacRae, 2005; Savoldelli et al., 2006). With both studies containing few limitations, and being randomized control designs of medium quality, the results indicated consistent lack of effect in utilizing videotaped feedback as a form of teaching. Furthermore, regardless of how videotaping is utilized, a key issue with measuring its true effect involves the potential distortion of result by the act of repetition, in that some learning may have occurred by other means (Hill, Hooper, &Wahl, 2000).

***Simulation*.** The Institute of Medicine *Future of Nursing Report* (2011) states that, "nurses should achieve higher levels of education and training through an improved education system that promotes seamless academic progression"(p. S5). To address this concept, one suggestion is for the inclusion of simulation in nursing education programs (Institute of Medicine, 2011). With chemotherapy regimens often being very detailed and the chemotherapy drugs identified as high-alert medications due to the potential for patient safety issues, hands-on practice should be incorporated to the educational programs for oncology nurses prior to patient interaction (Institute for Safe Medication Practices, 2008). Simulation is a solution which offers a “pedagogy using one or more typologies to promote improved and/or validate a participant’s progression from novice to expert” (INACSL, 2011, S6). This supports the broad purpose of simulation, to “improve the safety, effectiveness, and efficiency of healthcare” (Society for Simulation in Healthcare, 2013). The three areas (design, outcome, and challenges) were identified during the literature search relating to simulation as a teaching strategy for administering high-risk medications such as systemic chemotherapy.

*Design***.** Several components of simulation must be considered in its development, one of which is fidelity. The INACSL Standards Committee (2016a) defines fidelity as "the degree to which a simulated experience approaches reality; as fidelity increases, realism increases" (p. S42), with the degree to which this occurs determined by the environment, the tools and resources used, and many factors associated with the participants. Fidelity is further broken down to encompass physical (or environmental), conceptual, and psychological aspects (INACSL, 2016c). Environmental fidelity represents how realistically the simulated environment replicated the actual real-life environment (manipulated by use of manikins, equipment or props, etc). Conceptual fidelity ensures that elements of the scenario relate to each other, make sense as a whole to the learner. And finally, psychological fidelity incorporates contextual elements found in the clinical environment into the simulated environment. "Psychological fidelity works synergistically with physical and conceptual fidelity to promote participant engagement" (INACSL, 2016c, p. S7).

Positive effects have been found through both low and high-fidelity simulation methods (Butler, Veltre, & Brady, 2009; Crowe, Ewart, & Derman, 2018; McLaughlin, Hockenberry, Hueckel, & Docherty, 2014; Singh et al., 2015). Meyers, Connors, Hou, and Gajewski (2011) found that learners who partake in simulation prior to real patient interaction performed better in their clinical performance. To accomplish this, educators need to appropriately match the level of fidelity to the objectives of the specific simulation activities (Blake & Scanlon, 2007). Because part of the proposed learning module will be focused around the psychomotor skills required to administer systemic chemotherapy, a low fidelity manikin, such as a static-task trainer (model body parts),

would allow the nurse to focus on a specific task. (Maran & Glavin, 2003). However, use of high-fidelity scenarios would have greater impact, as it addresses multiple areas of fidelity. Learners also perceive higher fidelity experiences make their learning more active and productive (Butler et al., 2009). An example would be to re-create an actual patient setting with appropriate working equipment and structuring the case study to involve psychological factors such as a young single mother.

*Outcomes***.** To measure the effect of an intervention, outcomes are required as a means to "represent the integrated knowledge, skills, and abilities or competencies students [learners] are expected to demonstrate" (Sullivan, 2016, p. 107). Within the literature, several common themes (e.g. skill performance, self-confidence, and satisfaction) related to simulation outcomes were noted and are explored in detail below.

With patient safety always the top priority, nurses must be properly trained and competent in the administration of medication. Safety checks are required in attempts to reduce errors during medication administration, including additional checks when administering chemotherapy agents. Sanko and McKay (2017) found the simulation intervention group had improved medication administration actions compared to the control group during their study. For example, statistical significance was found using X^2 and Fisher's tests on performing correct hand hygiene ($p=0.021$) and correct infusion time ($p=0.017$), with near significance in correct medication administration ($p=0.066$). Limitations of this study however included the lack of blinding, confounders were not addressed, and the possibility of bias regarding the self-reporting. As a result of their overall findings, Sanko and McKay reflected that simulation might also have changed the participants' perceptions of the medication administration process and the inherent risks

involved. This self-reflection of the nurse is important as outlined in the *Code of Ethics for Registered Nurses* (CNA, 2017), but also in the provision of safe patient care.

Self-confidence was found to be a significant outcome of simulation. Although an assortment of study designs was identified during this critique, the majority of studies demonstrated an increase in self-confidence when simulation was used (Crannell, 2012; McLaughlin et al., 2014). Long-term effects of increased confidence were also reported (Crowe et al., 2018; Singh et al., 2015). Similar study limitations were noted for both Crowe, Ewart, and Derman (2018) and Singh et al. (2015) which had no randomization, or blinding, and small sample sizes. The results by Singh et al. suggest that the quality of the training had more of an impact than the time allotted for training.

Acquiring the skill of administering and handling high-risk drugs (i.e. chemotherapy), could induce anxiety and stress for an RN. Simulation offers a solution to this distress by means of a supportive learning environment. The reduction of stress on the RN while learning could translate into decreased anxiety when applying the skill in the clinical setting (Chen, Chen, Lee, Chang, & Yeh, 2017; Jeppesen, Christiansen, & Frederiksen, 2017).

Engaging learners is often a challenge for teachers while also attempting to achieve the learner's satisfaction. Utilizing teaching strategies which learners both enjoy and believe they gain value from, could augment learners' participation, producing better learning outcomes. Although measuring satisfaction was not often a primary research question, several authors have reported on post intervention surveys evaluating participants' satisfaction with the simulation activity. Studies often utilized a Likert scale to evaluate satisfaction, and demonstrated positive remarks for utilizing this teaching

strategy (Chen et al., 2017; McLaughlin et al., 2014; Sanko & McKay, 2017). Limitations of these studies unfortunately include small sample sizes, possible bias due to the use of self-reporting, and lack of blinding by researchers.

Challenges with simulation. Most of the challenges associated with simulation are related to the preparation of delivering this teaching strategy and associated cost (Jeffries, Swoboda, & Akintade, 2016). The cost of simulation is the primary issue; it is dependent on equipment purchased, training of personnel, and other factors (Jeffries, 2005). Given there are several options to deliver this teaching strategy (i.e. level of fidelity), institutions could determine which equipment is best suited for their needs. Another option would be to share training equipment with local facilities. Training of personnel in the use of simulation was identified in several of the studies appraised. Feingold, Calaluce, and Kallen (2004) utilized their findings regarding the additional time and training required for the preparation of simulation programs along with the positive impact it had on student performance, to support hiring a masters-prepared nurse to help with the teaching and learning of their program.

Teaching Critical Thinking Skills to Oncology Nurses

As previously mentioned, Blooms Taxonomy addresses three domains of learning which mirror skills that RNs require to practice safely and effectively (Anderson & Krathwohl, 2001; Bloom, 1956). The cognitive domain focuses on knowledge which can be further broken down comprising of four types, one being metacognition (Phillips, 2016). “Metacognitive knowledge is the awareness of one’s own cognition in addition to cognition in general” (Phillips, 2016, p. 247). The second part of this literature search sought to ascertain what strategies were being utilized to enhance critical thinking skills.

Case studies. Case studies as a teaching tool allows the learner to express and work through their thought process. Correlating with adult learning principles, case studies support the learner's prior experience and offers validation of their thinking process, which allows the connection of theory to practice (Phillips, 2016). One type of case study which provides real-life situations that progressively reveal more information, known as unfolding, allow learners to build on previous knowledge (Phillips, 2016). Unfolding case studies, when compared to usual case studies, were demonstrated to be more effective in enhancing critical thinking as they are closer to reality (Hong & Yu, 2017; Roca, Reguant, & Canet, 2016). With the only limitation of being located at a single site and direct evidence coming from both of these studies, the results are comprehensive. When unfolding cases are combined with simulation, demonstration of hierarchal order can occur by following progression of a health problem and the related nursing care (Jeffries et al., 2016). This could be established by administrating a vesicant chemotherapy agent through a peripheral intravenous access (involving the assessment of blood return and cannula location), leading to extravasation of the chemotherapy agent where additional assessment skills and nursing actions occur.

Problem-Based Learning. Problem-based learning (PBL) is student focused, interdisciplinary driven, and used with small group work to analyze problems in a clinical context autonomously (Baker, 2000; Roca et al., 2016). Some studies have demonstrated the success of using PBL when compared to traditional lectures, but none against simulation (Gholami et al., 2016; Roca et al., 2016). There is also the challenge of assessing PBL outcomes whereby "standardized elements do not exist that can be replicated, measured, and compared" (Baker, 2000, p. 263). Limitations with these

studies resonates with those from other studies which includes lack of a control group, randomization, and blinding by the researcher.

Certain teaching strategies appear to be more effective at different stages of learning. Specific to the NSCC program, presently there are no defined groups which take the program at a specific timeframe, RNs complete the program independent of one another, making it a challenge to utilize PBL as a teaching strategy. In the literature, PBL was found to be utilized more often with undergraduate programs to develop critical thinking in students (Gholami et al., 2016; Roca et al., 2016). Oncology RNs need to refine and enhance this skill, not develop it post-graduation.

Simulation. In addition to the above noted features of simulation and its effect on psychomotor skill development, simulation can also have an impact on enhancing critical thinking skills (Adib-Hajbaghery & Sharifi, 2017; Young & Jung, 2015). With the present chemotherapy program moving directly from theory to practice, simulation offers a means to bridge this gap in learning. Both simulation formats (low and high-fidelity scenarios) are perceived to increase problem solving abilities (Butlers et al., 2009). To aid the enhancement of critical thinking skills in oncology nurses, maximizing the use of higher fidelity scenarios would be advantageous (Sullivan-Mann, Perron, & Fellner, 2009).

A key feature of simulation is debriefing (INACSL, 2016b; Jeffries et al., 2016). "Debriefing encompasses the cognitive domain assessing knowledge; the kinetic domain assessing skill and action; and the affective domain, or how the learner felt or interacted with the patient or other staff" (Jeffries et al., 2016, p. 315). It takes place at the end of the session where discussion occurs regarding the process, outcomes, and application of the

scenario to clinical practice, as well as reviews key take-home messages with the aim at improving future performances (INACSL, 2016b; Rauen, 2001). As part of the debriefing process, identification of potential difficulties (relating to the administration, monitoring, or management of chemotherapy agents) prior to their occurrence with real patients allows time for re-training to occur, ultimately minimize patient risks while also improving clinical effectiveness and quality of care (Andreatta & Marzano, 2014). This aspect of simulation allows for learners to "reference real-life experiences, normalize behaviours, and acknowledge emotions" (Jeffries et al., 2016, p. 315), targeting the primary gap of transitioning knowledge and skill into practice that nurses may experience.

As a result of multiple instruments utilized between studies, a meta-analysis was unable to identify the true impact of simulation on critical thinking, although it is suggested a positive correlation is present (Adib-Hajbaghery & Sharifi, 2017). Meyers et al., (2011) suggested utilizing a more sensitive, well known evaluation tool (i.e. Lasater Clinical Judgement Tool) would be better to document the impact of this teaching strategy. Another challenge as noted in a systematic review by Adib-Hajbaghery and Sharifi (2017), was the varying instruments utilized across studies. Cant and Cooper (2017) state that such variation provides a challenge in making comparisons across the spectrum of simulation and comparisons to other methods of teaching; therefore potentially concealing the real effect of simulation.

Acknowledging that critical thinking is a skill that develops over time, it is recommended that additional longitudinal studies be designed to contribute to the body of evidence that simulation develops critical thinking skills (Choi, Lindquist, & Song, 2014).

Although it will take time to expand data in this particular area, sharing of information across disciplines will benefit research and practice. Several examples can be found within nursing theory whereby redefining and synthesizing the concepts according to nursing perspectives has occurred (McEwan, 2014).

Theoretical Framework

Simulation-based learning is grounded in the educational principles of two theorists in particular: Benner (1982) *novice to expert* (Dreyfus model) and, Knowles (1984) *adult learning principles*. These cognitive development theories "focus on sequential development of learning over time" (Candela, 2016, p.216). Such learning theories explain the interaction of learners with the teachers, the learning environment, and the subject matter (Candela, 2016).

According to Benner (1982) acquisition and development of a skill occurs once completion of five levels of proficiency happens. This can be explained through the Dreyfus Model, the levels are: novice, advanced junior, competent, proficient, and expert. Benner, Hooper-Kyriakidis, and Stannard (1999) expanded this concept by stressing the importance of reflection and that experience does not occur just through the passing of time but through actual clinical practice. Due to the complexities of nursing practice, ongoing experiential learning and reflection should occur which can be supported through the use of simulation (Benner, Hooper-Kyriakidis, & Stannard, 1999). By introducing the proposed chemotherapy learning module, additional time is allowed for reflection and learning to occur prior to engaging with patients.

For simulation-based learning to be effective, experiences need to be grounded in principles of adult learning. "The goal of deliberate practice in simulation-based learning

is constant skill, knowledge, and professional improvement that progresses to the expert level of performance" (Decker, Caballero, & McClanahan, 2014, p. 15). The five principles according to Knowles (1984) state that adults: are internally motivated, have past experiences and expects those experiences to be acknowledged, are goal directed, expect relevancy of learning, and want to be respected. As such, simulation activities provide a venue whereby concrete experience, reflective thought, and experimentation can occur (Decker et al., 2014). It also allows learners to practice in a safe, non-threatening environment (Decker et al., 2014).

The literature is evolving regarding simulation as a method to support the transfer of knowledge and skills into realistic interactions (Jeffries et al., 2016). To support simulation as a teaching strategy in nursing, a simulation model was created and is shown in Appendix B (Jeffries, 2005). Unfortunately, as reported by Ravert and McAfooes (2014), the framework constructs informed the work of several studies but the framework itself was not often mentioned in the literature. Moving forward, a task force by INACSL is presently working towards clarify the framework terminology to improve the facilitation of integrating the simulation framework into future studies (Ravert & McAfooes, 2014).

Implications for Development of the Learning Module

At the core of professional practice rests the mastery of clinical skill, which can only be accomplished if learners "are able to practice, engage in solving real problems, and develop confidence and proficiency without compromising public safety" (Traynor, Gallagher, Martin, & Smyth, 2010). Presently, there is an evolving trend in teaching to move away from teacher-centered instruction whereby students receive information, to a

learner-centered focus which promotes “teaching focused on learning” (Weimer, 2013, p. 15). Here, the educator’s role is to construct a setting allowing the learners to grow and create meaning for themselves (Schiro, 2013). Unfolding cases and simulation accomplish this, whereby the teaching strategies that actively engage learners, can promote reflective learning, bridge theory to practice, and allow a safe environment where mistakes can be made without risk to patients (Hong & Yu, 2017; Jeffries et al., 2016; McLaughlin et al., 2014; Ravert, 2008).

Much of the literature reviewed, albeit nursing focused, evolved around student curriculum and not health care training programs. Although comparisons could be made that both engage in a teaching-learning setting, nursing (health care) training programs are often designed to enhance skills and increase knowledge to accomplish a clinical task (Yakovlev & Yakovlev, 2014). As such, training programs which utilize simulation as a teaching strategy, may help RNs transition more quickly and efficiently in the clinical setting (Chen et al., 2017). According to learners, the use of simulation develops a more effective and meaningful learning experience (Jeppesen, et al., 2017). To strengthen the nursing literature on the use of simulation as an effective teaching tool, more high-quality studies are needed with training programs in the health care setting, focussing particularly in nursing. This echoes the findings by Norman (2012) in that there is a lack of literature related to the conveyance of how simulation supports development of skills and enhances critical thinking to the clinical setting.

With documented adverse events regarding medication administration and the high-alert status of chemotherapy agents, unfolding case studies and higher fidelity simulation scenarios provide a valuable means for learners to practice the administration

of systemic chemotherapy agents. Additionally, simulation has demonstrated to be the only teaching strategy utilized to address the two areas of interest during the literature search (psychomotor skills and critical thinking). When compared to other learning strategies, Hegland, Aarlie, Strømme, and Jamtvedt's (2017) meta-analysis supports the finding of Singh et al. (2015), which demonstrates a small but statistical significance in the use of simulation as a teaching method. Even though Hegland et al. (2017) included only randomized control trials, they did report a concern with a small number of studies pooled (each with small sample sizes) and the high variation in results across the studies combined, indicating uncertainty of the results.

High-fidelity simulation experiences (with the inclusion of case studies and partial-task trainers) will support the enhancement of RNs' confidence needed to assimilate the psychomotor skills and critical thinking skills from theory to practice. High-fidelity simulation experiences are worth the investment because they create opportunities that learners highly value, and offer standardization of curriculum (Butler et al., 2009). Beginning with psychomotor skills activities and building on complexities (e.g. critical thinking and clinical judgement) throughout the simulation scenario, learners are able to gain the most from the learning experience (Keene, 2009).

Conclusion

In order to have a comprehensive education program to assess chemotherapy competency, it is recommended that skill validation be incorporated into the process (Andam & Silva, 2008). Although there is a dearth of literature relating to teaching methods in chemotherapy administration, simulation scenarios (when integrated with unfolding case studies) have shown to engage learners through using principles of active

learning, as well as offering valuable opportunities for developing psychomotor skills and enhancing critical thinking (Childs & Sepples, 2006). This teaching strategy corresponds with the present shift in teaching to emphasize active student leaning.

High-fidelity simulation experiences are worth the investment regarding enhancement of RNs' chemotherapy management skills and critical thinking. Such experiences create opportunities learners highly value and the standardization of curriculum (Butler et al., 2009). As a result of this critical appraisal, there is strong evidence to support the recommendation in utilizing simulation as a teaching strategy when developing psychomotor skills and enhancing critical thinking skills. This evidence will help direct the content for the proposed learning module and assist with the consultation process as simulation not only provides a safe and supportive avenue for RNs to learn, but also affords patient safety.

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Appendix A
Critical Appraisal Table
Simulation Studies

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion and Rating
Crannell (2012) Is simulation a useful method to evaluate competency of chemotherapy administration	*Size*: 69 (97% of RN's on unit) *Location*: Single inpatient hematology/ oncology unit *Characteristics*: Registered Nurses	Case Series (Descriptive study) Simulation program 30 minutes in length	Simulation is a valuable method to evaluate level of competency in chemotherapy administration Simulation represents real patient settings without awkwardness of being assessed in front of patient Participants demonstrated increased confidence of skills post simulation in comparison to pre-evaluation	*Strength* - Participants were strong match to characteristics of the larger group of interest - Data collection methods were objective, with little missing data *Limitation* - Checklist to validate competency did not have validity or reliability data - Implemented on only one unit at one facility - Social desirability bias present, however, there was a clear difference between pre and post confidence levels.	Design: N/A Quality: N/A Direct Evidence Given this study only discusses a few participants, limited information can be attributed to the evidence. This study is highly creditable and is very relevant to the topic of interest. Further studies are needed to determine the extent of the effect in utilizing simulation to evaluate competency in specific skills like chemotherapy.
Ness, W., Holland, M., Johnston, D. C., Giordana, M., Kroon, S., & Hurley, R. (2016). Does simulation-based learning raise confidence and competency levels of oncology nurses in chemotherapy-	*Size:* 40 *Location:* unknown, most likely single source *Characteristics:* Oncology nurses	Uncontrolled Before & After (Analytical) 3 hour interactive simulation using mannequins	Self-reported confidence rose in four core areas (chemotherapy administration, management of hypersensitivity reactions, management of extravasation, and management of chemotherapy spills) post simulation activity	*Strengths:* - Likert scale utilized - Positive difference found in results - Intervention feasible to implement *Limitations:* - Unknown: random sampling, selection criteria, follow up or dropout rates, use of statistical analysis, examination of confounding,	Design: Weak Quality: Low Direct Evidence With limited literature regarding teaching strategies to enhance confidence and skills in oncology nurse, studies such as this one must not only be disseminated in a poster presentation, but also published in

biotherapy administration.				if control group utilized, or it blinding occurred	journals with full study details to strengthen this area of literature.
Foley, M., Robison, J., & Cline, A. (2015). Is simulation a beneficial tool to increase nurses' confidence level to perform oncology skills and procedures.	*Size:* 82 *Location:* unknown, most likely single source *Characteristics:* Oncology nurses	Uncontrolled Before & After (Analytical) Simulation exercises utilized during three classes (two focusing on chemotherapy administration, and one on oncology procedures)	Self-reported confidence rose post simulation exercises with all three classes	*Strengths:* - Likert scale utilized - Positive difference found in results - Intervention feasible to implement *Limitations:* - Unknown: random sampling, selection criteria, follow up or dropout rates, use of statistical analysis, examination of confounding, if control group utilized, or it blinding occurred	Design: Weak Quality: Low Direct Evidence With limited literature regarding teaching strategies to enhance confidence and skills in oncology nurse, studies such as this one must not only be disseminated in a poster presentation, but also published in journals with full study details to strengthen this area of literature.
Hegland, P. A., Aarlie, H., Strømme, H., & Jamtvedt, G. (2017) Meta-analysis on simulation vs other learning models	*Size*: 15 studies, 6 relevant to simulation vs other learning models *Characteristics*: 852 Registered Nurses enrolled; 12 studies where in hospitals	Meta-Analysis (Literature review) Nine databases searched Inclusion criteria: must be RCT Two independent reviewers	Although low quality evidence, a meta-analysis showed significant effect on use of simulation training compared to other learning strategies	*Strength* - Significant but small effect in favor of simulation - Appropriate statistical analysis utilized - Two appraisers of data who utilized same evaluation and data extraction form - Inclusion criteria clear and comprehensive *Limitation* - High heterogeneity (I^2=85%), but addressed by authors	Strength: Strong Quality: Medium Direct Evidence Simulation was demonstrated to have a positive effect over other learning strategies, however the lack of high-quality evidence should be taken into consideration regarding this finding. Additionally, the high heterogeneity is a concern. As such, future studies should be of higher quality and future

					reviews should limit search criteria to specific instruments utilized once such data is available.
Sanko, J. S., & McKay, M. (2017). Examine effects of simulation-based education in teaching pharmacology	*Size*: 120 students (60 in each of the two cohorts, control and simulation) *Location*: Accelerated Bachelor of Science Nursing Program at a single school *Characteristics*: nursing students	Prospective Cohort study (analytical) Convenience sampling done (consecutive semesters at one school)	Simulation has potential to improve medication administration safety practices	*Strengths* - Demonstrated appropriateness of data collection tools utilized with statistical methods - Utilized appropriate statistical test - Supported study's findings with similar results with other studies - Ethical approval obtained *Limitations* - No blinding by either researcher or participant - Unclear if attempts to minimize bias were taken (chance of social desirability with self-reporting) - Confounders were not addressed but same was acknowledged as a limitation by authors - Differences between groups not addressed (may not be as important as each nursing unit vary in age, education background, ethnicity, and gender) - No report on power or significance of small sample size	Design: Moderate Quality: Low Direct Evidence This evidence supports the literature whereby simulation is increases confidence and competence of medication administration. Future studies should perform similar evaluation on the effects of simulation with hospital staff to determine if such teaching method would improve medication administration safety practices like those with chemotherapy administration. It is also recommended that the studies report on the sample size, similarities between study groups and address confounders.

				- Single site	
McLaughlin, C., Hockenberry, M. J., Hueckel, R., & Docherty, S. L. (2014). Is simulation a valuable method to evaluate health care providers' competencies and critical thinking of IT access procedures?	*Size*:14 *Location*: One tertiary medical center *Characteristics*: Nurse Practitioners, physicians	Uncontrolled Before & After (Analytical) Convenience sampling Groups stratified by provided types	Simulation was found to be a helpful method in maintaining competency, including improving confidence of selected task	*Strength* - Approved by Review board - Clearly described outcomes - Appropriate statistics utilized *Limitation* - Small sample size; may have impacted ability to detect statistical differences between stations - Reporting bias may have impact as results self-reported	Design: Weak Strength: Medium Direct Evidence Skill standardization in experienced practitioners is important to promote patient safety and reducing variations in practice. This study demonstrates that skills taught or evaluated can be effectively delivered through simulation regardless of the health profession. Future recommendations include larger sample size, standardized script for providing instruction at each station.
Chen, S., Chen, S., Lee, S., Chang, Y., & Yeh, K. (2017). Evaluate the effects of interactive situated and simulation teaching on developing competency in novice nurse practitioners	*Size*: 31 *Location*: Single place of employment *Characteristics*: Post-graduate NP with no internship experience in the clinical setting	Randomized Control Trial (Analytical) Random allocation between groups Intervention: six follow up face-to-face interactive support sessions, each lasting about 1-2 hours	The three month program demonstrated improved clinical competency and reduce work-related stress in new NP's	*Strength* - Demonstrated reliability and validity of the tool utilized - Clear process relating to ethical consideration - Appropriate statistical tests utilized and interpreted *Limitation* - No blinding by researcher - Random sampling not done - Participants taken from a single source	Design: Strong Strength: Medium Extrapolated evidence Although this study showed positive effects utilizing simulation to develop competency, it contained a small sample size and participants were sourced from a single site. Additional future recommendations would

		Tools: modified questionnaires from Chang et al (2015) that utilized Likert Scale			include random sampling, and clear report of retention rate. The results are extrapolated for this review as there were multiple outcomes evaluated with regards to competency, not solely skill or critical thinking alone.
Young, J., & Jung, E. (2015). Evaluate the effect of a one-time simulation experience on students' knowledge acquisition, clinical reasoning skills, and self-confidence	*Size*: 94 *Location*: single university, undergraduate nursing program *Characteristics*: junior nursing students with no prior simulation experience	Controlled Before & After (Analytical) Convenience sampling and non-randomly assigned to either group	Simulation based learning supports the development of clinical reasoning skills in undergraduate curriculum	*Strength* - Approved by review board - All students approached agreed to participate - Data collection tool (for clinical reasoning) verified reliability with Cronbach's confidence and validity though three nursing faculty; as it was not well known - Avoided misclassification through recruiting from two classes - Appropriate statistical tests used and interpreted - Baseline characteristics similar *Limitations* - Convenience sampling at one facility - Baseline scores of clinical reasoning were unable to be evaluated; instead grade point average was evaluated	Design: Strong Quality: Medium Direct Evidence This study demonstrates a positive effect of utilizing simulation for improving clinical reasoning skills. Although this study evaluated nursing students, it would be anticipated the similar results could be obtained from staff nurses undertaking an education program for learning the administration of chemotherapy. A future recommendation would be to apply this intervention across multiple facilities and utilize randomization to further strengthen the

					study design and confirm the resulting findings.
Crowe, S., Ewart, L., & Derman, S. (2018). Examine the effects of simulation education on nursing confidence and knowledge on general medicine units.	*Size*:161 *Location*: single large tertiary teaching hospital *Characteristics*: Registered Nurses and Licenced Practical Nurses from general medicine units who partook in 4hour education session (excluded those who had critical care/advanced training)	Uncontrolled Before and After (Analytical) Convenience sample utilized Outcomes measured: confidence and knowledge Intervention: one hours lecture followed by four scenarios each lasting 40 minutes.	Simulation provided an environment whereby allowing critical thinking resulted in increased knowledge and confidence. Long term results can still be found at follow up.	*Strength* - Stated target sample size, same met - Tool demonstrated to be appropriate - 100% follow up completing one aim of the study *Limitation* - Bias with incentive to participate with pay - Follow up retention to second aim of study (three months post intervention) was 49% - No random selection - Single source of recruitment - Of those approached 48% agree to participate - No control group - No statement on ethical approval	Design: Weak Quality: Medium Extrapolated Evidence Correlations can be made regarding application of critical thinking towards a deteriorating patient and the adverse events that can occur when administering chemotherapy, such as extravasation and a cytotoxic spill. Use of simulation provides a supportive environment to learn how to manage this events. Recommendations for future studies would be have a control group, improve response follow up rates and incorporate random sampling.
Meyer, M. N., Connors, H., Hou, Q., & Gajewski, B. (2011) Evaluate the effect of a theory driven pediatric simulation curriculum on	*Size*: 120 students (broken into three semesters each with three groups of five) *Location*: Single Baccalaureate School of Nursing	Prospective Cohort (Analytical) 25% of clinical practice substituted for simulation (which included four	Transfer of skills learned in the simulation setting (therapeutic skills, communication, and documentation) can be seen in the clinical setting, augmenting	*Strength* - Received exemption from review board, students were informed about study and participation voluntary - Faculty were trained in facilitating simulation - Missing data from four students accounted for	Design: Moderate Quality: Medium Direct Evidence This study was well done. It demonstrated the impact of skills learned in a simulation setting can have direct

students clinical performance	*Characteristics*: junior nursing students with simulation experience	sessions, each with two cases) Allocation to clinical semester group from done as per school protocol, rotating selection every two weeks for simulation participation not described	the apprenticeship model. Simulation did not positively impact clinical judgement	- Appropriate statistical analysis and interpreted correctly - Demonstrated validity of tool, inter-reliability demonstrated by video training faculty on use of tool - Baseline characteristics similar with covariate effects demonstrating no effect on overall performance *Limitations* - Allocation to simulation groups not described - No blinding	impact on the clinical setting, which address one gap in the literature regarding simulation studies. This finding is key as it supporting the provision of safe patient care. To further evaluate the effect of simulation on clinical judgement, future use of an established tool (such as the Lasater Clinical Judgement Tool recommended by the authors) would be more appropriate. A true control group comparison would not have been ethically appropriate as it would have limited the participants from the same educational opportunity. This could be expanded upon however, with unit nurses.
Singh, P., Aggarwal, R., Pucher, P. H., Hashimoto, D. A., Beyer-Berjot, L., Bharathan, R., … Darzi, A. (2015).	*Size*:16 (10 intervention, 6 control) *Location:* unknown (most likely single site)	Non-Randomized Control Trial (Analytical) Intervention: 3-eight hours days, and one-12 hour night shift. Pre-post evaluation as	Although there was improvement in both intervention and control group regarding clinical performance and confidence, the intervention group consistently	*Strengths* - Ethical consent obtained from participants (through consultation with ethics board) - Appropriate statistical tests used and interpreted - Baseline comparison made regarding skills only	Design: Strong Quality: Low Extrapolation Correlation can be made between entering medicine internship and entering nursing preceptorship for

Evaluation of a 1-week simulation course for intern medicine students on clinical performance	*Characteristics*: final year medical students beginning internship	well as 1- and 6-month follow up	outperformed the control group.	- Only one participant lost in follow up, not related to intervention *Limitations* - No randomization, acknowledged by authors - No blinding - Small sample size, acknowledged by authors - Did not address potential confounders	chemotherapy administration. Future recommendation would be to incorporate randomization, and increase the sample size to demonstrate a statistical difference in utilizing simulation.
Butler, K. W., Veltre, D. E., & Brady, D. S. (2009). Implementation of active learning pedagogy comparing low-fidelity simulation versus high-fidelity simulation in pediatric nursing education.	*Size:* 31 *Location:* single nursing school *Characteristics:* Nursing students post completion of the pediatric course in second year	Randomized Control Trial (Analytical) Convenience sampling utilized Intervention: 20 minute simulation scenario (for both, high- and low-fidelity groups), followed by a 10 minute debriefing	Both groups (high- and low-fidelity) perceived an increase in their problem-solving ability. The higher fidelity experience represented a more realistic situation.	*Strengths:* - All participants completed study - Randomization utilized - Confounders discussed - Appropriate tests utilized and interpreted correctly - Tools shown and known to be reliable - Similar recruitment strategies utilized for all participants - Ethical approval obtained *Limitations:* - Only 23% approached agreed to participate - Similarity of groups not assessed	Design: Strong Quality: Medium Direct Evidence This study was well done. It demonstrated the positive impact simulation, regardless of the fidelity level, to be a valuable teaching strategy. It also indicates that learners prefer to engage with high-fidelity experiences as it represents a more realist scenario, allowing a smoother transfer of skills and knowledge to the clinical setting. Future recommendations include clear assessment of the collective groups' similarity and increasing the participation rate of

					those approached to be over 80%.

Critical Appraisal Table
Other Teaching Strategies

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion and Rating
Backstein, D., Agnidis, Z., Sadhu, R., MacRae, H. (2005). Evaluate the benefits of repeated videotaped feedback in surgical residents	*Size:* 26 *Location:* University of Toronto *Characteristics:* first year sub-speciality surgery residents	Randomized Control Trial (Analytical) Two groups (video feedback, and no video feedback) received over three weeks practiced skills.	In a prior study by the authors, a single videotaped feedback session demonstrated no significant difference in compared to a control group. This study was repeated addressing the possible inadequate exposure to videotaping and still found no significant different	*Strengths:* - Ethical approval obtained, and consent from participants - Randomization utilized - Tools shown to be reliable and valid - Testing appropriate and interpreted correctly *Limitations:* - Unknown how sampling obtained - 78% agreed to participate - Groups not evaluated concurrently - No blinding of researcher	Design: Strong Quality: Medium Direct Evidence Albeit this study built on weakness of a prior study utilizing videotaping as a feedback method, repeated exposure still did not produce a significant difference in results. Future studies should increase the participant size and demonstrate how the sampling was obtained to strengthen the quality of evidence.
Savoldelli, G. L., Naik, V. N., Park, J., Joo, H. S., Chow, R., & Hamstra, S. J. (2006) Comparison of the educational efficacy of oral feedback vs. video *and* oral feedback	*Size:* 42 *Location:* University of Toronto *Characteristics:* Anesthesia residents	Randomized Control Trial (Analytical) Three groups (control, oral feedback, video-assisted feedback), participants individually partook in two scenarios each lasting 8 minutes	No significant difference was found between oral and oral combined with video feedback relating to debriefing	*Strengths:* - Ethical approval and participant consent obtained - Researchers blinded - Tools demonstrated to be valid and reliable - All participants completed study - Randomization utilized - Test appropriate and utilized correctly *Limitations:* - Single source - Unknown recruitment process	Design: Strong Quality: Medium Direct Evidence Supporting other findings, videotaping for the purpose of feedback alone, was found to have no further advantage when combined with oral feedback. With additional costs associated with the equipment to add this teaching strategy, there is no value to pursuing this method, when it has been demonstrated produce no

				- Groups not assessed concurrently	significant difference compared to oral feedback alone. Even though the sample size was small and came from a single source, it did appear to impact the finding.
Baldwin, D., Hill, P., & Hanson, G. (1991). Comparison if faculty involvement with videotape teaching had effect on outcome performance	*Size:* 17 *Location:* single nursing school *Characteristics:* nursing students	Randomized Control Trial (Analytical)	Faculty contact is an important factor when students are learning to perform the psychomotor skill of measuring blood pressure.	*Strengths:* - Randomization utilized - Test appropriate and utilized correctly - Ethical approval and participant consent obtained - Researchers blinded - Confounders discussed - Content of tool assumed valid by nature of expert involved *Limitations:* - Single source - Similarity of groups not assessed (only combined) - Some misclassification may have occurred	Design: Strong Quality: Medium Direct Evidence While this study only evaluated the single psychomotor skill of measuring blood pressure, consideration on the impact of faculty (teacher) involvement in any psychomotor skill development would be key for learners' development. In support of the authors comment, further studies are needs from varying settings, with larger sample sizes, and assessing other psychomotor skills.
Hong, S. & Yu, P. (2017). Compare unfolding case studies with usual case studies	*Size:* 122 *Location:* Nursing school in China, medical nursing course *Characteristics:* Aged 20-22	Randomized Control Trial (Analytical) Two classes in each group (traditional and unfolding case studies) partook in 19 cases studies	Unfolding case studies are significantly more effective than usual case studies in developing critical thinking	*Strengths:* - Tools known and demonstrated reliable and valid - Baseline similar between groups - Ethical approval obtained - Groups assessed concurrently - Randomization utilized	Design: Strong Quality: High Direct Evidence This study was very well designed. The small amount of missing data and sourcing participants from a single site did not appear to have an impact on the finding. Future

		each over period of eight months		- Appropriate use of and interpretation of test *Limitations:* - Participants from a single source - Some missing data	studies should replicate this study in its rigor to strengthen the body of literature supporting unfolding case studies in the development of critical thinking
Roca, J., Reguant, M., & Canet, O. (2016). Comparison of problem-based learning, case based learning, and traditional methods	*Size:* 74 *Location:* Spanish school of health science *Characteristics:* Second year nursing students	Randomized Control Trial (Analytical) Three groups (problem-based learning, case based learning, and traditional methods) over three weeks directed care for a proposed patient receiving oncological treatment	Problem based learning was found to more effective than case base learning, which were both found to more effective than traditional methods when teaching critical thinking	*Strengths:* - Blinding occurred by researcher - Tools known and further demonstrated to be valid and reliable - Randomization utilized - Ethical approval obtained - Appropriate test utilized and interpreted *Limitations:* - Students selected from one site, but all second-year students involved	Design: Strong Quality: High Direct Evidence This study was very well designed. Future studies should replicate this study in its rigor to strengthen the body of literature supporting unfolding case studies in the development of critical thinking
Gholami, M., Moghadama, P. K., Mohammadipoor, F., Tarahi, M. J., Sak M., Toulabi T., & Pour, A. H. H. (2016). Comparing the effects of problem-based learning and the traditional lecture method on critical thinking	*Size:*40 *Location:* Single nursing school *Characteristics:* Undergraduate third year nursing students from one critical care class	Uncontrolled Before & After (Analytical)	Significant improvement of critical thinking skills and meta awareness post problem-based learning versus traditional lecture	*Strengths:* - Ethical approval obtained - Appropriate test utilized and interpreted - Tools known and further demonstrated to be valid and reliable - >90% completed the study *Limitations:* - Students selected from one site - No blinding by researcher - No control group	Design: Weak Quality: Medium Extrapolated Evidence Recommendations for future studies would be have a control group, utilize randomization, and incorporate random sampling to augment the design strength as a means to provide stronger evidence towards this effect.

skills and metacognitive awareness in nursing students in a critical care nursing course.				- No randomization	

Appendix B
Simulation Module

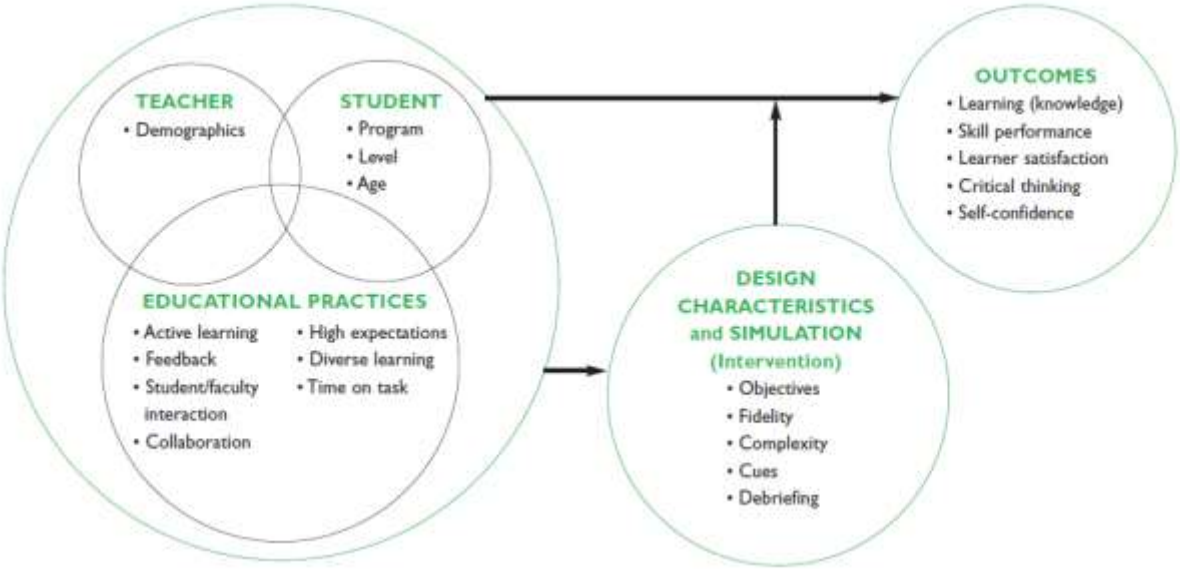

Figure Simulation model. Jeffries, P. R. (2005). A framework for designing, implementing, and evaluating simulations used as teaching strategies in nursing. *Nursing Education Perspectives*, *26*(2), 96-103.

Appendix B
Environmental Scan Report

Development of a Scenario-Based Simulation Module for Teaching Nurses the Administration of Systemic Chemotherapy for Adult Oncology Patients: Environmental Scan Report

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Oncology nurses within Canada must follow the Canadian Association of Nurses in Oncology (CANO, 2010) *National Strategy for Chemotherapy Administration: Standards and Competencies for Cancer Chemotherapy Nursing Practice* which are underpinned by the *CANO Position Statement for Cancer Chemotherapy Nursing Practice* (CANO, n.d.). Before administering or providing care to people receiving chemotherapy, the specific knowledge and skills required by registered nurses (RNs) is taught in educational programs which encompasses theoretical, clinical, and continuing competency components (CANO, 2010). There are comprehensive guidelines regarding the material to be included within the theoretical component. However, the clinical requirements are unclear with the exception of the learner being supervised by a "RN who has specialized knowledge, skill, critical thinking, and clinical judgment in cancer chemotherapy care" (CANO, 2010, p. 18). This environmental scan provides an overview of the existing chemotherapy administration educational programs within the provinces of Atlantic Canada and may offer ideas to include as part of the proposed scenario-based simulation module that will enhance the clinical component of this program.

Background

The Nova Scotia Cancer Care Program (NSCCP) oversees the management of care provided to those diagnosed with an oncological disease. Systemic therapy, as a cancer treatment modality, is defined as the use of drugs, which travel through the bloodstream, for the treatment or support of cancer patients (Canadian Cancer Society, 2018; National Cancer Institute, 2015b). Chemotherapy, a form of systemic therapy, can be administered by numerous routes (National Cancer Institute, 2015a). In Nova Scotia (NS), the administration of parenteral (by route other than the digestion tract) systemic therapy is a

post-entry level competency requiring specialized training (Cancer Care Nova Scotia, 2012). To ensure RNs are trained in the safe administration of systemic therapy (specifically chemotherapy) within NS, they are required to take the NSCCP *Administration of Cancer Systemic Therapy Online Learning Program* which integrates the CANO standards. As part of this NSCCP learning program, RNs complete online learning modules (theoretical component) followed by a preceptorship (clinical component), with suggestions for continuing competency practice.

Challenges associated with this present program are related to relevant clinical experiences for RNs learning to administer chemotherapy, different levels of experience of an assigned preceptor, and lack of priority for the learners' needs. As part of the preceptorship experience, exposure to relevant clinical situations (i.e. addressing all psychomotor skills from the NSCCP skill checklists) is largely based on chance (Singh et al., 2015). Because chemotherapy is administered at more than one facility within NS, the preceptorship experience can vary based on the clinical experience of the preceptor. Where patient safety is the primary focus, regrettably the learner's needs are placed second (Meyer, Connors, Hou, & Gajewski, 2011). Although the Nova Scotia Health Authority (NSHA) has specific policies to direct RNs on the management of cytotoxic spills and chemotherapy extravasation, present learning occurs through discussion, rather than actual hands-on experience to ensure the safety of patients. Additionally, learners may feel awkward being assessed in front of real patients (Norman, 2012). Above all, attention to multiple learning styles is important to consider; a scenario-based simulation module would add this value to the present program.

After conducting a literature review, the unfolding simulation scenario was the teaching strategy best suited to develop psychomotor skills, as well as enhance critical thinking skills of the oncology RNs. Furthermore, the use of high-fidelity simulation experiences create opportunities that learners highly value and provide standardization of the curriculum (Butler, Veltre, & Brady, 2009). Although there is a dearth of literature related to teaching methods in chemotherapy administration directed at nurses, unfolding simulation scenarios were found to actively engage learners, promote reflective learning, bridge theory to practice, and allow a safe environment where mistakes could be made without risk to patients (Hong & Yu, 2017; Jeffries, Swoboda, & Akintade, 2016; McLaughlin, Hockenberry, Hueckel, & Docherty, 2014; Ravert, 2008). These elements are important to consider when developing a chemotherapy education program because chemotherapy regimens are considered to be very detailed; and the chemotherapy drugs are identified as high-alert medications, due to the potential for patient safety issues (Institute for Safe Medication Practices, 2008).

Environmental Scan

An environmental scan was undertaken to identify which teaching strategies the provinces in Atlantic Canada use to educate RNs on the administration of chemotherapy. Additionally, this scan sought to identify how these provinces teach the management of unintended events, such as cytotoxic spills and chemotherapy extravasation. The information gathered was used to inform the development of a scenario-based simulation module with the objective to develop RNs' psychomotor skills associated with administering chemotherapy to adults, specifically via the intravenous (IV) route, and enhance their capacity for critical thinking.

Sources of Information

Provinces within Atlantic Canada were selected for the intent to work with a manageable amount of information. These provinces have smaller populations when compared to other Canadian provinces and more closely represent the demographic of NS. Additionally, health organizations from New Brunswick (NB), Prince Edward Island (PEI), and Newfoundland and Labrador (NL) that offer chemotherapy as a systemic therapy for cancer treatment for all ages were contacted. Information sought from all organizations included the following: 1) identification of teaching strategies utilized to deliver the specialized education program of administering chemotherapy, and 2) investigation of which teaching strategies are utilized to teach the management of cytotoxic spills and chemotherapy extravasation.

Websites for each of the identified health organizations within Atlantic Canada were initially scanned for information related to relevant teaching strategies and resources utilized. Clarification of each health organization's program was obtained through discussions with the appropriate provincial program liaison. Specifically within NS, two health organizations offer chemotherapy as part of their systemic therapy treatment options. The NSHA provides care to the adult population, and the IWK Health Center focuses on providing care to children and adolescents. Regardless of the patient's age, RNs from both organizations must adhere to the practice standards and competencies set out by CANO regarding the administration of chemotherapy (Atlantic Provinces Pediatric Hematology Oncology Network, 2015; NSCC, n.d.a).

Identification of resources that could be made available to support the development of a scenario-based simulation module was undertaken in partnership with

key stakeholders. From the QEII Health Science Center (QEII HSC) in Halifax, the Clinical Nurse Educators (CNEs) from two in-patients oncology units and the Oncology Practice Consultant (OPC) for NSCCP were consulted. The CNEs support the practice of oncology nursing staff in developing and maintaining new skills. The role of the OPC is "to support chemotherapy nurses at satellite clinics and other hospitals where chemotherapy is delivered, enabling safe, quality cancer care throughout Nova Scotia" (NSCC, n.d.b, para. 2). The OPC also oversees the online component of the provincial competency-based learning program.

Data Collection

The websites of selected health organizations were scanned to identify teaching strategies utilized and material contained within their chemotherapy competency programs. A request was made to appropriate individuals for any information not readily available on the public website. Initial contact was made via telephone to ensure the most appropriate person had been identified. A follow-up email was sent reiterating the details of the project and the information requested. A copy of the email can be found in Appendix A. The information obtained from the NB, PEI, NL, and NS health organizations were transcribed into a single document.

Discussion with key stakeholders in NS regarding resources that would be available to support the delivery of a simulation module occurred via email. It was made clear to the stakeholders that participation is voluntary, and they could decline to answer any questions. The pre-determined questions for the interview were emailed to the key stakeholders, and clarification of the questions was offered if requested. The *Environmental Scan Interview Questions* can be found in Appendix B

Data Analysis

Information gathered from the Atlantic Canadian provinces was juxtaposed to the NSCCP learning program, and similar, different, or unique components were identified. The table in Appendix C compares the key content, teaching and learning strategies, as well as the evaluation procedures for assessing RNs' competency for each organization within Atlantic Canada. Further detail on the comparison are elaborated below using a summative content analysis focusing on each provinces program material and teaching strategies for each province.

Several themes arose from the key stakeholders' responses. All responses from the questionnaires that were compiled into a summary table are located in Appendix D. The use of a summary content analysis was undertaken to explore the responses of the following: 1) the support for the development of learning module to develop psychomotor and critical thinking skills of the oncology nurses; 2) effective teaching strategies to develop these skills; and, 3) appropriate setting (and facilitator) to deliver the learning module.

Atlantic Canadian program material. The content made available to the public regarding the certification process for becoming competent in the administration of chemotherapy varied between health organizations. The NSCCP identified the teaching strategies utilized for their program on the public website. The IWK Health Center program offers a link to Atlantic Provinces Pediatric Hematology Oncology Network (APPHON) website which identifies the content for the theoretical course material. Details on the clinical component was obtained from the Clinical Leader of Development within IWK Health Center. Program materials from New Brunswick, Prince Edward

Island, and Newfoundland and Labrador were unable to be sourced directly from their websites.

The theoretical and clinical component across the provinces contained predominately similar details with only a few differences. The theoretical content of all the Atlantic Canadian programs reflects the required material noted within the CANO (2010) *Standards and Competencies for Cancer Chemotherapy Nursing Practice*, and the clinical component is designed using a preceptorship model for all provinces. Only two provinces specifically focused on additional topics of "survivorship" and the "role of pharmacy in chemotherapy preparation".

Atlantic Canadian teaching strategies. CANO has defined the educational requirements for RNs developing competency in chemotherapy administration, including the criteria to evaluate their understanding. However, they do not elaborate on which teaching strategies should be utilized in the delivery of such programs (aside from the clinical component to be supervised). Delivery of the theoretical content varied across the Atlantic Provinces; self-directed online learning modules and presentation workshops were both utilized. Integrated throughout these two teaching strategies were case studies, quizzes, and group discussions. All provinces utilize a written exam as the objective evaluation process upon completion of the theoretical content.

The Atlantic Provinces included in the environmental scan utilize a preceptorship model for the clinical component. During the preceptorship, RNs demonstrate the "chemotherapy competencies relevant to the practice setting" (CANO, 2010, p.18). Three of the provinces also require RNs to complete competency checklists during the clinical component (e.g. IV push, and the use of an infusion pump). New Brunswick was the only

province to utilize simulation exercises (which include the practice of managing chemotherapy spills, chemotherapy extravasation, and hypersensitivity reactions) as part of their certification program. All other provinces discuss the prevention and management of such events to assess the RNs' understanding.

Available resources within NS. Practicing psychomotor skills associated with chemotherapy administration prior to patient contact was reported to be very important by all key stakeholders for a variety of reasons. One CNE reported that practice allows for the "opportunity to practice skills and refine dexterity" (A. Whynot, personal communication, March 15, 2018). Another CNE stated simulated practice "reduces anxiety for the learners and provides a safe environment in which to question, explore options and practice skills" (F. MacLennan, personal communication, March 9, 2018). A common theme amongst all stakeholders was that confidence of the nurse is critical in what is already a stressful experience for the patient.

While the NSCCP competency checklists are helpful to standardize responses to unintended events (such as extravasation and a chemotherapy spill), the two CNEs suggested the use of simulation scenarios to practice the clinical responses which are outlined in the organization's policy for administering cancer chemotherapy. While not all administration methods are experienced during the preceptorship, simulation scenarios were seen as a method to address this gap to achieve the maximum opportunity for learning. Examples of suggested simulation scenarios provided by both CNEs can be found in Appendix D

Prior to the development of the scenario-based simulation module, it was important to identify which person(s) would be the most appropriate to facilitate such a

module, including the location within NS. According to the stakeholders, it was identified that the unit CNE would be most appropriate to deliver this type of learning module, with the added support from the NSHA Cancer Program Leadership. At a provincial level, the Halifax and Sydney cancer care centers were identified to be the most appropriate (at least initially), in supporting this type of learning module base on the volume and resources to support such a project.

Ethical Considerations

It was determined this environmental scan did not need the approval of an ethical board because this scenario-based simulation module is not actually conducting research according to the criteria of Newfoundland and Labrador Health Ethics Research Board. The results of the *Health Research Ethics Authority Screening Tool* (2011) can be found in Appendix E. Permission to obtain the program design (teaching strategies) and material from other provinces was discussed with the person contacted within each health organization. The purpose for obtaining the requested information was shared through email, and as part of the initial phone conversation. The contact person was also informed that the shared information would help to develop a scenario-based simulation module within the NSCCP, with intentions to be incorporated as part of the current competency-based program.

To ensure data security and confidentiality, all notes taken and any material submitted for review, were maintained at the student's home in a secure locked cabinet or on a password protected computer. The information will be destroyed within one year of the practicum completion, and this was communicated to individuals who had been contacted during the environmental scan.

Summary

The information obtained from the environmental scan will be used to guide the structure and content of the scenario-based simulation module. Identifying how other provinces in Atlantic Canada certify RNs in the administration of chemotherapy assisted in determining which teaching strategies were most often utilized in the education process. Ascertaining how the knowledge and skills associated with cytotoxic spills and extravasation management were taught by the other provinces further helped to direct the content for this module. With the present education program lacking a hands-on practice component prior to patient engagement, a simulation experience would bring added value and support the RNs who administer the chemotherapy, but most importantly to enhance patient safety.

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Appendix A

Email of Inquiry

Attention: _____

As per our phone conversation, I have contacted you to request your participation as part of an environmental scan in developing a scenario-based simulation module for administering systemic chemotherapy to adults as part of the current competency-based learning program for nurses within the Nova Scotia Cancer Care program. The development of this module is my practicum project in partial fulfilment of my Master of Nursing Degree at Memorial University of Newfoundland. I am requesting a description of the teaching strategies used (i.e. self-learning, preceptorship, etc.) as part of your program for teaching nurses' systemic chemotherapy administration. Additionally, I am interested in knowing how you teach the management of cytotoxic spills and extravasation. The purpose of the learning module is to provide the opportunity for nurses to practice the psychomotor skills and apply knowledge learned from the online modules prior to entering the preceptorship experience; thereby reducing anxiety, increasing confidence and allowing opportunity to learn in a safe, supportive, non- threatening environment.

The information gathered will identify how organizations within Atlantic Canada teach nurses the administration of systemic chemotherapy, and whether management of certain adverse events are taught. This information will be used as a comparative for the current process utilized by the Nova Scotia Cancer Care program, and which additional teaching strategies could enhance their program. Once the practicum project is complete, the data will be destroyed.

If at any time you have any questions I can be contacted by phone at (902) 877-5942 or by email at anc114@mun.ca. Your agreeing to submit information will indicate that you understand the contents of this letter and are agreeing to participate as a consultant.

Regards,
Ashley Crocker, BScN, RNCC

Appendix B

Environmental Scan Interview Script

1. As a health leader, do you believe psychomotor skill development is best learned prior to having patient contact?
2. As a health leader, would you consider a scenario-based simulation module implemented prior to nurses participating in the preceptorship experience would be beneficial for nurses?
3. As part of the competency-based learning program for nurses preparing to administer systemic chemotherapy, there are several required *skills checklist* that are to be demonstrated by nurses.
    a. Presently, to maintain safety of the patient, discussions occur during the preceptorship experience on how one would manage a cytotoxic spill and extravasation event. What would be an effective teaching strategy to ensure nurses have the skills to manage these events?
    b. Although attempts are made by the preceptors to ensure the majority of the skills checklist are demonstrated, the needs of the patients for that time allotted with the preceptor may not address all checklists. What would be an effective teaching strategy to ensure nurses have the skills to perform all systemic administration methods?
4. In your opinion, which individual(s) either within Nova Scotia Cancer Care or the Nova Scotia Health Authority would be best suited to deliver a scenario-based simulation module for
    a. the pilot sites of 5A and 8A inpatient units, and
    b. if incorporated as part of the NSCCP implemented across the province?
        i. As part of a provincial expansion, which area of the province would be best suited to deliver this module?

Appendix C

Atlantic Provinces Chemotherapy Administration Education Programs

Province	**Teaching Strategies**	**Theoretical Content**	**Evaluation of Competency**
Nova Scotia Cancer Care Program	Self-directed online course (case studies, quizzes) Exam (written and multiple choice) Preceptorship	Embraces elements of CANO *Standard C* including: - Systemic therapy as a cancer treatment modality - Safe handling of cytotoxic agents - Administration of cancer systemic therapy - Oncological emergencies - Psychosocial assessment and care - Patient education - Ethics and legal issues	Demonstration of the CANO chemotherapy competencies *relevant to their practice setting* Completion of NSCCP skills checklists
IWK Health Center (Nova Scotia)	Presentation (2 days) Preceptorship	- General Cancer Overview - Chemotherapy Overview - Ethical and Legal Considerations - Principles of Chemotherapy - Principles of Biotherapy - Chemotherapy: Agents and Classifications - Safe Handling of Chemotherapeutic Agents - Toxicity and Symptom Management - Psychosocial Issues	Supervised administration of three chemotherapy/ biotherapy agents (one must be a peripherally administered vesicant) Completion of APPHON/ROHPPA "Pediatric Chemotherapy/ Biotherapy Administration Clinical Competency Checklist"
New Brunswick	Presentation (3-days)	Embraces elements of CANO *Standard C* including: - Impact of Cancer	Exam Completion of a competency

Province	Teaching Strategies	Theoretical Content	Evaluation of Competency
	One-on-one instruction in a clinical setting for a duration of 2-4 weeks 2-hour simulation exercise (including practice of chemotherapy spills, extravasation, and hypersensitivity reaction)	- Understanding cancer biology - Survivorship - Principles of safe chemotherapy administration - Ethical and legal aspects - Safe handling of spills - Oncological emergencies - Patient teaching - Side effects and toxicities - Extravasation	checklist during the clinical instruction
Newfoundland and Labrador	Self-directed online course (group discussion, case studies, quizzes) Exam Preceptorship	Embraces elements of CANO *Standard C* including: - History, standards and policy - Principles of cancer chemotherapy - Anti-neoplastic agents - Administration of chemotherapy, management of cytotoxic spills, and extravasation - Side effects and toxicities - Patient education, assessment, and documentation - Oncological emergencies - Role of pharmacy in chemotherapy preparation	Demonstration of the CANO chemotherapy competencies *relevant to their practice setting* Demonstration of total patient care, administration of two infusion agents, and two IV push
Prince Edward Island	Online course, presentation (1 day)	Reflects the standards of CANO	Demonstration of the CANO chemotherapy

Province	Teaching Strategies	Theoretical Content	Evaluation of Competency
	Quizzes, assignments, Exam Preceptorship (1 month)		competencies *relevant to their practice setting*

Appendix D

Environmental Scan Stakeholders Responses

Stakeholder Survey Responses

Questions	Nurse Educator-1	Nurse Educator-2	Oncology Practice Consultant
1. Do you believe psychomotor skill development is best learned prior to having patient contact?	- Yes - Reduces anxiety for the learner - Provides safe environment to question and explore options	- Yes - Allows the opportunity to practice skills and refine dexterity - Allows for additional time to talk through skills	- Yes - Relieves anxiety, build comfort, and self confidence - Critical when performing high-risk psychomotor skills (e.g. chemotherapy)
2. Would you consider a scenario-based simulation module implemented prior to nurses participating in the preceptorship experience would be beneficial for nurses?	- Yes - Allow for enhances understanding of the involved skills	- Yes - Provide opportunity to practice and ask questions in a safe environment	- Nurses are hands-on learners - Increased practice time in a stress free environment is beneficial to both the learner and preceptor. - During the preceptorship, ability to solidify the skills instead of the initial learning occurs
3. (a) What would be an effective teaching strategy to ensure nurses have the skills to manage a cytotoxic spill and a chemotherapy extravasation event?	- A simulated module would provide opportunities to practice the recommended clinical responses	- Simulate a spill through use of dyed water - For extravasation, utilize a task trainer IV arm	- Simulate a spill and work through the steps

Questions	Nurse Educator-1	Nurse Educator-2	Oncology Practice Consultant
3. (b) What would be an effective teaching strategy to ensure nurses have the skills to perform all systemic administration methods?	- The creation of a broad array of simulation scenarios utilized prior to (or following) the preceptorship experience could allow for maximum learning opportunities	- Utilize scenarios in a skills lab setting to practice all skills - Example provided uses red food coloring in a saline syringe to mimic a vesicant in a free flowing IV	- Provide a simulated environment - Ideal if the preceptor could have a lighter patient assignment to allow for a stronger learning experience (can be challenging with staffing issues)
4. (a) Which individual within the organization would be best suited to pilot the module on the inpatient units 8A and 5A?	- When delivered on an in-patient unit, the unit CNE would be most appropriate	- CNE - Views the module as a valuable use of educator time	- Learn where the nurse will be practicing (in-patient, in-patient) and (ambulatory-ambulatory), however a cross-over could work
4. (b) Which individual within the organization would be best suited to run the module if implemented across the province of NS? As part of a provincial expansion, which area of the province would be best suited to deliver this module?	- The Nova Scotia Cancer Care program could best determine which areas would be best suited to introduce this module. - Halifax and Sydney cancer centers would have the largest volume and resources to support the module initially	- Support from the Nova Scotia Cancer Care Program Leadership would be needed	- Key point for project is that it needs to be deliverable in all settings - To avoid a financial impact of travel (if a simulation module offered at limited sites), project needs to be deliverable at all community chemotherapy administration sites; recognizing that preceptor training would be needed within those sites

Appendix E

Health Research Ethics Authority Screening Tool

	Question	**Yes**	**No**
1.	Is the project funded by, or being submitted to, a research funding agency for a research grant or award that requires research ethics review	❒	☒
2.	Are there any local policies which require this project to undergo review by a Research Ethics Board?	❒	☒
	IF YES to either of the above, the project should be submitted to a Research Ethics Board. **IF NO** to both questions, continue to complete the checklist.	❒	❒
3.	Is the primary purpose of the project to contribute to the growing body of knowledge regarding health and/or health systems that are generally accessible through academic literature?	❒	☒
4.	Is the project designed to answer a specific research question or to test an explicit hypothesis?	❒	☒
5.	Does the project involve a comparison of multiple sites, control sites, and/or control groups?	❒	☒
6.	Is the project design and methodology adequate to support generalizations that go beyond the particular population the sample is being drawn from?	❒	☒
7.	Does the project impose any additional burdens on participants beyond what would be expected through a typically expected course of care or role expectations?	❒	☒
LINE A: SUBTOTAL Questions 3 through 7 = (Count the # of Yes responses)		**0**	**7**
8.	Are many of the participants in the project also likely to be among those who might potentially benefit from the result of the project as it proceeds?	☒	❒
9.	Is the project intended to define a best practice within your organization or practice?	❒	☒
10.	Would the project still be done at your site, even if there were no opportunity to publish the results or if the results might not be applicable anywhere else?	☒	❒
11.	Does the statement of purpose of the project refer explicitly to the features of a particular program, Organization, or region, rather than using more general terminology such as rural vs. urban populations?	☒	❒

12.	Is the current project part of a continuous process of gathering or monitoring data within an organization?		x
LINE B: SUBTOTAL Questions 8 through 12 = (Count the # of Yes responses)		3	2
	SUMMARY **See Interpretation Below**	A	B

Interpretation:

- If the sum of Line A is greater than Line B, the most probable purpose is **research**. The project should be submitted to an REB.
- If the sum of Line B is greater than Line A, the most probable purpose is **quality/evaluation**. Proceed with locally relevant process for ethics review (may not necessarily involve an REB).
- If the sums are equal, seek a second opinion to further explore whether the project should be classified as Research or as Quality and Evaluation.

These guidelines are used at Memorial University of Newfoundland and were adapted from ALBERTA RESEARCH ETHICS COMMUNITY CONSENSUS INITIATIVE (ARECCI). Further information can be found at: http://www.hrea.ca/Ethics-Review-Required.aspx.

Appendix C
Consultation Report

Development of a Scenario-Based Simulation Module for Teaching Nurses the Administration of Systemic Chemotherapy for Adult Oncology Patients: Consultation Report

Ashley Nicole Crocker

Memorial University of Newfoundland

Oncology nurses within Canada must follow the Canadian Association of Nurses in Oncology (CANO, 2010) *National Strategy for Chemotherapy Administration: Standards and Competencies for Cancer Chemotherapy Nursing Practice* which are underpinned by the *CANO Position Statement for Cancer Chemotherapy Nursing Practice* (CANO, n.d.). Before administering or providing care to people receiving chemotherapy, the specific knowledge and skills required by registered nurses (RNs) is taught in educational programs which encompasses theoretical, clinical, and continuing competency components (CANO, 2010). There are comprehensive guidelines regarding the material to be included within the theoretical component. However, the clinical requirements are unclear, with the exception of the learner being supervised by a "RN who has specialized knowledge, skill, critical thinking, and clinical judgment in cancer chemotherapy care" (CANO, 2010, p. 18). This consultation report describes the background, methods, and results of a learning needs assessment that was conducted.

Background

The Nova Scotia Cancer Care Program (NSCCP) oversees the management of care provided to those diagnosed with an oncological disease. Systemic therapy, as a cancer treatment modality, is defined as the use of drugs, which travel through the bloodstream, for the treatment or support of cancer patients (Canadian Cancer Society, 2018; National Cancer Institute, 2015b). Chemotherapy, a form of systemic therapy, can be administered by numerous routes (National Cancer Institute, 2015a). In Nova Scotia (NS), the administration of parenteral (by route other than the digestion tract) systemic therapy is a post-entry level competency requiring specialized training (Cancer Care Nova Scotia, 2012). To ensure RNs are trained in the safe administration of systemic therapy

(specifically chemotherapy) within NS, they are required to take the NSCCP *Administration of Cancer Systemic Therapy Online Learning Program* which integrates the CANO standards. As part of this program, RNs complete online learning modules (theoretical component) followed by a preceptorship (clinical component) with suggestions for continuing competency practice.

Challenges associated with this present program are related to relevant clinical experiences for RNs learning to administer chemotherapy, different levels of experience of an assigned preceptor, and lack of priority for the learners' needs. As part of the preceptorship experience, exposure to relevant clinical situations (i.e. addressing all psychomotor skills from the NSCCP skill checklists) is largely based on chance (Singh et al., 2015). Because chemotherapy is administered at more than one facility within NS, the preceptorship experience can vary based on the clinical experience of the preceptor. Where patient safety is the primary focus, regrettably the learner's needs are placed second (Meyer, Connors, Hou, & Gajewski, 2011). Although the Nova Scotia Health Authority (NSHA) has specific policies to direct RNs on the management of cytotoxic spills and chemotherapy extravasation, present learning occurs through discussion, rather than actual hands-on experience to ensure the safety of patients. Additionally, learners may feel awkward being assessed in front of real patients (Norman, 2012). Above all, attention to multiple learning styles is important to consider; a scenario-based simulation module would add this value to the present program.

After conducting a literature review, the unfolding simulation scenario was the teaching strategy best suited to develop psychomotor skills, as well as enhance critical thinking skills for oncology RNs. Furthermore, the use of high-fidelity simulation

experiences create opportunities that learners highly value and provide standardization of the curriculum (Butler, Veltre, & Brady, 2009). Although there is a dearth of literature related to teaching methods in chemotherapy administration directed at nurses, unfolding simulation scenarios were found to actively engage learners, promote reflective learning, bridge theory to practice, and allow a safe environment where mistakes could be made without risk to patients (Hong & Yu, 2017; Jeffries, Swoboda, & Akintade, 2016; McLaughlin, Hockenberry, Hueckel, & Docherty, 2014; Ravert, 2008). These elements are important to consider when developing a chemotherapy education program because chemotherapy regimens are considered to be very detailed; and the chemotherapy drugs are identified as high-alert medications, due to the potential for patient safety issues (Institute for Safe Medication Practices, 2008).

Consultations

A consultation process was required to identify learning needs and associated challenges with the present NSCCP learning program, including obtaining suggestions on how to address these areas of concern. Information gathered from health leaders and floor RNs was used to inform the design and content of the scenario-based simulation module with the objective to develop RNs' psychomotor skills associated with administering chemotherapy to adults and enhance their capacity for critical thinking.

Sample

Two targeted groups within the QEII Health Sciences Center (QEII HSC) located within the NSHA, were the focus for this practicum consultation: health leaders and floor RNs. Strategic health leaders for this practicum project were the Oncology Practice Consultant (OPC), the Coordinator for the QEII HSC Simulation Program, and the

operational staff (unit manager, charge nurse, and Clinical Nurse Educator [CNE]) from the two inpatient oncology units. The OPC has expertise in supporting healthcare professionals who provide care to patients with cancer. The Coordinator for the QEII Simulation Program has expertise in supporting professional development, particularly in the capacity of developing psychomotor skills and critical thinking abilities. The unit manager, charge nurse, and CNE support nurses in their daily practice of chemotherapy administration at the unit level.

Data Collection

A total of six RNs from two adult oncology inpatient units were approached in person at random to answer questions based on their recent experience completing the competency-based chemotherapy program. The RNs approached had less than two years of chemotherapy administration experience. This time period was selected to increase the opportunity for accurate recall and ensuring only those who had completed the new online learning competency-based chemotherapy program were included in the RN sample.

The above identified health leaders were contacted by phone to request a face-to-face meeting. During this conversation, I identified myself and the purpose of the practicum project. Predetermined questions were emailed to each health leader in advance of the meeting. Due to work constraints, two health leaders were unable to meet face-to-face, but provided responses to the questions via email. Floor RNs were approached in-person allowing for the opportunity to identify myself, to describe the purpose of the practicum project, and to request a few minutes of their time to answer a few focused questions. Appendix A outlines the invitations for both of the targeted groups.

Two different sets of questions were developed for the targeted groups. Appendix B contains both the Health Leader Questionnaire and the Floor Nurse Questionnaire. During the arranged meetings with each health leader, I took hand written notes. Clarification of questions was provided at the request of the individual. To ensure accuracy of the responses provided, I repeated what the stakeholders stated, confirming the responses were understood. The meetings were no longer than 30 minutes in length. The questions designed for the floor RNs utilized the Likert Scale design (1 – *Do not agree,* to 5 *Agree*). Opportunity to provide additional feedback on the questions was offered to the RNs at the time of the interaction.

Data Management and Analysis

The data collected from the health leaders and floor RNs questionnaires were compiled and analyzed. A content analysis was undertaken from the answers provided by the health leaders, and any outlier responses have been identified. Appendix C contains a summary of the health leaders' responses. Comments by the floor RNs have been analyzed for common themes. Reponses from the floor RNs are represented in a table located in Appendix D.

Health leaders' responses. All health leaders contacted were supportive in the creation of a scenario-based chemotherapy simulation module and thought that RNs could benefit from the hands-on practice of administering simulated high-risk medication. Positive effects of the proposed module (according to several of the health leaders) were believed to include: a safe zone for RNs to ask questions, an environment to allow for the deconstruction of any issues and reduced anxiety for the RNs following participation in the simulation experience. Both in-patient oncology units agreed to participate in offering

feedback of the module. Utilization of task trainers and real equipment (e.g. infusion pump, syringes, intravenous line, etc.) was reported by most of the health leaders as important aspects to include as part of the simulation. Although the health leaders did not directly use the term "fidelity" in their responses to question two, they all were of the opinion that the higher degree of "reality" would be best suited for the module; but not to the extent of utilizing a full simulation manikin or the QEII HSC simulation bay. Moreover, the OPC believed that any form of simulation would be an added value to the current program.

Tasks. Health leaders reported several tasks that RNs should practice in relation to the administration of chemotherapy. The top three tasks identified included: 1) the verification process (of chemotherapy drugs pre-administration and of the pre-printed orders); 2) management of a chemotherapy spill; and, 3) management of a chemotherapy extravasation. Two other remarks (provided by the CNEs) were also considered to be important, and will be included in the module: 1) management of hypersensitive reactions; 2) and, the importance of the RN identifying their own limits, including where to access additional resources for assistance. While all health leaders commented on the value of including the management of a chemotherapy spill and extravasation as part of the module, one suggestion was to consider creating or sourcing a video link that could be incorporated into the online theoretical component.

Several common themes developing during the consultation process.

- According to the managers, tasks from which incidents reports could be derived (e.g. errors with verification and transcription of pre-printed orders) should be included in the content of the module.

- The charge nurses commonly reported psychomotor and critical thinking skills (such as IV push, and reaction management) as key tasks RNs should practice.
- The CNEs and the OPC included a more comprehensive list of tasks, taking into consideration the entire process of administrating chemotherapy.

Module scheduling. While both charge nurses believed group work at schedule periods throughout the year would be of benefit to RNs when practicing chemotherapy administration, the managers, CNEs, and the OPC stated this would not likely be feasible. One of the challenges reported was ensuring that there were enough certified chemotherapy RNs per shift to support patient care needs. One manger further commented that not only is the hiring of new nursing graduates in constant fluctuation, but so is the 'lateral movement" of chemotherapy trained RNs between units which administer chemotherapy to oncology patients (C. Read, personal communication, March 27, 2018).

With financial constraints of each units operating budget, it was made clear by both managers that no additional education days would be approved (aside from what was already allocated). To overcome this obstacle all unit managers, CNEs, and the OPC suggested to incorporate a few hours of simulation with the unit CNE as part of the first clinical day, prior to the preceptorship experience.

Floor RNs' responses. Of the six staff who participated in the consultation, two had not completed the preceptorship placement. RNs reported that they were most confident to independently administer chemotherapy via an infusion pump (93%). Other tasks that RNs reported lower confidence in carrying out were: management of a

chemotherapy skill (70%), administering chemotherapy via gravity (66%), and the management of an extravasation of chemotherapy (56%). This confirmed the need for a learning module with hands-on practice to be developed as part of the competency-based program.

In addition to the questionnaire, three RNs provided comments regarding their experience. One of the RNs (RN-1) would have liked to practice management of a chemotherapy extravasation, however this task is restricted to discussion due to safety of the patient. Another RN (RN-3) commented that a "testing component" is needed to make sure all core competencies are practiced during the clinical aspect. Lastly, two of the other RNs commented that the varying processes and routines utilized between the clinics versus the inpatient setting, made them feel ill-prepared to practice independently in their specific clinical setting. Again, these comments indicate that RNs undertaking the current NSCCP learning program require further practice to increase their confidence with the administration of chemotherapy and potential consequences.

Ethical Considerations

Permission to approach floor RNs was obtained from each unit manager. Furthermore, all individuals involved during the consultation process were asked for individual permission to partake. Because no patient information was being disclosed during the consultation, there was no need for the organization's permission to proceed with this process.

It was determined these consultations did not need the approval of an ethical board because this scenario-based simulation module is not actually conducting research according to the Newfoundland and Labrador Health Ethics Research Board. The results

of the *Health Research Ethics Authority Screening Tool* (2011) can be found in Appendix E. It was made clear to both target groups that participation was voluntary, and could they decline to answer any questions at any time. It was made clear to the floor RNs that no identifying information would be collected, and confidentiality would be guaranteed. To ensure data security and confidentiality, any notes taken, or material submitted for review was maintained at the student's home in a secure locked cabinet and in a password protected computer.

Summary

The information obtained from the consultation process will be used to guide the structure and content of the scenario-based simulation module. The health leaders' responses and the floor RNs' input not only validated the key psychomotor skills and critical thinking skills required to be added to the current NSCCP learning program, but also provided additional suggestions as to which skills should be included in the scenario-based simulation module. Since the NSCCP learning program lacks a hands-on practice component prior to patient engagement, a simulation experience would bring added value and support the RNs who administer the chemotherapy, but most importantly to enhance patient safety.

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Appendix A

Health Leader Invitation Letter

Good day,

My name is Ashley Crocker, a student of the Master of Nursing Program at Memorial University of Newfoundland. In partial fulfilment of this program, a practicum project is required to be undertaken after completion of all course work. For my project, I am developing a scenario-based simulation module for administering systemic chemotherapy to adults, with prospects of the module to be incorporated as part of the current competency-based learning program for nurses within the Nova Scotia Cancer Care program. The purpose of the learning module is to provide the opportunity for nurses to practice the psychomotor skills and apply knowledge learned from the online modules prior to entering the preceptorship experience; thereby reducing anxiety, increasing confidence and allowing opportunity to learn in a safe, supportive, non-threatening environment.

I am inviting you to participate in the consultation process as part of my practicum project. I would like to set up a meeting to discuss the attached topics within the next week. The information gathered will assist in developing the content for this module. Participation in this interview is voluntary and refusal to answer any questions or withdraw participation at any time is permitted.

If at any time you have any questions, I can be contacted by phone at (902) 877-5942 or by email at anc114@mun.ca.

Regards,
Ashley Crocker, BScN, RNCC

Floor Nurse Invitation Letter

Good day,

My name is Ashley Crocker, a student of the Master of Nursing Program at Memorial University of Newfoundland. In partial fulfilment of this program, a practicum project is undertaken after completion of all course work. For my project, I am developing a scenario-based simulation module for administering systemic chemotherapy to adults, with prospects of the module to be incorporated as part of the current competency-based learning program for nurses within the Nova Scotia Cancer Care program. The purpose of the learning module is to provide the opportunity for nurses to practice the psychomotor skills and apply knowledge learned from the online modules prior to entering the preceptorship experience; thereby reducing anxiety, increasing confidence and allowing opportunity to learn in a safe, supportive, non- threatening environment.

I am inviting you to participate in the consultation process as part of my practicum project. I am requesting a few minutes of your time to complete the attached questionnaire and offer any other additional feedback regarding your recent experience completing the chemotherapy competency-based program. The information gathered will assist in developing the content for this module. Participation in this interview is voluntary and refusal to answer any questions or withdraw participation at any time is permitted. No identifying information will be collected and confidentiality will be ensured, if you choose to participate.

If at any time you have any questions I can be contacted by phone at (902) 877-5942 or by email at anc114@mun.ca.

Regards,
Ashley Crocker, BScN, RNCC

Appendix B

Health Leader Questionnaire

1. What is your role within the Nova Scotia Health Authority?
2. In your opinion, what form of simulation (low fidelity such as task trainer arm vs. high-fidelity such as a SimMan) would be necessary to effectively teach the skills associated with chemotherapy administration and enhance critical thinking associated with such tasks?
3. In your opinion, could nurses benefit from practice sessions on chemotherapy administration prior to caring for oncology patients? Please explain.
4. What tasks related to chemotherapy administration do you believe would be important for nurses to practice prior to caring for oncology patients?
5. In your opinion, would hands-on practice managing a chemotherapy spill be of value to nurses? Please explain.
6. In your opinion, would hands-on practice managing an extravasation related to chemotherapy administration be of value to nurses? Please explain.

A scenario-based simulation module is being proposed to be integrated into the Nova Scotia Cancer Care competency-based chemotherapy program. This simulation module would be implemented prior to nurses entering their preceptorship component.

1. In your opinion, would restricting the competency-based program to three or four times a year facilitate enhanced learning of the nurses by working together in a half-day simulation experience? Please explain.
2. Would your oncology nursing unit be interested in participating in a pilot project to review the contents of the planned scenario-based simulation module? Please explain.

Floor Nurse Questionnaire

Please read the following questions and circle whether you agree or disagree with the following statements about your experience following the completion of the competency-based learning program for chemotherapy administration.

1. I felt confident to independently administer chemotherapy using the technique of IV push.

   Do Not Agree 1 2 3 4 5 Agree

2. I felt confident to independently administer chemotherapy using the technique of gravity.

   Do Not Agree 1 2 3 4 5 Agree

3. I felt confident to independently administer chemotherapy using an infusion pump.

   Do Not Agree 1 2 3 4 5 Agree

4. I felt confident to safely manage a chemotherapy spill.

   Do Not Agree 1 2 3 4 5 Agree

5. I felt confident to correctly manage an extravasation that occurred as a result of administering chemotherapy.

   Do Not Agree 1 2 3 4 5 Agree

6. I felt confident to independently transcribe chemotherapy pre-printed orders.

   Do Not Agree 1 2 3 4 5 Agree

Appendix C

Health Leaders Questionnaire Reponses

Health Leader Questionnaire Reponses

Question	Manger-1	Manager-2	Charge Nurse-1	Charge Nurse-2	Nurse Educator-1	Nurse Educator-2	Oncology Practice Consultant	QEII HSC Simulation Coordinator
2. What form of simulation would be necessary to effectively teach the skills associated with chemotherapy administration and enhance critical thinking?	- No experience with chemotherapy administration - The more realistic, the better to reduce anxiety and provide patient safety	- Real equipment and patient setting	- Real equipment and patient setting (medium fidelity)	- Real equipment and patient setting	- Real equipment and patient setting	- Real equipment and patient setting	- Mix of different simulation would enhance critical thinking - Any form of simulation would be of value, given there is none in the present program	- Difficult to answer as unfamiliar with the current program (including the content of online learning)
3. Could nurses benefit from practice sessions on administering chemotherapy prior to caring for patients?	- Yes	- Yes	- Yes	- Yes	- Yes	- Yes	- Yes, reduces anxiety, increases confidence, and therefore increase competency in the skill	- Yes
4. Which tasks related to chemotherapy administration are important for nurses to practice?	- Transcription - Verification	- Verification of chemotherapy drugs - Verification of pre-printed orders	- Verification of chemotherapy drugs - Verification of pre-printed orders	- Setting up IV lines - Verification of chemotherapy drugs - Verification and transcription of pre-printed orders	- Interpret pre-printed orders - Identify self-limits, and who to reach out to for assistance - Patient education (immediate needs pre administration)	- Verification of chemotherapy drugs - Verification of pre-printed orders - IV push - Hypersensiti-vity reaction management	- All steps associated with chemotherapy administration (pre-treatment: reviewing lab work, health history, orders, drug pharmacology; treatment: adequate venous access, proper	- Difficult to answer as unfamiliar with the current program (including the content of online learning)

Question	Manger-1	Manager-2	Charge Nurse-1	Charge Nurse-2	Nurse Educator-1	Nurse Educator-2	Oncology Practice Consultant	QEII HSC Simulation Coordinator
				- Managing chemotherapy spills	- Knowledge of chemotherapy drugs (e.g. vesicant, irritant, or non-irritant) and acknowledge where to locate drug information		drug sequence, blood return, IV push; and post-treatment care) - Extravasation - Hypersensiti-vity reactions - Cytotoxic spill	
5. Would hands-on practice managing a chemotherapy spill be of value to nurses?	- Yes, increase patient and staff safety	- Yes, critical the practice to understand how to avoid situation, and proper procedure to assess issue if it occurs	- Yes, suggest incorperating mock spills periodically throughout year	- Yes	- Yes, but also include discussion - Offer a video link attached to the online theory component	- Yes	- Yes, while not something encountered often, important to draw on experience if it does occur	- Value in practicing the administration of medication and simulated patient conditions
6. Would hands-on practice managing a chemotherapy extravasation be of value to nurses?	- Yes	- Yes, critical the practice to understand how to avoid situation, and proper procedure to assess issue if it occurs	- Yes	- Yes	- Yes, but also include discussion - Offer a video link attached to the online theory component	- Yes	- Yes, while not something encountered often, important to draw on experience if it does occur	- Value in practicing the administration of medication and simulated patient conditions
7. Would restricting the competency-based program to three or four times a year facilitate	- No, due to program requirement and new staff orientation, this would be it challenging	- No, due to program requirement and new staff orientation, this would be it challenging	- Yes, group work would be more beneficial for learners	- Yes, group work would be more beneficial for learners	- From a scheduling perspective it would be helpful - But, program requirement and new staff	- From a scheduling perspective it would be helpful - But, program requirement and new staff	- No, restricting availability would not allow units to be reactive to program staffing needs, travel expense costs	- Not applicable

Question	Manger-1	Manager-2	Charge Nurse-1	Charge Nurse-2	Nurse Educator-1	Nurse Educator-2	Oncology Practice Consultant	QEII HSC Simulation Coordinator
enhanced learning of the nurses by working together?	- A half day module would be an option	- A half day module would be an option			orientation would make it challenging - Would most likely be a unit specific initiative	orientation would make it challenging - Would most likely be a unit specific initiative - Suggest half day skills program with half day observation in clinical setting, followed by full day interacting in clinical setting	would also need to be considered - Half day simulation would be idea - Module should be able to be integrated into every facility, with facilitators/ educators being trained on it use	
8. Would your oncology nursing unit be interested in participating in a pilot project to review the contents of the module?	- Yes, the module provides concrete organized structured material	- Yes	- Yes	- Yes	- Yes, present the content of module to educator upfront, then have nursing staff proceed through for additional feedback	- Yes - Develop a lesson plan to create a uniform delivery in all settings - Add module after preceptorship to consolidate learning	- Not applicable	- Not applicable

Appendix D

Floor Nurse Responses

Floor Nurse Confidence of Skills

	Subjective Confidence				
	Disagree				**Agree**
Skill	**1**	**2**	**3**	**4**	**5**
IV push chemotherapy administration			3	2	1
Gravity chemotherapy administration			4	2	
Pump chemotherapy administration				2	4
Chemotherapy spill management			3	3	
Extravasation management		2	3	1	
Transcribe pre-printed orders		1	1	1	3

Appendix E

Health Research Ethics Authority Screening Tool

	Question	Yes	No
1.	Is the project funded by, or being submitted to, a research funding agency for a research grant or award that requires research ethics review	❒	☒
2.	Are there any local policies which require this project to undergo review by a Research Ethics Board?	❒	☒
	IF YES to either of the above, the project should be submitted to a Research Ethics Board. **IF NO** to both questions, continue to complete the checklist.	❒	❒
3.	Is the primary purpose of the project to contribute to the growing body of knowledge regarding health and/or health systems that are generally accessible through academic literature?	❒	☒
4.	Is the project designed to answer a specific research question or to test an explicit hypothesis?	❒	☒
5.	Does the project involve a comparison of multiple sites, control sites, and/or control groups?	❒	☒
6.	Is the project design and methodology adequate to support generalizations that go beyond the particular population the sample is being drawn from?	❒	☒
7.	Does the project impose any additional burdens on participants beyond what would be expected through a typically expected course of care or role expectations?	❒	☒
LINE A: SUBTOTAL Questions 3 through 7 = (Count the # of Yes responses)		**0**	**7**
8.	Are many of the participants in the project also likely to be among those who might potentially benefit from the result of the project as it proceeds?	☒	❒
9.	Is the project intended to define a best practice within your organization or practice?	❒	☒
10.	Would the project still be done at your site, even if there were no opportunity to publish the results or if the results might not be applicable anywhere else?	☒	❒
11.	Does the statement of purpose of the project refer explicitly to the features of a particular program, Organization, or region, rather than using more general terminology such as rural vs. urban populations?	☒	❒

12.	Is the current project part of a continuous process of gathering or monitoring data within an organization?		x
LINE B: SUBTOTAL Questions 8 through 12 = (Count the # of Yes responses)		3	2
	SUMMARY **See Interpretation Below**	A	B

Interpretation:

- If the sum of Line A is greater than Line B, the most probable purpose is **research**. The project should be submitted to an REB.
- If the sum of Line B is greater than Line A, the most probable purpose is **quality/evaluation**. Proceed with locally relevant process for ethics review (may not necessarily involve an REB).
- If the sums are equal, seek a second opinion to further explore whether the project should be classified as Research or as Quality and Evaluation.

These guidelines are used at Memorial University of Newfoundland and were adapted from ALBERTA RESEARCH ETHICS COMMUNITY CONSENSUS INITIATIVE (ARECCI). Further information can be found at: http://www.hrea.ca/Ethics-Review-Required.aspx.

Appendix D
Scenario-Based Simulation Module

Teaching Nurses Chemotherapy Administration in the Adult Population: A Scenario-based Simulation Module

Developed by:
Ashley Crocker MN, BScN, RNCC

Created: Aug 7, 2018

Content

Section 1

OVERVIEW

Discipline: Oncology Nurses	**Expected Entire Simulation Run Time:** 4 hours **(includes 15min break)**
Location: Clinical setting	
Location for Reflection: Office space	

1.1 FACILITATOR INFORMATION

Contained within this simulation-based learning module:

- Materials list
- Simulation Skills Quick Notes
- Debriefing Questions
- Two case-scenarios (separate facilitator and nurse copies)

Additional requirements

- Quiet location to set up and complete the case-scenarios.

Guidelines

1. Familiarize yourself with the case-scenarios in advance of implementing them with the nurse(s).
2. Review the *Simulation Skills Quick Notes* (Nova Scotia Cancer Care skills checklist) for the breakdown of the expected skills to be demonstrated by the nurse(s). These notes provide the objective and skill performance expected of the nurse(s). All skills are integrated amid both case-scenarios, with the expectation that the nurse(s) will demonstrate all skills.
3. Gather all supplies and set up location as indicated in the instructions (specific to each clinical setting).
4. Instruct the nurse(s) to complete the *Participant Pre-Questionnaire* in section 4 prior to beginning the experience.
5. Read the first case-scenario along with the nurse(s). Inform the nurse(s) this is not a formal assessment of the skills, and that this environment is a safe space to ask questions while practicing the skills. Encourage the nurse(s) to complete the simulation case-scenarios as if they are in the actual clinical setting, and are to ask questions when appropriate. Review the simulation learning objectives with nurse(s) before commencing scenarios.
6. Complete one case-scenario at a time since BOTH are required to complete all associated chemotherapy skills. Provide the nurse(s) with specific paperwork associated with each case-scenario, when appropriate.
7. After completion of each case-scenario, have a debriefing session with attached list of questions.
8. Instruct the nurse(s) to complete the *Participant Post-Questionnaire* in section 4 at the end of experience. Review both completed questionnaires with the nurse(s) to discuss areas of growth, and future areas for development.

1.2 NURSING PREREQUISITES

Psychomotor Skills

- Intravenous (IV) insertion
- Use of a central venous access device (CVAD)
- Use of infusion pumps
- Basic physical assessment skills

Cognitive Skills

- Completion of the online Nova Scotia Cancer Care Program (NSCCP) competency-based learning program
- Knowledge of the pathophysiology and the medication management of oncology patients
- Transcription of physicians orders
- Medication administration

1.3 SIMULATION LEARNING OBJECTIVES

General Objectives:

1. Demonstrate safe and appropriate administration of systemic therapy agents.
2. Demonstrate management of complications associated with systemic therapy administration.

Simulation Case-scenario Objectives:

1. To correctly identify all appropriate paperwork has been completed prior to administering chemotherapy.
2. To correctly calculate body surface area of the oncology patient.
3. To review laboratory values and pre-printed orders for completeness and accuracy of dosing.
4. To identify correct procedure to follow on the physician's medication order.
5. Demonstrate proper equipment set-up for chemotherapy administration.
6. Demonstrate proper drug verification with a second health care provider (Registered Nurse or pharmacist).
7. Demonstrate how and when to verify blood return during administration of chemotherapy.
8. To identify and demonstrate appropriate drug administration sequencing.
9. Demonstrate appropriate flushing of IV lines upon completion of systemic therapy infusion.
10. Demonstrate appropriate disconnection of IV lines and disposal of cytotoxic waste.
11. Demonstrate management of a cytotoxic spill.
12. Demonstrate management of a chemotherapy extravasation.
13. Demonstrate management of a hypersensitivity reaction.

SECTION 2

FACILITATOR GUIDE

2.1 SIMULATION MODULE RESOURCES

Nova Scotia Health Authority Policy and Procedures:

- Administration of Cancer Chemotherapy (MM 40-005)
  - Appendix 1 - Extravasation management
  - Appendix 2 - Hypersensitivity reaction algorithm
- Safe Handling of Cytotoxic Drugs and Waste (CC 05-055)

Nova Scotia Cancer Care skills checklists

Located on the NSCCP website under "Administration of Cancer Systemic Therapy Online Learning Program" a link is provided for the checklist**.** *(The nurse(s) should bring copies of these checklists with them.)* www.cdha.nshealth.ca/nova-scotia-cancer-care-program-19

- Extravasation Management
- Safe Handling & Disposing of Hazardous Drugs
- IV administration of cancer chemotherapy via infusion in a peripheral vein
- IV administration of cancer chemotherapy infusion via CVAD
- IV DIRECT administration of cancer chemotherapy via infusion in a peripheral vein
- IV DIRECT administration of cancer chemotherapy via CVAD
- Management of Hypersensitivity Reactions
- Management of a Cytotoxic Spill

Canadian Association of Nurses in Oncology. (2010). *National strategy for chemotherapy administration: standards and competencies for cancer chemotherapy nursing practice.* Retrieved from www.cano-acio.ca/page/NSCA

For educational purposes, the following documents were retrieved from Nova Scotia Health Authority Intranet in May through to July, 2018 with approval to utilize "For Reference Only":

- Physician's Orders CP0120MR-10_2013
- Parenteral Systemic Therapy for Cancer Nursing Verification Checklist - Ambulatory Oncology CD1888MR_05_2014
- Parenteral Systemic Therapy for Cancer Nursing Verification Checklist – Hem/Onc Inpatient CD2678MR_12_2013
- Medication Administration Record (7 day/ scheduled) CD0146MR_11_2017
- Consent for Investigation, Treatment or Operative Procedure CD0301MR_07_2014
- Consent for Investigation, Treatment or Operative Procedure FolFIRI (Colon) CD1521MR_01_2016
- Vital Signs with MEWS Score CD3085MR_09_2017

- CHOP/CVP with/without Rituximab (IV/subcut) – Low Grade and High Grade Non-Hodgkin Lymphoma (NHL) PPO0084MR Mar, 2018
- IRINotecan/Fluorouracil/Leucovorin (FOLFIRI) Metastatic GI Regimen PPO0133MR Oct, 2016

2.2 MATERIALS LIST

Reuse

- IV task arm (manikin)
- "Chester" chest or PICC arm (manikin)
- Computer to look up current policies
- Patient ID Band x2 (*reuse*)
- Allergy Band (*reuse*)
- Chemotherapy precaution sign (*reuse*)
- Red chemotherapy disposal bucket (*reuse*)
- Black disposal garbage bin (*reuse*)
- Hand sanitizer (in rooms / hallway)
- Chemotherapy spill kit: gloves, gown, shoe covers, goggles/shield, N95 respirator mask, blue plastic pads, red plastic bag, bottle labeled as cleaning solution, instructions on usage (*reuse majority of kit*)
- N/S 50ml IV bag x1, connected to secondary line x1 and clamped (*reuse*)
- N/S 100ml IV bag x1, connected to secondary line x1 and clamped (*reuse*)
- D5W 100ml IV bag x1 (reuse)
- N/S 250ml IV bag x2 (*reuse*)
- D5W 250ml IV bag x1 (*reuse*)
- D5W 500ms IV bag x1, connected to secondary line and clamped (*reuse*)
- Medication labels (See example on page 7)
- Food coloring (*Reuse*)
- IV tubing – primary line with or without cassette x3 (*reuse*)
- Secondary IV tubing x1 (*reuse*)
- IV pump and pole (*reuse*)
- Chemotherapy gown - blue (*reuse*)
- Box of chemotherapy gloves medium (*reuse*)
- Box of regular gloves medium (*reuse*)
- Alcohol swabs (box)
- Gauze 2x2 (box)
- 3ml syringe x1 (*reuse*)
- 30 ml syringe x2 (*reuse*)
- Infusor bottle x1 (*reuse*)
- Calculator (*reuse*)
- Transport Tape x1 (*reuse*)

Consumables

- Blue plastic pads x3
- Prefilled saline syringes x6

Additional Paperwork

- Three blank Scheduled Medication Administration Record (MAR)
- Two blank copies of *Parental Systemic Therapy for Cancer Nursing Verification Checklist* (Hem/Onc Inpatient or Ambulatory form, as appropriate for clinical area)

MEDICATION LABEL EXAMPLE

Bags

Patient Name: _____ HUN: _____ VinCRIStine 2 MG 0.9% Sodium chloride 50 ML Intravenous Over 15 minutes gravity infusion Total Volume 55ml Rate: N/A Drug Prepared on _____ Drug Expires on _____	Patient Name: _____ HUN: _____ Rituximab 660 MG 5% Dextrose in water 250 ML Intravenous Concentration 3mg/ml Total Volume 265ml Rate: _____ Drug Prepared on _____ Drug Expires on _____
Patient Name: _____ HUN: _____ CycloPHOSPHAMIDE 1320 MG 0.9% Sodium chloride 100 ML Intravenous Total Volume 112ml Rate: _____ Drug Prepared on _____ Drug Expires on _____	Patient Name: _____ HUN: _____ IRINotecan 229.3 MG 5% Dextrose in water 500 ML Intravenous Total Volume 525ml Rate: _____ Drug Prepared on _____ Drug Expires on _____
Patient Name: _____ HUN: _____ Leucovorin 764 MG 5% Dextrose in water 250 ML Intravenous Total Volume 260ml Rate: _____ Drug Prepared on _____ Drug Expires on _____	

SYRINGES

Patient Name: _____ HUN: _____ DOXOrubicin 88 MG Normal Saline 0.9% 18.2 ML Intravenous IV Direct Total Volume 20ml Rate: N/A Drug Prepared on _____ Drug Expires on _____	Patient Name: _____ HUN: _____ Fluorouracil 458.4 MG Normal Saline 0.9% 22 ML Intravenous IV Direct Total Volume 26ml Rate: N/A Drug Prepared on _____ Drug Expires on _____

2.3 SIMULATION SKILLS QUICK NOTES

These simulation quick notes are a brief overview of the objectives and NSCCP skills that will be demonstrated by the nurse(s) during the two simulation case-scenarios. As part of case-scenario one, the nurse(s) will perform the administration of chemotherapy agents via a CVAD, management of a hypersensitivity reaction, as well as management of cytotoxic spill. In case-scenario two, skills performed by the nurse(s) will include the administration of chemotherapy agents via a peripheral vein, and the management of a chemotherapy extravasation These below noted skills correspond with the skills checklists required by the NSCCP on their website under "Administration of Cancer Systemic Therapy Online Learning Program".

Simulation – Spill Management

Objective: To select appropriate supplies; don appropriate personal protective equipment (PPE) in correct order of mask, goggles/face shield, one pair of gloves, gown, shoe covers, second pair of gloves; and follow procedure outlined in Nova Scotia Health Authority policy "Handling of Cytotoxic Drugs and Waste".

Skill Performance Guide: Identify location of "Spill Kit" in practice area. Demonstrate proper procedure for spill containment. Demonstrate donning of appropriate PPE. Demonstrate appropriate spill cleanup. Demonstrate appropriate removal of PPE and waste disposal associated with a cytotoxic spill.

Simulation – Safe Handling & Disposal of Hazardous Drug

Objective: To select appropriate supplies, don appropriate PPE, and appropriately handle hazardous drugs and waste as outlined in the Nova Scotia Health Authority policy "Handling of Cytotoxic Drugs and Waste".

Skill Performance Guide: Demonstrate safe administration of chemotherapy agents at patient's bedside/chair. Demonstrate appropriate cytotoxic waste disposal.

Simulation – Extravasation Management

Objective: To identify risk factors that may lead to potential or actual extravasation of systemic cancer drugs. To demonstrate the care and documentation required of a suspected of actual event.

Skill Performance Guide: Demonstrate proper management, follow up, and documentation according to Nova Scotia Health Authority policy "Administration of Cancer Chemotherapy" Appendix A: Extravasation.

Simulation – Management of Hypersensitivity Reaction

Objective: To demonstrate the ability to prepare for and manage reactions associated with systemic cancer drugs.

Skill Performance Guide: Describe risk factors for hypersensitivity reactions. Demonstrate patient teaching on symptoms. Demonstrate appropriate sequence of symptom management.

Simulation – Intravenous Administration of Cancer Chemotherapy Infusion via in a Peripheral Vein

Objective: To demonstrate the ability to prepare and safely administer systemic chemotherapy by pump and gravity via a peripheral vein.

Skill Performance Guide: Identify appropriate IV site and gauge to be selected for the administration of systemic chemotherapy. Demonstrate appropriate frequency for verifying blood return. Demonstrate appropriate connection and disconnection of syringes and IV lines. Demonstrate application of independent second check with infusion pump rate and volume.

Simulation – Intravenous Administration of Cancer Chemotherapy Infusion via a CVAD

Objective: To demonstrate the ability to prepare and safely administer systemic chemotherapy by pump and gravity via a central venous access device.

Skill Performance Guide: Demonstrate appropriate frequency for verifying blood return. Demonstrate appropriate connection and disconnection of syringes and IV lines. Demonstrate application of independent second check with infusion pump rate and volume.

Simulation – Intravenous Direct Administration of Cancer Chemotherapy via a Peripheral Vein

Objective: To demonstrate the ability to prepare and safely administer systemic chemotherapy directed via a peripheral vein.

Skill Performance Guide: Demonstrate appropriate frequency for verifying blood return. Demonstrate appropriate connection and disconnection of syringes and IV lines.

Simulation – Intravenous Direct Administration of Cancer Chemotherapy via a CVAD

Objective: To demonstrate the ability to prepare and safely administer systemic chemotherapy directed via a central venous access device.

Skill Performance Guide: Demonstrate appropriate frequency for verifying blood return. Demonstrate appropriate connection and disconnection of syringes and IV lines.

Nova Scotia Cancer Care Program. (n.d.). *Administration of Cancer Systemic Therapy Online Learning Program.* Retrieved from www.cdha.nshealth.ca/nova-scotia-cancer-care-program-19

2.4 DEBRIEFING QUESTIONS

Use these questions to stimulate critical thinking by the nurse(s) following completion of each separate case-scenario, and then use the summary simulation questions at the end. Suggested answers follow each question. This section is meant to be more of a conversation between the facilitator and nurse(s) whereby the nurse(s) are guided in reflection. The debriefing allows nurse(s) to describe the experience and review the objectives; and the facilitator to reinforce learning and correct any misconceptions.

Case-scenario #1 (Mary Johnson)

1. What would you document in the patient's chart after case-scenario #1?

Items include the following:

- **Patient's reaction to Rituximab (a monoclonal antibody) and management of symptoms.**
- **Verification of chemotherapy drugs done with second nurse.**
- **Specific route of administration of chemotherapy drugs (e.g. red lumen of Peripherally Inserted Central Catheter).**
- **Verification of blood return pre, during, and post administration.**
- **Chemotherapy bag became disconnected from secondary spike during disposal of line. Use of spill kit and who should be notified as directed in the "Safe Handling of Cytotoxic Drugs and Waste" policy.**
- **Any patient concerns or issues during the administration of chemotherapy medications.**

2. What would be the rationale for remaining in the room with the patient during the infusion of a vesicant?

Vesicants are drugs which have the greatest potential to cause trauma to tissue when it infiltrates into the surrounding tissue (i.e. extravasation). Early intervention is critical if extravasation is suspected to minimize damage to the surrounding tissue.

3. What length of time should patients be placed on "Cytotoxic Precautions" as an inpatient?

Correct response: Seven days from completion of chemotherapy.

4. What do you feel you did well during the simulation?

5. If you were able to do these simulation case scenario again, is there anything you would have done differently?

6. Is there anything else you would like to discuss?

Case-scenario #2 (Sam Smith)

1. What would you document after case-scenario #2?

Documentation should include the following:

- **BSA adjusted for weight loss**
- **Verification of chemotherapy drugs labels with another nurse.**
- **Specific route of administration of chemotherapy drugs (e.g. peripheral IV for irinotecan and fluorouracil, and Port-a-Cath for completion fluorouracil and bottle connection).**
- **Verification of blood return pre, during, and post administration of chemotherapy.**
- **Identify that the nurse followed the appropriate policy "**Administration of Cancer Chemotherapy**" to document the event of a suspected extravasation of a chemotherapy drug, fluorouracil (irritant) in this case-scenario.**
- **Any patient concerns or issues during administration of chemotherapy medications.**

2. What are the major routes by which unintentional exposure to cytotoxic drugs occur?

Response should include the following:

- **Absorbed through direct contact with the drug or from surfaces of objects that are contaminated with the hazardous drug.**
- **Inhalation of drug aerosols or droplets.**
- **Ingestion through contaminated food, beverage, or other hand-to-mouth activities.**

3. What length of time should patients placed on "Cytotoxic Precautions" as an outpatient?

Correct response: 48 hours from completion on chemotherapy.

4. What do you feel you did well during the simulation?

5. If you were able to do this simulation case scenario again, is there anything you would have done differently?

6. Is there anything else you would like to discuss?

Summary Simulation Debriefing Questions

1. How did you feel throughout the simulation experience?

   Acknowledge nurse's feelings and validate their responses.

2. What is one important thing that you have learned during this simulation experience?

3. Do you have any concerns regarding the safe administration of chemotherapy agents?

   If the nurse responds with any concerns, offer additional 1:1 teaching at another time prior to independent practice of the administration of chemotherapy in the clinical setting.

4. Were you satisfied with your ability to work through the simulation?

SECTION 3

SIMULATION CASE-SCENARIOS

3.1 CASE-SCENARIO #1

Brief Description of Client

Name: Mary Johnson

Gender: Female **Age**: 32 T**odays Weight**: 61.3kg **Height**: 176.4 cm

Major Support: Husband (Jack)

Allergies: Bananas

Physician: Dr. Green

Past Medical History: GERD

History of Present Illness: Presented to family physician with increased fatigue and drenching night sweats for the past two weeks.

Social History: Works as chartered accountant. Supportive parents and parents-in-law. Daughter aged 8. Non-smokers. Social ETOH.

Drug Coverage: Yes

Cancer Diagnosis*: Diffuse Large B-Cell Lymphoma*

Surgeries/Procedures & Dates: C-Section

Report

Mrs. Johnson was admitted yesterday (March 13) to the inpatient unit to undergo her first round of chemotherapy today. The diagnosis of diffuse large b-cell lymphoma has been explained to both Mrs. Johnson and her husband by the attending hematologist. The pharmacist has also been in to see the patient about the drugs she is going to receive, as part of the protocol R-CHOP. Mrs. Johnson is worried and anxious about how the chemotherapy will make her feel. This morning Mrs. Johnson has returned from interventional radiology with a newly inserted PICC line, and is ready to begin her treatment.

Nursing Tasks

The chemotherapy orders are completed on the patient's chart. A co-worker has transcribed the orders for you.

1. Co-sign the transcribed medication administration records.
2. Proceeds with the orders accordingly and complete appropriate paperwork.
3. Set up and administer the chemotherapy (mock medication).

Case-scenario #1
Facilitator's Notes

1. Provide a copy of case-scenario #1 to nurse(s) and review.
2. Provide the nurse(s) a copy of the *Parenteral Systemic Therapy for Cancer Nursing Verification Checklist* relevant to the area of practice (inpatient or ambulatory), physician order, and chemotherapy orders.

   Note: It would be expected the nurse(s) would ask for assistance completing the checklist.
3. Provide the nurse(s) *Lab Results Case-Scenario Part 1* (from Section 4 of this package). The nurse(s) will need to calculate the required formulas. Review the calculations with the nurse(s).
4. Instruct the nurse to verify that the height and weight are co-signed. Then, instruct the nurse(s) to compare the lab values to the written orders and begin to complete the verification checklist. The nurse(s) should identify that the total bilirubin is above the threshold according to the written orders. The nurse(s) should state that he/she would contact the hematologist. Next provide the nurse(s) a copy of *Lab Results Part 2,* and he/she should identify this blood work is safe to proceed with chemotherapy.
5. Next, instruct the nurse(s) to co-sign the transcribed chemotherapy medication administration record (provide transcribed records). Ensure they identify the following transcription errors:
   - Pre-medications for Rituximab given 30-45 minutes prior,
   - Mark "stop" with reaction management for Rituximab,
   - After initial Zofran pre-med, no dosing marked with q12h order,
   - Doxorubicin dose is wrong, dose should be 88 mg,
   - Vincristine order missing "Day 1" and day identified in calendar box,
   - Cyclophosphamide mixed in 100ml, not 1000ml.
6. Now have the nurse(s) properly set up equipment in preparation to administer the chemotherapy. Encourage nurse(s) to prepare a rescue line (e.g. normal saline IV bag connected to primary set and primed. If nurse(s) unfamiliar with drugs, encourage review of drug monograph (chemotherapy drugs and reaction medications).

   Note: It would be expected the nurse(s) would ask for assistance gathering equipment.
7. The nurse(s) can now proceed with the chemotherapy orders, beginning with the administration of Rituximab.

   Note: The nurse(s) may verbalize they have administered the premedication.
8. Once Rituximab is set up and running, inform the nurse(s) 90 minutes into the infusion the patient has begun to develop a fever and started to rigor. The nurse(s) should follow the reaction orders and manage the situation appropriately. Once

correctly managed, inform nurse(s) the remainder of infusion was uneventful, and may proceed with the chemotherapy in the following sequence:

8.1. Using free flowing IV solution, begin administration of Doxorubicin on lowest port of IV line. Flush with 50mls of solution between drugs. *Note: it would be expected the nurse(s) would ask for assistance on how administer medication via the IV push route if never practiced previously.*

8.2. Follow with Vincristine by gravity administration (either piggybacked with cassette not using pump or on lowest port of gravity line, depending on clinical area supplies). Flush with 50mls of solution between drugs.

8.3. Conclude with cyclophosphamide via infusion pump on piggyback line. Flush with 50mls of solution post.

9. Upon completion of chemotherapy administration, ensure the nurse(s) properly disposes of the equipment and waste materials.

9.1. Inform the nurse(s) upon discarding the chemotherapy lines, the secondary line has come dislodged from the cyclophosphamide chemotherapy bag. Droplets of liquid are found next to the sharps bucket he/she are disposing items into. The nurse(s) should identify this event as a chemotherapy spill and manage appropriately.

10. Complete debriefing questions for case scenario one.

Scenario Progression Outline
Case-scenario #1
Facilitator Copy

Timing (approx.)	Actions	Expected Interventions	May Use the Following Cues
5 min	Introduction to scenario.		
10-20 min	Verify BSA. Review lab results and compare to R-CHOP orders.	Verify height & weight. Identify concern with lab results. Notify physician.	Check Total Bilirubin level.
15-20 min	Review transcribed R-CHOP orders for any errors.	Identify two areas transcribed incorrectly.	6 rights of medication administration.
10 min	Set-up equipment for Rituximab.	Verify drug label with order with second RN. Obtain second RN to verify infusion pump rate prior to initiating.	Use two unique identifiers.
10-15 min	Demonstrate management of hypersensitivity response.	Follow algorithm in policy.	Refer to chemotherapy administration policy and pre-printed chemotherapy orders.
30 min	Set-up equipment and administer CHOP in correct order.	Verify drug label with order with second RN. Obtain second RN to verify infusion	Use two unique identifiers.

		pump rate prior to initiating. Demonstrate when to verify blood return. Demonstrate flushing of IV solution between drugs.	Refer to chemotherapy administration policy on frequency of blood verification.
5-10 min	Dispose of cytotoxic waste when completed.	Utilize appropriate bin and bucket.	What has chemotherapy touched?
15-20 min	Demonstrate management of chemotherapy spill when chemotherapy bag becomes disconnected.	Follow policy.	Refer to policy on Administration of Cancer Chemotherapy and Safe Handling of Cytotoxic Drugs and Waste.

Capital Health

00000222 YYYY/MM/DD F 32
Johnson, Mary

Example

Cancer Care Program

Parenteral Systemic Therapy for Cancer Nursing Verification Checklist – Hem/Onc Inpatients

Patient: Mary Johnson Allergies: Bananas.

The following form must be completed by a Registered Nurse certified in the administration of cancer chemotherapy (RNCC) prior to the administration of chemotherapy and accompanied by documentation on a medication administration record.

1. **Diagnosis:** DLBCL
Protocol R-CHOP **Cycle** #1 **Treatment date** March 14th

2. Order Verification

- Must be completed prior every cycle and when chemotherapy orders are changed.
- Each of the following steps should be initialed. For steps which are not applicable, mark n/a

RNCC Initial:	Order verification:	Comment:
TJ	Consent signed (verify cycle #1 only)	
TJ	Chemotherapy order signed/co-signed by NP/ Hematologist/Medical/Gyne Oncologist Date order written: 18.03.13.	Written + signed by Dr. A Green - 18.03.13
TJ	Verify day of cycle matches treatment date	
TJ	Drugs ordered are consistent with cycle/day/week	Cycle 1, Day 1
TJ	Verify initial BSA. (Confirm wt/ht double checked) Recalculate BSA if the weight has changed by ± 10% Verify other adjusted weight calculations	Ht = 176.4cm wt = 61.3kg BSA Dubois = 1.75690 m^2 ≈ 1.76 m^2 ✓
TJ	Recalculate all doses. Contact NP/Hematologist/Medical/Gyne Oncologist if there is a discrepancy; an incorrect calculation or a ± 10% variation in the dose accuracy	Rituximab = 660mg ✓ prednisone → ø calc. Doxorubicin = 88mg ✓ Vincristine → ø calculation cyclophosphamide = 1,320mg
RNCC signature: Taylor Jordan RN		Date / time: 2018.03.14.

3. Verification of lab / diagnostic results. Enter relevant values below

Date	Results	Results consistent with protocol parameters Yes / No Comments	Initial
2018.03.14	WBC = 15.8 Hgb = 102		
	plt = 188 →	yes	TJ
	ANC = 10,510 →	yes	TJ
	t.bili = 25 →	no↑	
	cr = 80		
	CrCl = 95mL/min	yes	TJ.

4. Drug Label Verification

Immediately prior to administration, the RNCC with another RN will verify the information on the chemotherapy drug label matches the information on the orders and/or medication administration record (MAR).Verify patient's name, medical record number, drug name, dose, route, infusion rate.diluent solution and expiry dates. **Drug label verification will be documented on the MAR with the initials of the RNCC administering the chemotherapy first and the RN completing the double check second.**

Capital Health

5. Infusion Rate Verification

- Immediately prior to administration, the RNCC administering chemotherapy programs infusion pump at prescribed rate.
- Second RN will independently calculate the infusion rate and verify the infusion pump is programmed with the calculated rate and verify infusion is going in intended pump channel by tracing line from solution through pump to insertion site. Both RNs will initial below.
- Identify drug(s) not requiring pump verification as Gravity or IV Push

6. Patient Identification

Immediately prior to administration the RNCC who administers the drug(s) will:

- verify patient identification using at least two identifiers
- cross reference patient's name, medical record number with the medication bag/syringe.

Note: Policy does not require that a second RN check patient identification prior to administration but this may be a preferred practice on some units.

Date	Drug Name	Total Dose Volume (mL)	Infusion Duration (hrs)	Infusion Rate mL/ hr	Independently Calculated Infusion Rate (W)	Correct Rate Programmed Correct pump channel (Q)	Patient ID verified (W)	Initials	
								RNCC Admin	RN
18.03.14	Rituximab	250mL	Standard long infusion					TJ	e
18.03.14	Doxorubicin	18.2mL	via	IV Push				TJ	U
18.03.14	Vincristine	55mL	via gravity					TJ	
18.03.14	Cyclophosphamide	130	1	130mL/hr	✓	✓	✓	TJ	

7. Signatures

Date/Time	Initials	Signature	Initials	Signature

Lab Results Case-scenario #1

Facilitator Copy

Part 1

Date: March 14

	Reference range	Result
WBC	4.5-11.00	15.8
HGB	120-160	102
PLT	150-350 $x10^9$/L	188
ANC		10510
Creatinine	46-90	80
Urea	2.9-9.2	7
Potassium	3.4-5.0	3.0
Sodium	136-145	140
Magnesium	0.66-1.07	1.0
Phosphorus	0.74-1.52	1.2
Total bilirubin	**0.0-8.54**	**25**
Direct bilirubin	0.00-20.4	24
ALT	38-150	148
AST	0-44	30
LDH	120-230	900

CrCl = $\frac{[140\text{-age}] \times IBW \times 1.2}{\text{Serum Cr}}$ x 0.85 (female)

IBW= [ht(cm)-150] x 0.9 + 45kg (female)

BSA (Dubois) m^2 = 0.007184 x $ht(cm)^{0.725}$ x $wt(kg)^{0.425}$

BSA (Mosteller) m^2 = $\sqrt{[ht(cm)\ x\ wt\ (kg)/\ 3600]}$

Lab Results Case-scenario #1
Calculation Results
Facilitator Copy

Lab Results Part 1

CrCl = $\frac{[140-32] \times 69.03 \times 1.2}{80} \times 0.85$
= 111.82 x 0.85
= 95.05

IBW = [176.7-150] x 0.9 +45
= 69.03

BSA (DuBois)
M2 = $(0.007184 \times 176.7^{0.725}) \times 61.3^{0.425}$
= 0.306 x 5.75
=1.76

BSA (Mosteller)
M2 = $\sqrt{176.7x61.3 \div 3600}$

= 1.73

Lab Results Case-scenario #1

Facilitator Copy

Part 2

Date: March 14

	Reference range	Result
WBC	4.5-11.00	15.8
HGB	120-160	102
PLT	150-350 $x10^9$/L	188
ANC		10510
Creatinine	46-90	55
Urea	2.9-9.2	3.4
Potassium	3.4-5.0	3.6
Sodium	136-145	140
Magnesium	0.66-1.07	1.0
Phosphorus	0.74-1.52	1.4
Total bilirubin	0.0-8.54	8
Direct bilirubin	0.00-20.4	14
ALT	38-150	100
AST	0-44	30
LDH	120-230	900

nova scotia health authority

Medication Administration Record

Nursing Division / 7 Day - **SCHEDULED**

RCHOP #1
Ht 176.4 cm
Wt 61.3 kg
BSA 1.76 m² (Dubois)

0000222 YYYY/MM/DD F 32Y
Mary Johnson

Recopied
Initial _____ Date (YYYY/MM/DD) _____
Initial _____ Date (YYYY/MM/DD) _____

Allergies _____

YYYY 18 MM 3 DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)	13	14 +1	15 +2	16 +3	17 +4	18 +5	19 +6
Allopurinol 300mg PO daily x5 days; start day prior to chemo Order date: 180314 Stop date: Transcribed: ✓ Checked:	1700	1	2	3	4	5	6	
PreMeds for Ritux Tylenol 650 mg PO x1 Benadryl 25-50mg PO/IV x1 30min prior to Ritux Order date: 18.03.14 Stop date: Transcribed: ✓ Checked:	1100	→						
Hold morning dose of anti-hypertensives on day of Ritux (if applicable) Order date: 180314 Stop date: Transcribed: ✓ Checked:		→	←					
STANDARD LONG INFUSION Rituximab 600mg IV in D5W (prepared to conc. 3mg/ml) on Course 1: Day 1 Order date: 18.03.14 Stop date: Transcribed: ✓ Checked:	1200	→	←					

Room # _____

Keys for Injection Site

D	Deltoid	V	Vastus lateralis
VG	Ventrogluteal	R	Right
A	Abdomen	L	Left

Abbreviations to Use

R	Refused	S	Self administered
P	Pass	H	Held
NPO		*	See Nursing Notes

Correctly Transcribed MAR

Facilitator copy

YYYY 18 MM 3 DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)	13	14 +1	15 +2	16 +3	17 +4	18 +5	19 +6
RXN Meds for Ritux ① Stop infusion ② Give benadryl 25-50mg w/IV push Q2-3h PRN Order date: 180314 Stop date: end Transcribed: ✓ Checked:		→	→					
③ Meperidine 12.5-25mg IV/IV push Q2-3h PRN (rigors) ④ wait 15min or until symptoms subside, restart at ½ previous rate. Order date: 180314 Stop date: Transcribed: ✓ Checked:		→	→					
Ondansetron 8mg PO/IV 30-45min prior to chemo Order date: 180314 Stop date: Transcribed: ✓ Checked:	1700	→	→					
Then, ondansetron 8mg PO/IV Q12h x 2 doses Order date: 180314 Stop date: Transcribed: ✓ Checked:	0500 1700	→	→	→	←	←	←	←
Prednisone 100mg PO daily on Day 1-5 Order date: 180314 Stop date: Transcribed: ✓ Checked:	0800	→	1	2	3	4	5	←
Doxorubicin 88mg IV Push Day 1 Order date: 180314 Stop date: Transcribed: ✓ Checked:	1800	→	→	←	←	←	←	←

Facilitator Copy

0000222 YYYY/MM/DD F 32Y
Mary Johnson

YYYY 18 MM 3 DD

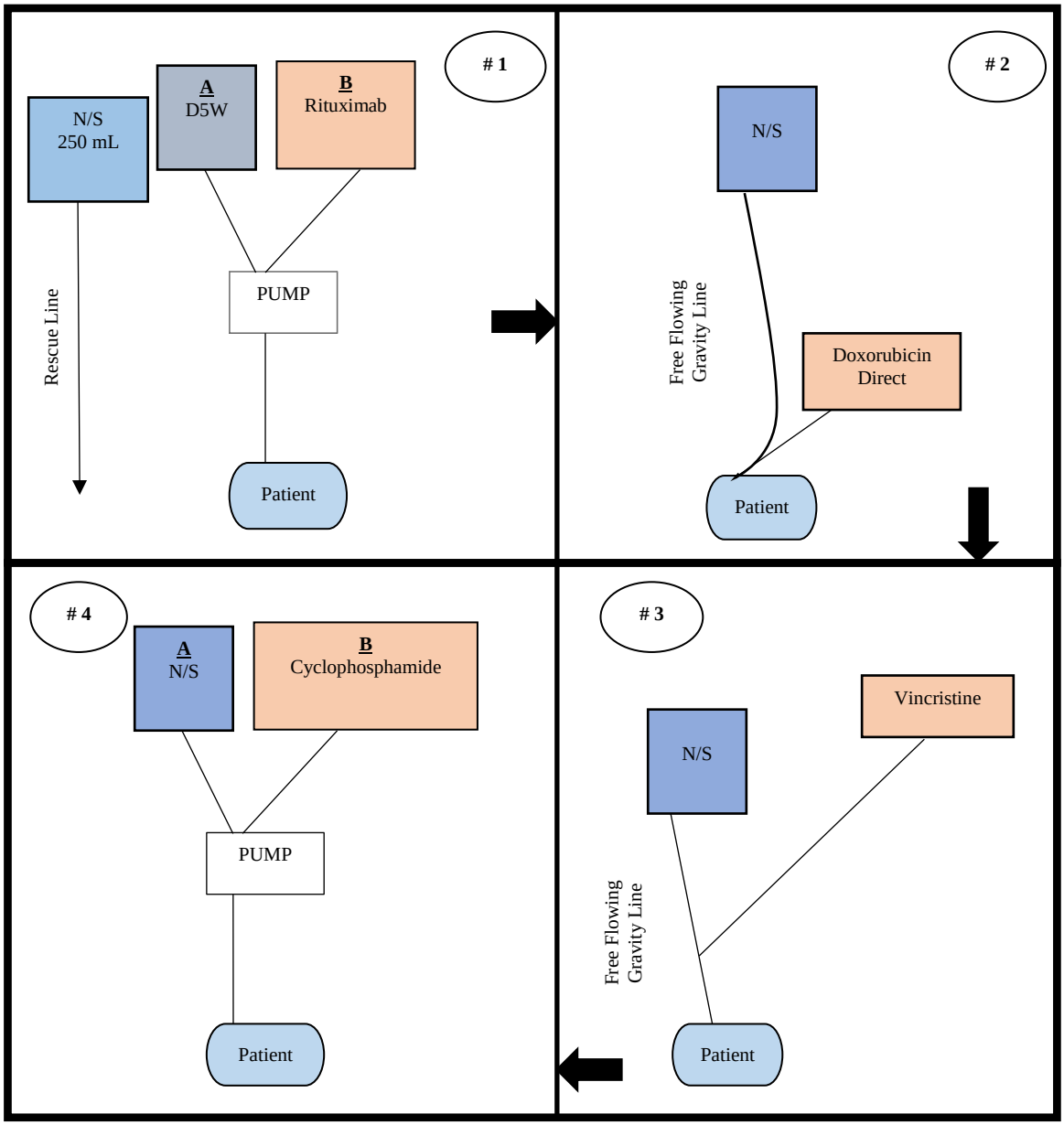
MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)	13	14	15	16	17	18	19
Vincristine 2mg IV infusion in 50ml NS over 15min gravity infusion Day 1	1830	→		←				
Order date: 180314 Stop date:								
Transcribed: ✓ Checked:								
Cyclophosphamide 1320 mg IV in 100ml NS over 1h on Day 1	1900	→		←				
Order date: 180314 Stop date:								
Transcribed: ✓ Checked:								
Order date: Stop date:								
Transcribed: Checked:								
Order date: Stop date:								
Transcribed: Checked:								

YYYY_____ MM_____ DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)						
Order date: Stop date:							
Transcribed: Checked:							
Order date: Stop date:							
Transcribed: Checked:							
Order date: Stop date:							
Transcribed: Checked:							
Order date: Stop date:							
Transcribed: Checked:							

Signature & Status	Initials	Date (YYYY/MM/DD)	Signature & Status	Initials	Date (YYYY/MM/DD)
	~				

Tubing Map
RCHOP
(Doxorubicin / Vincristine / Cyclophosphamide)



3.2 CASE-SCENARIO #2

Brief Description of Client

Name: Sam Smith

Gender: Male **Age**: 38 **Todays Weight**: 68 kg **Height**: 185.7 cm

Major Support: Parents

Allergies: None

Physician: Dr. Xo

Past Medical History: Tonsillectomy at age 10

History of Present Illness: Presented to family with decrease appetite, increase weight loss, and abdomen pain.

Social History: Works as veterinary assistant. Single. Son age 14

Drug Coverage: No

Cancer Diagnosis: ***Metastatic GI Cancer***

Surgeries/Procedures & Dates: Port-a-Cath inserted January 18, 2018

Report

Mr. Smith has arrived at the outpatient clinic today to undergo his third cycle of chemotherapy treatment. On assessment, he tells you about his ongoing intermittent troubles with indigestion and diarrhea since his first treatment. Upon verifying is chemotherapy orders, you notice Mr. Smith's weight has decreased significantly since his last cycle. Mr. Smith is requesting you insert a peripheral IV to begin treatment as the Port-a-Cath is uncomfortable being accessed and taped down. After discussion with the patient a number 24G peripheral IV has been inserted into his left forearm for part of his treatment, understanding the Port-a-Cath will be accessed for the infusor bottle.

Tasks

1. Calculate the patient's BSA. Discuss appropriate actions.
2. Transcribed the physician's orders.
3. Proceed with the physician's orders and complete appropriate paperwork.
4. Set up and administer the chemotherapy (mock medication).

Case-scenario #2
Facilitator's Notes

1. Provide a copy of case-scenario #2 to nurse(s) and review.
2. Provide the nurse(s) a copy of the *Parenteral Systemic Therapy for Cancer Nursing Verification Checklist* relevant to the area of practice (inpatient or ambulatory), physician order, and chemotherapy orders.

   Note: It would be expected the nurse(s) would ask for assistance completing the checklist.
3. Instruct the nurse to verify that the height and weight are co-signed. The nurse(s) should identify issues with the Body Surface Area (it is no longer accurate due to drop in weight secondary to patient's indigestion and diarrhea), and there is greater than a 10% discrepancy. The nurse(s) should report this finding to the oncologist. Provide corrected chemotherapy orders.
4. Instruct the nurse(s) to calculate the required formulas. Review calculations with nurse(s).
5. Instruct the nurse(s) to transcribe the chemotherapy orders onto the medication administration record. Instruct the nurse(s) to mark the pre-meds at 0800 and follow the times according throughout the MAR. (Transcription of record for inpatient area only. If ambulatory setting, proceed to next step.)
   - **5.1.** If nurse inquires as to why the Leucovorin dose is not reduced along with other medications, indicate given elevated creatinine and history of prior chemotherapy associated side effects, the dose is to remain as written.
6. Ensure the nurse(s) properly sets up equipment in preparation to administer the chemotherapy.

   Note: It would be expected the nurse(s) would ask for assistance if never assisted with this process previously.
7. The nurse(s) can now proceed and action the chemotherapy orders

   Note: The nurse(s) may verbalize they have administered the premedication.
   - **7.1.** Begin with Irinotecan. Flush with 50mls of solution between drugs. *Note: it would be expected the nurse(s) would ask for assistance on how administer medication via the IV push route if never practiced previously.*
   - **7.2.** Follow with leucovorin administration. Flush with 50mls of solution between drugs.
   - **7.3.** Follow with Fluorouracil via IV push.
8. During the administration of fluorouracil, inform the nurse(s) that the patient reports a burning feeling at the site of his peripheral IV. The nurse(s) should identify their concern for a suspected extravasation and perform appropriate tasks. After identifying the appropriate steps to manage the event, inform the nurse(s) the physician would

identify how to proceed with the remaining drug in syringe (most likely to access Port-a-Cath).

9. Instruct the nurse(s) to then continue with the regimen on the presumption the extravasation did not occur.

9.1. Connect the infusor bottle.

Note: It would be expected the nurse(s) would ask for assistance if never assisted with this process previously.

10. Upon completion of administering all the chemotherapy, ensure the nurse(s) properly disposes of the equipment waste.

11. Complete debriefing questions for case-scenario two, followed by the summary debriefing questions.

Scenario Progression Outline
Case-scenario #2
Facilitator Copy

Timing (approx.)	Actions	Expected Interventions	May Use the Following Cues
10-20 min	Verify BSA. Review lab results and compare to FOLFIRI orders.	Identify concern with BSA. Notify physician.	Has the weight changed greater than 10%?
20 min	Transcribe FOLFIRI orders	Transcribes correctly	
20-30 min	Set-up equipment and administer FOLFIRI in correct order.	Verify drug label with order. Obtain second RN to verify infusion pump rate prior to initiating. Demonstrate when to verify blood return with PIV access. Demonstrate flushing of IV solution between drugs. Correctly attaches infusor bottle.	Use two unique identifiers. Refer to policy on Administration of Cancer Chemotherapy.
10 min	Demonstrate management of extravasation with Fluorouracil.	Follow policy.	Refer to policy on Administration of Cancer Chemotherapy.
5-10 min	Dispose of cytotoxic waste when completed.	Utilize appropriate bin and bucket.	What has the chemotherapy touched?

	Refer to policy on Administration of Cancer Chemotherapy.

Lab Results Case-scenario #2

Facilitator Copy

Date: March 14

	Reference range	Result
WBC	4.5-11.00	3.0
HGB	120-160	100
PLT	150-350 $x10^9$/L	180
ANC		2580
Creatinine	46-90	89
Urea	2.9-9.2	6.2
Potassium	3.4-5.0	3.5
Sodium	136-145	140
Magnesium	0.66-1.07	0.60
Phosphorus	0.74-1.52	0.78
Alk Phosp.	50-100	95
ALT	38-150	148
AST	0-44	42
T. Bili	0-8.54	9

BSA (Dubois) m^2 = 0.007184 x ht(cm)$^{0.725}$ x wt(kg)$^{0.425}$

BSA (Mosteller) m^2 = $\sqrt{[ht(cm)\ x\ wt\ (kg)/\ 3600]}$

Lab Results Case-scenario #2
Facilitator Copy

Lab Results

BSA (DuBois)

$m^2 = (0.007184 \times 185.7^{0.725}) \times 68^{0.425}$

$=1.91$

BSA (Mosteller)

$m^2 = \sqrt{(185.7 x 68 \div 3600)}$

$= 1.87$

Capital Health
Cancer Care Program

0001111 YYYY/MM/DD M 38Y
Smith, Sam

Example

Parenteral Systemic Therapy for Cancer
Nursing Verification Checklist – Ambulatory Oncology

The following form must be completed by a Registered Nurse certified in the administration of cancer chemotherapy (RNCC) prior to the administration of chemotherapy and accompanied by documentation on a medication administration record.

1. **Protocol** FOLFIRI **Cycle** 3 **Date** 180315
   Diagnosis: Met Colon Ca
   Allergies: NKA
   Comments: Issues ↓ diarrhea past 2 cycles

2. **Order Verification**
   - Must be completed for all new or changed chemotherapy orders.
   - Each of the following steps should be initialed. For steps which are not applicable, mark n/a.

RNCC Initial	Order Verification	Comments
	Consent signed (verify cycle #1 only)	Signed 17/12/20 (on HPF)
ℓ	Chemotherapy order signed/ co-signed by NP/ Hematologist/ Medical/Gyne Oncologist	Date order written: 180315 Dr Xo
ℓ	Verify day of cycle matches treatment date	Cycle 3 D+1 Week 0
ℓ	Order compares with last treatment order	wt down, BSA corrected + NBW dosed
ℓ	Verify BSA. Recalculate BSA if the weight has changed by ± 10% Verify other adjusted weight calculations	Ht 185.7 cm wt 85 → 68 kg BSA 2.1 → 1.91 m^2
ℓ	Recalculate all doses. Contact NP/Hematologist/ Medical /Gyne Oncologist if there is a discrepancy; an incorrect calculation; or a ± 10% variation in the dose accuracy	
ℓ	Bloodwork/results of diagnostic tests consistent with protocol parameters	ANC 2500 ✓ Plts 180 ✓
RNCC Signature: X		**Date:** X
RNCC Signature: X		**Date:** X

Folfiri
Wt 68 kg
Ht 185.7cm
BSA 1.91 m²

00011111 YYYY/MM/DD 38Y M
Smith, Sam

nova scotia health authority

Medication Administration Record
Nursing Division / 7 Day - **SCHEDULED**

Recopied
Initial _____ Date (YYYY/MM/DD) _____
Initial _____ Date (YYYY/MM/DD) _____

Allergies _____

YYYY 8 MM 3 DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)	15 +1	16 +2	17 +3	18 +4	19 +5	20 +6	21 +7
Premedication Dexamethasone 8mg PO/IV pre-chemo Order date: 180315 Stop date: Transcribed: Checked:	0800		←					
Then, Dexamethasone 8mg PO Q24h x 2 doses Order date: 180315 Stop date: 180317 Transcribed: Checked:	0800	→	①					④
Premedication Zofran 8mg PO/IV pre-chemo Order date: 180315 Stop date: Transcribed: Checked:	0800		←					
Then, Zofran 8mg PO Q12h x 3 doses Order date: 180315 Stop date: 180316 Transcribed: Checked:	0800		→ ②	←				
	2000	①	③	←				

Room # _____

Keys for Injection Site

D	Deltoid	**V**	Vastus lateralis
VG	Ventrogluteal	**R**	Right
A	Abdomen	**L**	Left

Abbreviations to Use

R	Refused	**S**	Self administered
P	Pass	**H**	Held
NPO		*	See Nursing Notes

Correctly Transcribed MAR

YYYY 18 MM 3 DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)	15 +1	16 +2	17 +3	18 +4	19 +5	20 +6	21 +7
Prophylaxis Atropine 0.25mg subcut pre-chemo Order date: 180315 Stop date: Transcribed: Checked:	0800		←					
If acute cholinergic syndrome during Treatment - - stop infusion - Give Atropine 0.25mg subcut notify MD for further recommendations Order date: 180315 Stop date: Transcribed: Checked:								
Irinotecan 229.3mg IV in 500ml DSW over 90min Day +1 Order date: 180315 Stop date: Transcribed: Checked:	0830		←					
Leucovorin 764mg IV in 250ml DSW over 120min D+1 Order date: 180315 Stop date: Transcribed: Checked:	1000		←					
Ice chips 5min Pre-Fluorouracil bolus Order date: 180315 Stop date: Transcribed: Checked:	1200		←					
Fluorouracil 458.4mg IV direct D+1 Order date: 180315 Stop date: Transcribed: Checked:	1205		←					

00011111 YYYY/MM/DD M
Smith, Sam 38Y

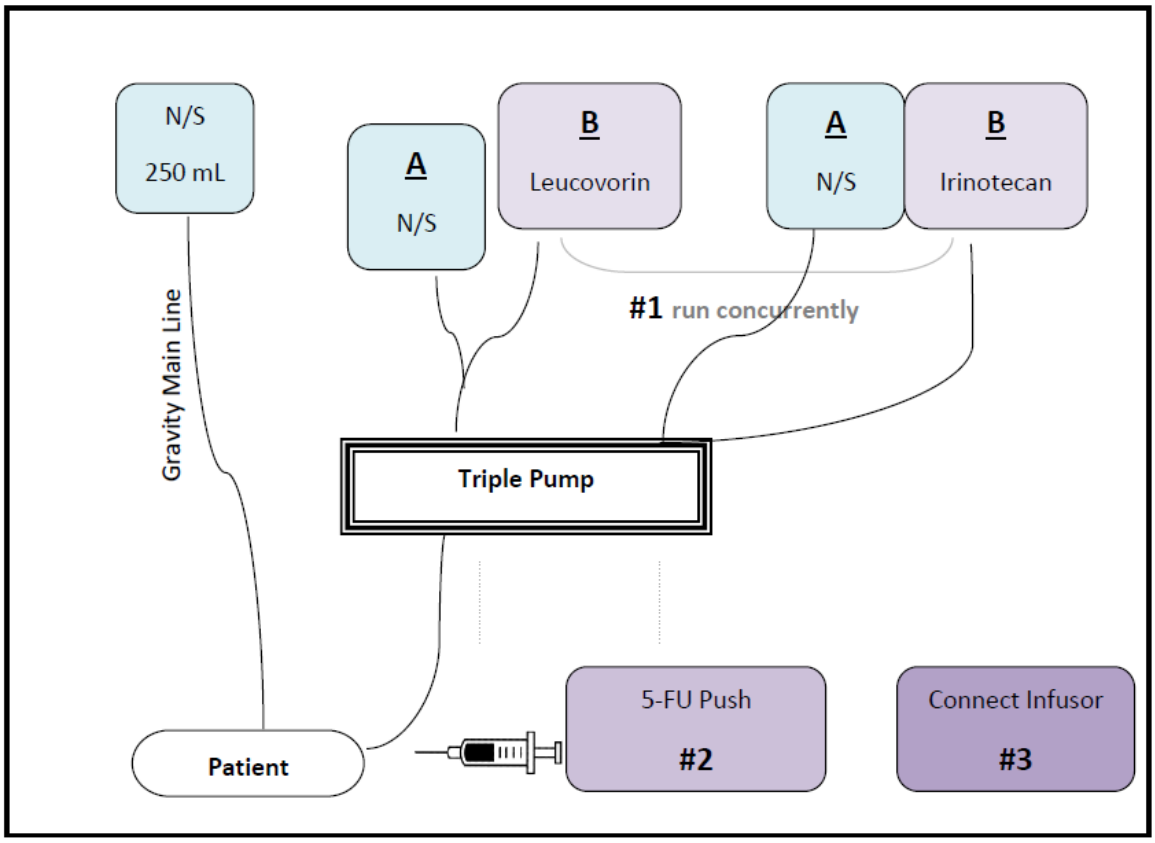
YYYY 18 MM 3 DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)	15 +1	16 +2	17 +3	18 +4	19 +5	20 +6	21 +7
Ice chips 30min post Fluorouracil Order date: 180315 Stop date: Transcribed: Checked:	12:40		←					
Fluorouracil 3200mg Continuous IV infusion over 46 hours Day+1 Order date: 180315 Stop date: Transcribed: Checked:	1215		←					
If delayed diarrhea: Give loperamide 4mg at 1st sign of any change in Bowel movement. Continue 2mg PO QD QHours until 12hrs w/o BM Order date: Stop date: Transcribed: Checked:								
after Bowel movement return to normal, May take 4mg PO at night instead for convienence Q4h Order date: 180315 Stop date: Transcribed: Checked:								

YYYY 18 MM 3 DD	15	16	17	18	19	20	21
MEDICATION (Dose/Route/Frequency) / **TIME** (24h/hh:mm)							
Hypersensitivity Reaction ①follow algorithm ②Benadryl 50mg IV direct x1 PRN ③Hydrocortisone 100mg IV direct x1 PRN Order date: 180315 Stop date: Transcribed: Checked:							
Order date: Stop date: Transcribed: Checked:							
Order date: Stop date: Transcribed: Checked:							
Order date: Stop date: Transcribed: Checked:							

Signature & Status	Initials	Date (YYYY/MM/DD)	Signature & Status	Initials	Date (YYYY/MM/DD)

Tubing Map
FOLFIRI
(Irinotecan / Leucovorin / 5-FU / 5-FU Infusor)



Step 1 – Have gravity line prepared ready to use. On one pump, piggy-back Irinotecan to N/S and run directly to patient. On a second pump, piggy-back Leucovorin to a N/S line and connect to the lowest y-site port on the Irinotecan line. Run both Leucovorin and Irinotecan concurrently as ordered.

Step 2 – Following completion of step 1, connect gravity line to patient. Connect syringe containing 5-FU to lowest y-site port on gravity line and administer IV direct.

Step 3 – Following completion of step 2, disconnect gravity line and connect 5-FU infusor.

SECTION 4

NURSE HANDOUTS

4.1 SIMULATION LEARNING OBJECTIVES

General Objectives:

1. Demonstrate safe and appropriate administration of systemic therapy agents (chemotherapy).
2. Demonstrate management of complications associated with systemic therapy administration.

Simulation Case-scenario Objectives:

1. To correctly identify all appropriate paperwork has been completed prior to administering chemotherapy.
2. To correctly calculate body surface area of the oncology patient.
3. To review laboratory values and pre-printed orders for completeness and accuracy of dosing.
4. To identify correct procedure to follow on the physician's medication order.
5. Demonstrate proper equipment set-up for chemotherapy administration.
6. Demonstrate proper drug verification with a second health care provider (Registered Nurse or pharmacist).
7. Demonstrate how and when to verify blood return during administration of chemotherapy.
8. To identify and demonstrate appropriate drug administration sequencing.
9. Demonstrate appropriate flushing of IV lines upon completion of systemic therapy infusion.
10. Demonstrate appropriate disconnection of IV lines and disposal of cytotoxic waste.
11. Demonstrate management of a cytotoxic spill.
12. Demonstrate management of a chemotherapy extravasation.
13. Demonstrate management of a hypersensitivity reaction.

Participant Pre-Questionnaire

Please circle whether you agree or disagree with the following statements regarding your confidence in administering chemotherapy and managing complications.

3. I feel confident to independently administer chemotherapy using the technique of IV push.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

4. I feel confident to independently administer chemotherapy using the technique of gravity.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

5. I feel confident to independently administer chemotherapy using an infusion pump.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

6. I feel confident to safely manage a chemotherapy spill.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

7. I feel confident to correctly manage an extravasation that occurred as a result of administering chemotherapy.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

8. I feel confident to independently verify chemotherapy pre-printed orders.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

4.2 CASE-SCENARIO #1

Brief Description of Client

Name: Mary Johnson

Gender: Female **Age**: 32 **Todays Weight**: 61.3kg **Height**: 176.4 cm

Major Support: Husband (Jack)

Allergies: Bananas

Physician: Dr. Green

Past Medical History: GERD

History of Present Illness: Presented to family physician with increased fatigue and drenching night sweats for the past two weeks.

Social History: Works as chartered accountant. Supportive parents and parents-in-law. Daughter aged 8. Non-smokers, and Social ETOH

Drug Coverage: Yes

Cancer Diagnosis*: Diffuse Large B-Cell Lymphoma*

Surgeries/Procedures & Dates: C-Section

Report

Mrs. Johnson was admitted yesterday (March 13) to the inpatient unit to undergo her first round of chemotherapy today. The diagnosis of diffuse large b-cell lymphoma has been explained to both Mrs. Johnson and her husband by the attending hematologist. The pharmacist has also been in to see the patient about the drugs she is going to receive, as part of the protocol R-CHOP. Mrs. Johnson is worried and anxious about how the chemotherapy will make her feel. This morning Mrs. Johnson has returned from interventional radiology with a newly inserted PICC line, and is ready to begin her treatment.

Tasks

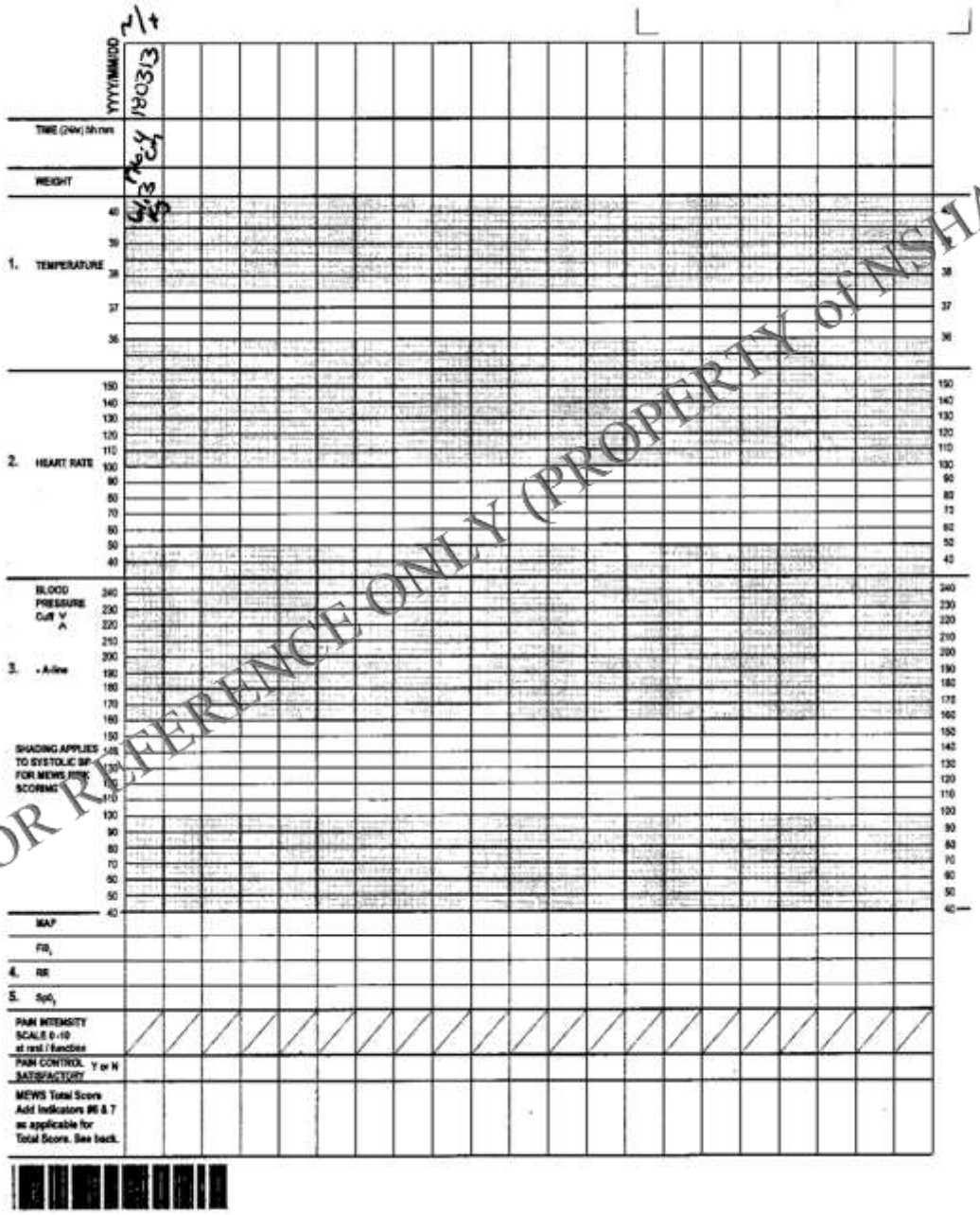
The chemotherapy orders are completed on the patient's chart. A co-worker has transcribed the orders for you.

1. Co-sign the transcribed medication administration records.
2. Proceeds with the orders accordingly and complete appropriate paperwork.
3. Set up and administer the chemotherapy (mock medication).

nova scotia health authority

000022 YYYY/MM/DD F 32Y
Johnson, Mary

Vital Signs with MEWS Score



Capital Health

0000222 YYYY/MM/DD F 32y
Mary Johnson

PHYSICIAN'S ORDERS

Allergy Alert **MUST COMPLETE**

☐ No known allergies ☐ Known allergies

List _____

Diagnosis:

DO NOT USE	USE	DO NOT USE	USE	DO NOT USE	USE
U, IU, u	unit	D/C	discharge or discontinue	> or <	greater than or less than
OD, QD or qd	daily	cc	mL	trailing zero (X.0 mg)	never use zeros after decimal
QOD or qod	every other day	µg	mcg	lack of leading zero (.X mg)	always use zeros before decimal
drug name abbreviations	write generic drug name	@	at	OS, OD, OU	left eye, right eye, both eyes

DATE	TIME	PHYSICIAN'S SIGNED ORDERS	INT.
180314	1200	Proceed with chemo orders today. X	

0000222 YYYY/MM/DD F 32Y
Mary Johnson

(5)

Capital Health

Consent for Investigation, Treatment or Operative Procedure

Patient: _____
Allergies: Banana
Date: 180814 Time: _____
(YYYY/MM/DD) (24h)

1. I, Mary Johnson consent to undergo the investigation, treatment or operative procedure ("treatment") KCHOP chemotherapy

ordered by or to be performed by Dr Green and those whom he/she may designate as associates or assistants.

2. The proposed treatment has been explained to me by Dr Green in terms that I can understand, including:

- What the treatment involves (what will be done & what will happen);
- What my options or choices are;
- How the treatment is intended to help my condition; and
- The common, foreseeable risks or potential serious consequences of this treatment, which may include:

Febrile neutropenia, ↓ blood counts (WBC, Plts, Hgb) need for transfusions of blood products, infections, nausea, diarrhea, major organ damage

3. It has been explained to me that during the course of the proposed treatment, unforeseen conditions may be revealed or encountered that require other treatment in addition to or different from the treatment discussed. I also consent to such additional or alternative investigation, treatment or operative procedure as _____ deems immediately necessary.

4. It has been explained to me that in the course of my treatment I may need a transfusion of blood components and/or blood products. Appropriate alternatives to the use of blood components and/or blood products have also been discussed. I have been informed of and understand the benefits and risks associated with transfusion. I understand that risks exist even though the blood components and blood products have been tested. I have been given information, including access to a pamphlet at www.cdha.nshealth.ca/patientinformation/nshealthnet/1202.pdf on blood components and blood products. **Unless the box below is checked**, I consent to transfusion of blood components and/or blood products if it becomes necessary at any time during the course of treatment, including post-surgical blood transfusions if required.

I wish to refuse or limit consent to blood transfusion ☐ **[If checked, complete Form CD0738MR]**

5. I agree that the Capital Health can retain (for the purpose of diagnosis) or dispose of any material that may be removed during the treatment.

6. All my questions regarding the proposed treatment and blood transfusion have been answered to my satisfaction.

7. I consent to have aspects of my treatment discussed with the following family members:

_____

8. I will notify my treating health care professional in the event of a change in the above authorization.

Mary Johnson Date: 180814 _____
Signature of patient **Witness**

OR

_____ **Date:** _____

Signature of Substitute Decision Maker (Print Name): _____

nova scotia health authority

0000222 YYYY/MM/DD F
Mary Johnson

PRE-PRINTED ORDER
Medicine, Hematology

(2)

CHOP / CVP with / without Rituximab (IV/Subcut) - Low Grade and High Grade Non-Hodgkin Lymphoma (NHL)

Patient: Mary Johnson Allergies: Banana

Items preceded by a **bullet** (•) are active orders. Items preceded by a **checkbox** (☐) are only to be carried out if checke

1. **Consent obtained and signed** ☒ Yes ☐ No

2. **Diagnosis**
   - ☐ Low grade lymphoma
   - ☒ Diffuse large b-cell lymphoma
   - ☐ Transformed lymphoma
   - ☐ Mantle cell lymphoma
   - ☐ Other _____

3. **Regimen** (1 cycle = 21 days)
   - ☐ CHOP
   - ☒ CHOP + Rituximab
   - ☐ CVP
   - ☐ CVP + Rituximab

   Cycle Dates

1. March 14	2. April 4	3. May 2	4. May 23
5. June 13	6. July 4	7.	8.

4. Height 176.4 cm **Actual** weight 69.3 kg **Actual BSA** 1.76 m² (Dubois)

5. **Laboratory Investigations**
   - Profile (auto diff) - Within 3 days prior to chemotherapy initiation
   - ANC and platelet count – If ANC is less than 1 x 10^9/L and/or platelet count is less than 100 x 10^9/L, notify attending physician or delegate **before** chemotherapy is administered.

   To be checked by physician before first course:
   - Total bilirubin - If greater than or equal to 25 micromol/L, dose adjustments may be required.
   - Creatinine - If calculated CrCl less than 10 mL/min, dose adjustments may be required.

6. **Tumor Lysis Prophylaxis** (Outpatient - provide prescription)
   - Allopurinol 300 mg po daily x 5 days. Start day prior to chemotherapy (Cycle #1 only)
   - ☐ Other (e.g. hydration) _____

7. **Rituximab**

   Rituximab ☒ Yes ☐ No
   - Administer prior to CHOP / CVP, if applicable.
   - Hold morning dose of anti-hypertensive(s) on day of rituximab administration, if applicable.

   Rituximab Pre-medications
   - Acetaminophen 650 mg po x 1 dose 30-45 min prior to rituximab AND
   - DiphenhydrAMINE 25-50 mg po/IV x 1 dose 30-45 min prior to rituximab

   ☐ Other _____

Prescriber's Signature A Green Date 130313 Time 1100
Prescriber's Name A Green (Print) Reg. No. 00001

nova scotia health authority

PRE-PRINTED ORDER
Medicine, Hematology

CHOP / CVP with / without Rituximab (IV/Subcut) - Low Grade and High Grade Non-Hodgkin Lymphoma (NHL)

Patient: _____ Allergies: _____

Items preceded by a **bullet** (•) are active orders. Items preceded by a **checkbox** (☐) are only to be carried out if checked.

7. **Rituximab continued...**
   - Initial rituximab dose to be give IV (all patients)

☐ **Low Grade NHL including Mantle Cell Lymphoma**

First Dose (Cycle 1, Day 1; All patients)

- **Rituximab** 375 mg/m² = _____ mg IV in 5% dextrose in water
  Administer standard (long) IV infusion. Concentration 3 mg/mL. (per NSHA IV Drug Therapy Manual)

Subsequent Doses

- If **no reaction** OR **mild / moderate reaction** to first standard (long) IV infusion, may administer rituximab subcut for subsequent doses.
- If **severe reaction** to first standard (long) IV infusion, subsequent doses to be infused as standard (long) IV infusion until patient has either no reaction or mild / moderate reaction. Then proceed to subsequent doses section (subcut rituximab).
- If criteria met for subcut administration, but **subcut route is not possible or refused**, may be given via rapid 90 min IV infusion provided first IV infusion was well tolerated or only mild-moderate reaction. Otherwise, return to standard (long) IV infusion. (per NSHA IV Drug Therapy Manual)

Subsequent Doses

☐ **Rituximab / hyaluronidase** 1400 mg subcut on Day 1.
Administer into the abdomen at a rate of 2 mL/min. (Follow NSHA Protocol MM-CP-005)

OR

☐ **Rituximab** 375 mg/m² = _____ mg IV in 5% dextrose in water on Day 1.
Administer: ☐ Standard (long) IV Infusion or ☐ Rapid 90 min IV infusion

☒ **Diffuse Large B-cell Lymphoma (DLBCL) and Transformed Lymphoma**

First Dose (Cycle 1, Day 1)

- **Rituximab** 375 mg/m² = 660 mg IV in 5% dextrose in water
  Administer standard (long) IV infusion. Concentration 3 mg/mL. (per NSHA IV Drug Therapy Manual)

Subsequent Doses

- If **no reaction** OR **mild / moderate reaction** to standard (long) IV infusion, subsequent doses may be given as rapid 90 min IV infusion. (per NSHA IV Drug Therapy Manual)
- If **severe reaction** to initial standard (long) IV infusion, subsequent doses will be infused as standard (long) IV infusion. (per NSHA IV Drug Therapy Manual)
- **Subcut rituximab is not permissible for DLBCL or Transformed Lymphoma.**

Subsequent Doses

- **Rituximab** 375 mg/m² = 660 mg IV in 5% dextrose in water on Day 1.
  Administer: ☐ Standard (long) IV Infusion or ☐ Rapid 90 min IV infusion

To be determined post 1st cycle

Prescriber's Signature A Green Date 15 03 13 Time 1100

Prescriber's Name A Green (Print) Reg. No. 00001

nova scotia health authority

0000222 YYYY/MM/DD F 32Y
Mary Johnson

PRE-PRINTED ORDER
Medicine, Hematology

CHOP / CVP with / without Rituximab (IV/Subcut) - Low Grade and High Grade Non-Hodgkin Lymphoma (NHL)

Patient: _____ Allergies: _____

Items preceded by a **bullet** (•) are active orders. Items preceded by a **checkbox** (☐) are only to be carried out if checked

7. **Rituximab continued...**

Rituximab Hypersensitivity Reaction
Any signs of reaction during rituximab administration, **stop rituximab** AND give:

- DiphenhydrAMINE 25-50 mg IV/IV direct q2-3h prn
- Meperidine 12.5-25 mg IV/IV direct q2-3h prn (if rigors)
- IV infusion: Wait 15 min or until symptoms subside. Restart at half previous rate and follow appropriate infusion protocol in NSHA IV Drug Therapy Manual.
- Subcut injection: Resume injection when symptoms subside. May use same injection site or another abdominal site.

8. **Chemotherapy Antiemetics** (Outpatient - provide prescriptions)
   - Ondansetron 8 mg po/IV x 1 dose 30-45 min prior to chemotherapy, then q12h x 2 doses (M: 12 doses, repeat x 1)
   - Metoclopramide 10-20 mg po/IV q3h prn (M: 25 doses, repeat x 2)

9. **Chemotherapy** (Check appropriate regimen; Outpatient – provide prednisone prescription)

☑ **CHOP**
- PrednISONE 100 mg po daily on Days 1–5. (M: 20 doses, repeat x 1)
- **DOXOrubicin** 50 mg/m² = 88 mg IV direct Day 1
- **VinCRIStine** 2 mg IV Infusion in 50 mL 0.9% sodium chloride over 15 min **gravity infusion** on Day 1
- **CycloPHOSPHAMIDE** 750 mg/m² = 1320 mg IV in 100 mL 0.9% sodium chloride over 1 h on Day 1

☐ **CVP**
- PrednISONE 100 mg po daily on Day 1 – 5. (M: 20 doses, repeat x 1)
- **VinCRIStine** 2 mg IV Infusion in 50 mL 0.9% sodium chloride over 15 min **gravity infusion** on Day 1
- **CycloPHOSPHAMIDE** 750 mg/m² = _____ mg IV in 100 mL 0.9% sodium chloride over 1 h on Day 1

Prescriber's Signature A Green Date 180313 Time 1100
Prescriber's Name A Green Reg. No. 00001

Lab Results Case-scenario #1
Part 1

Use the bloodwork listed below to make a judgement if this patient is appropriate to continue with the chemotherapy orders. Use the equations provided to calculate the creatinine clearance (CrCl), ideal body weight (IBW), and body surface area (BSA).

Date: March 14

	Reference range	Result
WBC	4.5-11.00	15.8
HGB	120-160	102
PLT	150-350 $x10^9$/L	188
ANC		10510
Creatinine	46-90	80
Urea	2.9-9.2	7
Potassium	3.4-5.0	3.0
Sodium	136-145	140
Magnesium	0.66-1.07	1.0
Phosphorus	0.74-1.52	1.2
Total bilirubin	0.0-8.54	25
Direct bilirubin	0.00-20.4	24
ALT	38-150	148
AST	0-44	30
LDH	120-230	900

CrCl = $\frac{[140\text{-age}] \times IBW \times 1.2}{\text{Serum Cr}}$ x 0.85 (female)

IBW= [ht(cm)-150] x 0.9 + 45kg (female)

BSA (Dubois) m^2 = 0.007184 x $ht(cm)^{0.725}$ x $wt(kg)^{0.425}$

BSA (Mosteller) m^2 = $\sqrt{[ht(cm)\ x\ wt\ (kg)/\ 3600]}$

Lab Results Case-scenario #1
Part 2

Given the bloodwork listed below, make a judgement if this patient is appropriate to continue with the chemotherapy orders.

Date: March 14

	Reference range	Result
WBC	4.5-11.00	15.8
HGB	120-160	102
PLT	150-350 $x10^9$/L	188
ANC		10510
Creatinine	46-90	55
Urea	2.9-9.2	3.4
Potassium	3.4-5.0	3.6
Sodium	136-145	140
Magnesium	0.66-1.07	1.0
Phosphorus	0.74-1.52	1.4
Total bilirubin	0.0-8.54	8
Direct bilirubin	0.00-20.4	14
ALT	38-150	100
AST	0-44	30
LDH	120-230	900

nova scotia health authority

Medication Administration Record

Nursing Division / 7 Day - **SCHEDULED**

RCHOP #1
Ht 176.4 cm
wt 61.3 kg
BSA 1.76 m² (DuBois)

0000222 YYYY/MM/DD F 32Y
Mary Johnson

Recopied
Initial _____ Date (YYYY/MM/DD) _____
Initial _____ Date (YYYY/MM/DD) _____

Allergies _____

YYYY 18 MM 3 DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)	13	14 +1	15 +2	16 +3	17 +4	18 +5	19 +6
Allopurinol 300mg PO daily x5 days: start day prior to chemo Order date: 180314 Stop date: Transcribed: ✓ Checked:	1700	1	2	3	4	5	LD	
PreMeds for Ritux Tylenol 650 mg PO x1 Benadryl 25-50mg PO/IV x1 30min prior to Ritux Order date: 180314 Stop date: Transcribed: ✓ Checked:	1100	→		←				
Hold morning dose of anti-hypertensives on day of Ritux (if applicable) Order date: 180314 Stop date: Transcribed: ✓ Checked:		→		←				
STANDARD LONG INFUSION Rituximab loading IV in D5W (to be mixed to conc. 3mg/ml) on Cycle: Day 1 Order date: 180314 Stop date: Transcribed: ✓ Checked:	1200	→		←				

Room # _____

Keys for Injection Site

D Deltoid	V Vastus lateralis
VG Ventrogluteal	R Right
A Abdomen	L Left

Abbreviations to Use

R Refused	S Self administered
P Pass	H Held
NPO	* See Nursing Notes

YYYY 18 MM 3 DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)	13	14	15	16	17	18	19
			+1	+2	+3	+4	+5	+6
KXN meds for Ritux ① Give Benadryl 25-50mg IV/IV push Q2-3h PRN ② Give Meperidine 12.5-25mg IV/IV push Q2-3h PRN (if rigors) Order date: 18C314 Stop date: Transcribed: ✓ Checked:								
③ wait 15min or until symptoms subside, restart at ½ previous rate. Follow appropriate infusion protocol in NSHA IV drug manual Order date: 18C314 Stop date: Transcribed: ✓ Checked:								
Zofran 8mg PO/IV 30-45min prior to chemo Order date: 18C314 Stop date: Transcribed: ✓ Checked:	1700							
Then Zofran Q12h x 2 doses Order date: 18C314 Stop date: Transcribed: ✓ Checked:	0500 1700	→	→					
Prednisone 100mg PO daily on Days 1-5 Order date: 18C314 Stop date: Transcribed: ✓ Checked:	0800	→	1	2	3	4	5	
Doxorubicin 80mg IV push Day 1 Order date: 18C314 Stop date: Transcribed: ✓ Checked:	1800	→		←				

③

0000222 YYYY/MM/DD F 32Y
Mary Johnson

YYYY 18 MM 3 DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)	13	14 +1	15 +2	16 +3	17 +4	18 +5	19 +6
Vincristine 2mg IV infusion in 50ml N/S over 15min Gravity infusion	1830	→						
Order date: 180314 Stop date:								
Transcribed: ✓ Checked:								
Cyclophosphamide 1267.2mg IV in 1000ml N/S over 1h on day 1	1900	→						
Order date: 180314 Stop date:								
Transcribed: ✓ Checked:								
Order date: Stop date:								
Transcribed: Checked:								
Order date: Stop date:								
Transcribed: Checked:								

YYYY____MM____DD

MEDICATION (Dose/Route/Frequency)	TIME (24h/hh:mm)						
Order date: Stop date:							
Transcribed: Checked:							
Order date: Stop date:							
Transcribed: Checked:							
Order date: Stop date:							
Transcribed: Checked:							
Order date: Stop date:							
Transcribed: Checked:							

Signature & Status	Initials	Date (YYYY/MM/DD)	Signature & Status	Initials	Date (YYYY/MM/DD)

4.3 CASE-SCENARIO #2

Brief Description of Client

Name: Sam Smith

Gender: Male **Age**: 38 **Todays Weight**: 68 kg **Height**: 185.7 cm

Major Support: Parents

Allergies: None

Physician: Dr. Xo

Past Medical History: Tonsillectomy at age 10

History of Present Illness: Presented to family with decrease appetite, increase weight loss, and abdomen pain.

Social History: Works as veterinary assistant. Single. Son age 14.

Drug Coverage: No

Cancer Diagnosis: ***Metastatic GI Cancer***

Surgeries/Procedures & Dates: Port-a-Cath inserted January 18, 2018

Report

Mr. Smith has arrived at the outpatient clinic today to undergo his third cycle of chemotherapy treatment. On assessment, he tells you about his ongoing intermittent troubles with indigestion and diarrhea since his first treatment. Upon verifying is chemotherapy orders, you notice Mr. Smith's weight has decreased significantly since his last cycle. Mr. Smith is requesting you insert a peripheral IV to begin treatment as the Port-a-Cath is uncomfortable being accessed and taped down. After discussion with the patient a number 24G peripheral IV has been inserted into his left forearm for part of his treatment, understanding the Port-a-Cath will be accessed for the infuser bottle.

Tasks

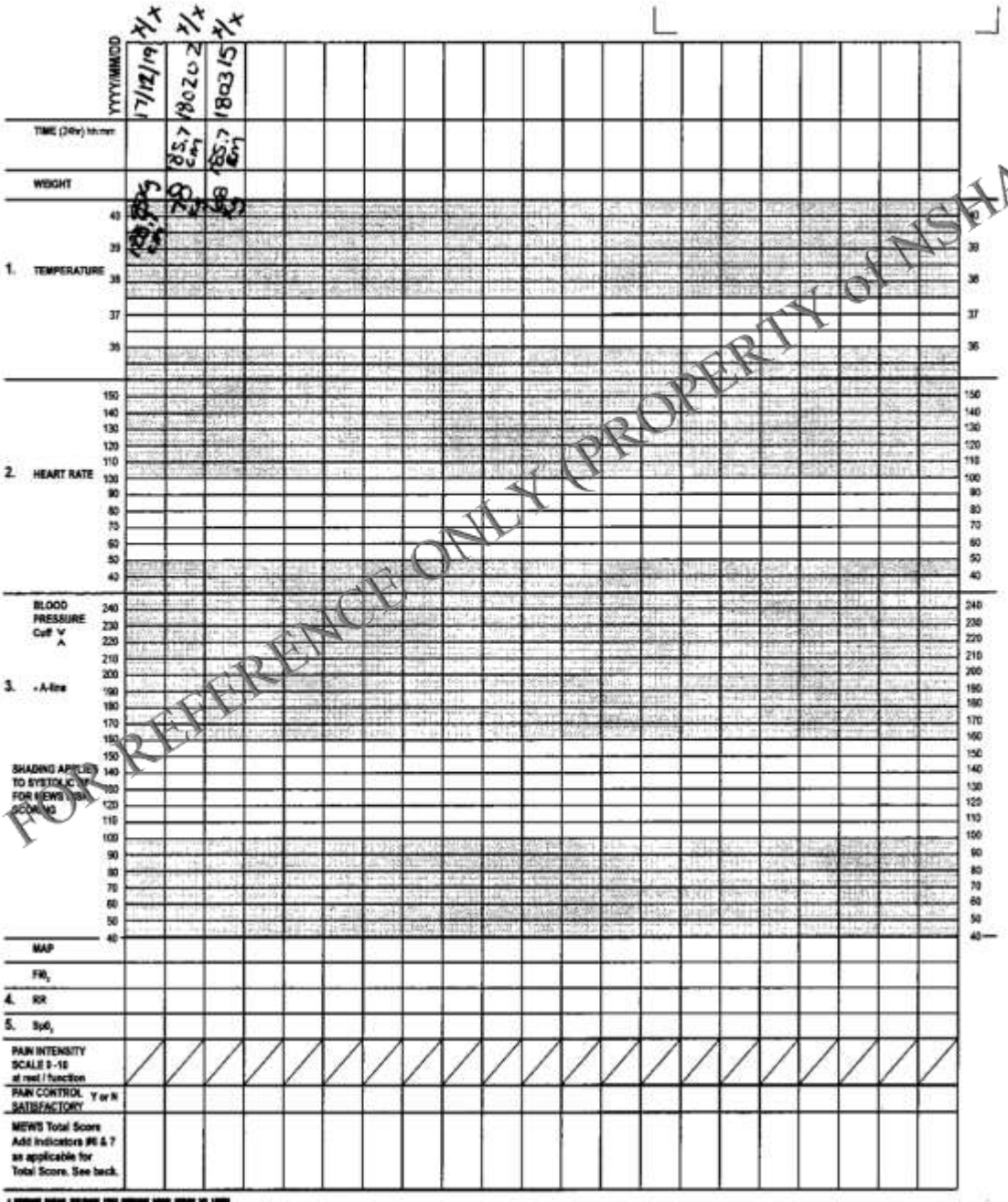
1. Calculate the patient's BSA. Discuss appropriate actions.
2. Transcribed the physician's orders.

3. Proceed with the physician’s orders and complete appropriate paperwork.
4. Set up and administer the chemotherapy (mock medication).

nova scotia health authority

00011111
Smith, Sam
YYYY/MM/DD M 38

Vital Signs with MEWS Score



00011111 YYYY/MM/DD M 38Y
Smith, Sam

Capital Health

PHYSICIAN'S ORDERS

Allergy Alert **MUST COMPLETE**

☐ No known allergies ☐ Known allergies

List _____

Diagnosis:

DO NOT USE	USE	DO NOT USE	USE	DO NOT USE	USE
U, IU, u	unit	D/C	discharge or discontinue	> or <	greater than or less than
OD, QD or qd	daily	cc	mL	trailing zero (X.0 mg)	never use zero after decimal
QOD or qod	every other day	µg	mcg	lack of leading zero (.X mg)	always use zeros before decimal
drug name abbreviations	write generic drug name	@	at	OS, OD, OU	left eye, right eye, both eyes

DATE	TIME	PHYSICIAN'S SIGNED ORDERS	INT.
180315	0900	Proceed with cl[illegible] today, see orders	
		Dr 00000	

Physician's Orders

Lab Results Case-scenario #2

Use the bloodwork listed below to make a judgement if this patient is appropriate to continue with the chemotherapy orders. Use the equations provided to calculate the creatinine clearance (CrCl), ideal body weight (IBW), and body surface area (BSA).

Date: March 14

	Reference range	Result
WBC	4.5-11.00	3.0
HGB	120-160	100
PLT	150-350 $x10^9$/L	180
ANC		2580
Creatinine	46-90	89
Urea	2.9-9.2	6.2
Potassium	3.4-5.0	3.5
Sodium	136-145	140
Magnesium	0.66-1.07	0.60
Phosphorus	0.74-1.52	0.78
Alk Phosp.	50-100	95
ALT	38-150	148
AST	0-44	42
T. Bili	0-8.54	9

BSA (Dubois) m^2 = 0.007184 x ht(cm)$^{0.725}$ x wt(kg)$^{0.425}$

BSA (Mosteller) m^2 = $\sqrt{[ht(cm)\ x\ wt\ (kg)/\ 3600]}$

nova scotia health authority

0000111 YYYY/MM/DD M 38Y
Smith, Sam

PRE-PRINTED ORDER
Medicine, Medical Oncology

IRINotecan / Fluorouracil / Leucovorin (FOLFIRI)
Metastatic GI Regimen

Patient: _____ Allergies: _____

Items preceded by a **bullet** (•) are active orders. Items preceded by a **checkbox** (☐) are only to be carried out if checked

1. **Consent** obtained and signed

2. Weight 85 kg Height 186.7 cm BSA 2.1 m^2

3. **Action order if**
   - Day 1- ANC greater than or equal to 1.5 x 10^9/L and platelets greater than or equal to 100 x 10^9/L (Week 0, 2 & 4)
   - Toxicity assessment completed prior to Day 1 (Week 0, 2 & 4)
   - Day 1- No diarrhea or abdominal cramping (Week 0, 2 & 4)
   - Electrolytes, serum creatinine, alk phos, ALT, AST and total bilirubin assessed prior to Day 1 (Week 0)

4. **Initiate Orders on** Cycle # 3
   Week 0 (Date) March 15
   Week 2 (Date) March 29
   Week 4 (Date) April 12

   Dose Level -1

5. Rationale for Modification of Protocol Diarrhea cycle 1+2

Level	+1	0	-1	-2
IRINotecan (mg/m²)	180	180	150	120
Fluorouracil bolus (mg/m²)	400	400	320	240
Fluorouracil infusion (mg/m²)	3000	2400	2000	1600

6. **Prophylaxis**
   - ☑ Atropine 0.25 mg subcut pre chemo
   - Ice chips 5 min pre-fluorouracil bolus and 30 min post
   - ☐ Other _____
   - Acute Cholinergic Syndrome **during treatment – stop** infusion. Administer atropine 0.25 mg subcut. Page physician for further recommendations.

7. **Antiemetics**
   - Ondansetron 8 mg po/IV pre-chemo then q12h po x 3 doses
   - Dexamethasone 8 mg po/IV pre-chemo then q24h po x 2 doses
   - ☐ Prochlorperazine 10 mg po q4-6h prn
   - ☑ Metoclopramide 10mg po q4-6h prn

Prescriber's Signature _____ Date 180315 Time 0850
Prescriber's Name _____ Reg. No. _____
Print

Chemotherapy Orders(3)

nova scotia health authority

00011111 YYYY/MM/DD M 38Y
Smith, Sam

PRE-PRINTED ORDER
Medicine, Medical Oncology

IRINotecan / Fluorouracil / Leucovorin (FOLFIRI)
Metastatic GI Regimen

Patient: _____ Allergies: _____

Items preceded by a **bullet** (•) are active orders. Items preceded by a **checkbox** (☐) are only to be carried out if checked

8. **Chemotherapy**

☐ **IRINotecan** 180 mg/m² = _____ mg IV in 500 mL 5% dextrose in water over 90 min Day 1 (Week 0, 2 & 4)

OR (Dose Modified)

☑ **IRINotecan** 150 mg/m²= 315 mg IV in 500 mL 5% dextrose in water over 90 min Day 1 (Week 0,2 & 4)

☑ **Leucovorin** 400 mg/m² = 840 mg IV in 250 mL 5% dextrose in water over 120 min Day 1 (Week 0, 2 & 4)

OR (Dose Modified)

☐ **Leucovorin** _____ mg/m²= _____ mg IV in 250 mL 5% dextrose in water over 120 min Day 1 (Week 0, 2 & 4)

☐ **Fluorouracil** 400 mg/m²= _____ mg IV direct Day 1 (Week 0, 2 & 4)

OR (Dose Modified)

☑ **Fluorouracil** 320 mg/m²= 672 mg IV direct Day 1 (Week 0, 2 & 4)

☐ ****Fluorouracil** 2400 mg/m²= _____ mg continuous IV infusion over 46 hours Day 1 (Week 0, 2 & 4)

OR (Dose Modified)

☑ ****Fluorouracil** 2400 mg/m²= 4200 mg continuous IV infusion over 46 hours Day 1 (Week 0, 2 & 4)

**** For 3000 mg to 5500 mg dose, the appropriate Dose Band INFUSOR will be selected according to the dose range below (doses outside dose banding range are prepared as ordered)**

Dose Banding Range (mg)	Dose Band INFUSOR (mg)	Pharmacist Initial and Date
3000 to 3400	3200	
3401 to 3800	3600	
3801 to 4200	4000	CDan 180315
4201 to 4600	4400	
4601 to 5000	4800	
5001 to 5500	5250	

9. **Post Chemotherapy Care**
   - **Delayed Diarrhea**- Loperamide – 4 mg at first sign of **ANY** change in bowel movement. Continue 2 mg po q2h until 12 h **AFTER** bowel movements have returned to normal pattern. (May take 4mg po q4h at night instead of 2 mg po q2h for convenience.)
10. Treatment of Hypersensitivity Reaction
    - Follow algorithm
    - DiphenhydrAMINE 50 mg IV direct x 1 dose prn
    - Hydrocortisone 100 mg IV direct x 1 dose prn

(1 cycle = 6 weeks)

Prescriber's Signature _____ Date 180315 Time 0850

Prescriber's Name _____ Reg. No. _____
Print

nova scotia health authority

6001111
Smith, Sam
YYYY/MM/DD 39Y

Cancer Care Program
Medical Oncology

Consent for Investigation, Treatment or Operative Procedure
Folfiri (Colon)

1. I, _____ consent to undergo the investigation, treatment or operative procedure ("treatment"): **Chemotherapy – 5FU, Folinic Acid, Irinotecan** ordered by, or to be performed by E. Xa and those whom he/she may designate as associates or assistants.

2. The proposed treatment has been explained to me by E. Xa in terms that I can understand, including:
   - what the treatment involves (what will be done and what will happen)
   - what my options or choices are
   - how the treatment is intended to help my condition
   - the potential need, risks, and benefits of transfusion of blood or blood components
   - the common, foreseeable risks or potentially serious consequences of treatment; which may include:
     - Fatigue
     - Nausea
     - Vomiting
     - Low blood counts
     - Risk of fever and infection
     - Diarrhea and sweating during treatment and later
     - Risk of bleeding
     - Mouth irritation or sores
     - Change in taste
     - Hair loss
     - Vein pain or irritation
     - Allergic Reaction
     - Rash
     - Redness and tenderness of hands and feet with possible blistering
     - Eye irritation and/or excess tearing
     - Rarely: Heart rhythm problems or chest pain, Balance problems or confusion

3. It has been explained to me that during the course of the proposed treatment, unforeseen conditions may be revealed or encountered that require other treatment in addition to or different from the treatment discussed. I also consent to such additional or alternative investigation, treatment or as operative procedure _____ as deems immediately necessary.

4. It has been explained to me that in the course of my treatment I may need a transfusion of blood components and/or blood products. Appropriate alternative to the use of blood components and/or blood products have also been discussed. I have been informed of and understand the benefits and risks associated with transfusion. I understand that risks exist even though blood components and blood products have been tested. I have been given information, including access to a pamphlet at www.cdha.nshealth.ca/patientinformation/nshealthnet/1202.pdf on blood components and blood products. **Unless the box below is checked,** I consent to transfusion of blood components and/or blood products if it becomes necessary at any time during the course of treatment, including post-surgical blood transfusions if required.

I wish to refuse or limit consent to blood transfusion ☐ [If checked, complete Form CD0738MR]

Date: 18-03-14 (yyyy/mm/dd)

Signed: Sam Smith _____ Witness

5 I agree that Nova Scotia Health Authority can retain (for the purpose of diagnosis) or dispose of any material that may be removed during treatment.

6. All my questions regarding the proposed treatment and blood transfusion have been answered to my satisfaction.

7. I consent to have aspects of my treatment discussed with the following family members:

_____

8. I will notify my treating health care professional in the event of a change in the above authorization.

Sam Smith Date: 18·03·14 _____

Signature of Patient Witness

OR

_____ Date: _____

Signature of Substitute Decision Maker (Print Name): _____

00011111 YYYY/MM/DD M 38Y
Smith, Sam

Capital Health

PHYSICIAN'S ORDERS

Allergy Alert **MUST COMPLETE**

☐ No known allergies ☐ Known allergies

List _____

_____

_____

②

Diagnosis:

DO NOT USE	USE	DO NOT USE	USE	DO NOT USE	USE
U, IU, u	unit	D/C	discharge or discontinue	> or <	greater than or less than
OD, QD or qd	daily	cc	mL	trailing zero (X.0 mg)	never use zeros after decimal
QOD or qod	every other day	µg	mcg	lack of leading zero (.X mg)	always use zeros before decimal
drug name abbreviations	write generic drug name	@	at	OS, OD, OU	left eye, right eye, both eyes

DATE	TIME	PHYSICIAN'S SIGNED ORDERS	INT.
180315	0900	Proceed with chemo today, see orders. Dr [illegible]	
180315	1030	See Clarified chemo orders with corrected Ht + Wt Dr [illegible]	

00011111 YYYY/MM/DD M 30Y
Smith, Sam

nova scotia health authority

PRE-PRINTED ORDER
Medicine, Medical Oncology

IRINotecan / Fluorouracil / Leucovorin (FOLFIRI)
Metastatic GI Regimen

Patient: _____ Allergies: _____

Items preceded by a **bullet** (•) are active orders. Items preceded by a **checkbox** (☐) are only to be carried out if checked

1. **Consent** obtained and signed

2. Weight 68 kg Height 185.7 cm BSA 1.91 m^2 *Corrected BSA + doses 190315

3. **Action order if**
   - Day 1- ANC greater than or equal to 1.5 x 10^9/L and platelets greater than or equal to 100 x 10^9/L (Week 0, 2 & 4)
   - Toxicity assessment completed prior to Day 1 (Week 0, 2 & 4)
   - Day 1- No diarrhea or abdominal cramping (Week 0, 2 & 4)
   - Electrolytes, serum creatinine, alk phos, ALT, AST and total bilirubin assessed prior to Day 1 (Week 0)

4. **Initiate Orders on** Cycle # 3
   Week 0 (Date) March 15
   Week 2 (Date) March 29
   Week 4 (Date) April 12
   Dose Level -2

5. Rationale for Modification of Protocol diarrhea cycle 1+2

Level	+1	0	-1	-2
IRINotecan (mg/m^2)	180	180	150	120
Fluorouracil bolus (mg/m^2)	400	400	320	240
Fluorouracil infusion (mg/m^2)	3000	2400	2000	1600

6. **Prophylaxis**
   - ☑ Atropine 0.25 mg subcut pre chemo
   - Ice chips 5 min pre-fluorouracil bolus and 30 min post
   - ☐ Other _____
   - Acute Cholinergic Syndrome **during treatment – stop infusion.** Administer atropine 0.25 mg subcut. Page physician for further recommendations.

7. **Antiemetics**
   - Ondansetron 8 mg po/IV pre-chemo then q12h po x 3 doses
   - Dexamethasone 8 mg po/IV pre-chemo then q24h po x 2 doses
   - ☐ Prochlorperazine 10 mg po q4-6h prn
   - ☑ Metoclopramide 10mg po q4-6h prn

Prescriber's Signature _____ Date 190315 Time 0855
Prescriber's Name _____ Reg. No. _____
PRN

nova scotia health authority

0001111 Smith, Sam YYYY/MM/DD M 58y

PRE-PRINTED ORDER
Medicine, Medical Oncology

IRINotecan / Fluorouracil / Leucovorin (FOLFIRI)
Metastatic GI Regimen

Patient: _____ Allergies: _____

Items preceded by a **bullet** (•) are active orders. Items preceded by a **checkbox** (☐) are only to be carried out if checked

8. **Chemotherapy**

☐ **IRINotecan** 180 mg/m² = _____ mg IV in 500 mL 5% dextrose in water over 90 min Day 1 (Week 0, 2 & 4)
OR (Dose Modified)
☑ **IRINotecan** 120 mg/m²= 229.3 mg IV in 500 mL 5% dextrose in water over 90 min Day 1 (Week 0,2 & 4)

☑ **Leucovorin** 400 mg/m² = 764 mg IV in 250 mL 5% dextrose in water over 120 min Day 1 (Week 0, 2 & 4)
OR (Dose Modified)
☐ **Leucovorin** _____ mg/m²= _____ mg IV in 250 mL 5% dextrose in water over 120 min Day 1 (Week 0, 2 & 4)

☐ **Fluorouracil** 400 mg/m²= _____ mg IV direct Day 1 (Week 0, 2 & 4)
OR (Dose Modified)
☑ **Fluorouracil** 240 mg/m²= 458.4 mg IV direct Day 1 (Week 0, 2 & 4)

☐ ****Fluorouracil** 2400 mg/m² = _____ mg continuous IV infusion over 46 hours Day 1 (Week 0, 2 & 4)
OR (Dose Modified)
☑ ****Fluorouracil** 1600 mg/m²= 3056 mg continuous IV infusion over 46 hours Day 1 (Week 0, 2 & 4)

**** For 3000 mg to 5500 mg dose, the appropriate Dose Band INFUSOR will be selected according to the dose range below (doses outside dose banding range are prepared as ordered)**

Dose Banding Range (mg)	Dose Band INFUSOR (mg)	Pharmacist Initial and Date
3000 to 3400	3200	Lee 180515
3401 to 3800	3600	
3801 to 4200	4000	
4201 to 4600	4400	
4601 to 5000	4800	
5001 to 5500	5250	

9. **Post Chemotherapy Care**
   - **Delayed Diarrhea**- Loperamide – 4 mg at first sign of **ANY** change in bowel movement. Continue 2 mg po q2h until 12 h **AFTER** bowel movements have returned to normal pattern. (May take 4mg po q4h at night instead of 2 mg po q2h for convenience.)
10. Treatment of Hypersensitivity Reaction
    - Follow algorithm
    - DiphenhydrAMINE 50 mg IV direct x 1 dose prn
    - Hydrocortisone 100 mg IV direct x 1 dose prn

(1 cycle = 6 weeks)

Prescriber's Signature _____ Date 180515 Time 0855

Prescriber's Name _____ Reg. No. _____
PRN

Participant Post-Questionnaire

Please circle whether you agree or disagree with the following statements about your experience following participation in the scenario-based simulation module.

1. I feel confident to independently administer chemotherapy using the technique of IV push.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

2. I feel confident to independently administer chemotherapy using the technique of gravity.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

3. I feel confident to independently administer chemotherapy using an infusion pump.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

4. I feel confident to safely manage a chemotherapy spill.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

5. I feel confident to correctly manage an extravasation that occurred as a result of administering chemotherapy.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

6. I feel confident to independently verify chemotherapy pre-printed orders.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

7. This simulation learning experience helped me to think critically when working with cancer patients.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

END